Analysis of the State of Implementation of Georgia's first National Biodiversity Strategy and Action Plan

Compilation of the situation analyses prepared for the purpose of elaborating the second National Biodiversity Strategy and Action Plan

Draft of 16 August 2013

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List of Abbreviations

ACIAR	Australian Centre for International Agricultural Research
APA	Agency of Protected Areas of Georgia
ASCI	Area of Special Conservation Interest
AUG	Agricultural University of Georgia

AWCC	Australian Winter Crop Gene bank
BC	Before Christ
BMU	German Federal Ministry for Environment, Nature Conservation and Nuclear Safety
BMZ	German Federal Ministry for Economic Cooperation and Development
BP	British Petroleum
BP/BTC	British Petroleum/Baku-Tbilisi-Ceyhan Pipeline
CACAARI	Central Asia and Caucasus Association of Agricultural Research Institutes
CBD	Convention on Biological Biodiversity
CCD	Community Collapse Disorder
CENN	Caucasus Environmental NGO Network
CEPF	Critical Ecosystem Partnership Fund
CGIAR	Consultative Group for International Agricultural Research
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLIMA	Centre for Legumes in Mediterranean Agriculture
CNF	Caucasus Nature Fund
CRDF	CRDF Global - an independent non-profit organization that promotes international scientific and technical collaboration through grants, technical resources, training and services.
CWR	Crop Wild Relatives
EC	European Commission
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FFI	Fauna & Flora International
GAAS	Georgian Academy of Agricultural Sciences
GCDT	Global Crop Diversity Trust
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft fuer Internationale Zusammenarbeit
GMO/LMO	Genetically Modified Organism/Living Modified Organism
GPAP	Georgian Protected Area Programme
GPS	Global Positioning System
GRDF	Georgian Research and Development Foundation
IBA	Important Bird Area
ICARDA	International Centre of Agricultural Research for Dry land Areas
IPA	Important Plant Area
IPK	Leibniz Institute of Plant Genetics and Crop Plant Research
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for the Conservation of Nature
IUCN CCC	IUCN Caucasus Cooperation Centre
KBA	Key Biodiversity Area
KfW	Kreditanstalt für Wiederaufbau
LEPL	Legal entity of public law
MoA	Ministry of Agriculture of Georgia
MoEP	Ministry of Environment of Georgia
NBSAP	National Biodiversity Strategy and Action Plan. The suffixes “1” and “2” denote Georgia’s first NBSAP, which was adopted in 2005, and Georgia’s second NBSAP, which was due to be adopted in the first quarter of 2013 at the time of printing this report.
NELE	Non-commercial legal entity
OSCE	Organization for Security and Cooperation in Europe
PA	Protected Area

PAL.CLASS	Habitat classification based on "*A classification of Palaearctic habitats*" 1995 version
PCT	Patent Cooperation Treaty
PGR	Plant Genetic Resources
PGRFA	Plant Genetic Resources for Food and Agriculture
POPs	United Nations Stockholm Convention on Persistent Organic Pollutants
RAPPAM	Rapid Assessment and Prioritisation of Protected Areas Management
REC Caucasus	Regional Environmental Centre for the Caucasus
TJS	Transboundary Joint Secretariat
UNDP	United Nations Development Programme
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UPOV	International Union for the Protection of New Varieties of Plants
USDA	United States Department of Agriculture
USDoI/ITAP	International Technical Assistance Programme of the US Department of the Interior
WB	World Bank
WRB	World Reference Base for Soil Resources
WWF	Worldwide Fund for Nature

Units of measurement

asl	above sea level
km	kilometres
m	metres
ppm	parts per million
psu	Practical salinity unit
^{o}C	degrees centigrade

INTRODUCTION

Background to the report

This report is a compilation of eleven situation analyses which were prepared to provide the basis for elaborating Georgia's second National Biodiversity Strategy and Action Plan (NBSAP-2).

Georgia's first National Biodiversity Strategy and Action Plan (NBSAP-1) was approved by decree No 27 of the Government of Georgia dated February 19, 2005. NBSAP-1 set out a vision for the future status of biodiversity and its management in Georgia, ten strategic goals, 51 specific objectives arranged under the strategic goals, and a large number of planned activities to achieve the specific objectives.

The tenth meeting of the Conference of the Parties (COP10) to the Convention on Biological Diversity (CBD), 18 - 29 October 2010 - Nagoya, Aichi Prefecture, Japan, adopted the "*Strategic Plan for Biodiversity 2011-2020*" and the "*Aichi Biodiversity Targets*" (Decision X/2). In the same decision COP10 urged parties to implement the Strategic Plan for Biodiversity 2011-2020 and to review, and as appropriate update and revise, their national biodiversity strategies and action plans.

Georgia's Ministry of Environment (MoEP)[1] initiated the process of preparing NBSAP2 in May 2011 and in June 2011 established a coordination committee under the leadership of the Biodiversity Protection Service to steer the process. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Gmb is providing technical assistance with funding provided by the German Ministry of Economic Cooperation and Development (BMZ).

In July 2011 the MoEP conducted a workshop for stakeholders involved in biodiversity and biodiversity protection. The workshop agreed that NBSAP2 should focus on the eleven thematic fields which are addressed in this report.

The situation analyses

The MoEP contracted eleven Georgian organisations to lead the preparation of situation analyses that would 'take stock' of what is known about the status and trends of biodiversity, the drivers of biodiversity loss, relevant strategies, laws, policies, programmes and projects, as well as lessons learned, gaps and unmet needs.

Preparation of the situation analyses was performed through review of existing information and interviews with stakeholders. The first step involved review and analysis of relevant existing information, documents and analytical reports; analysis of NBSAP1 and evaluation of its achievements and unmet needs. On the next step the lead organisations identified stakeholders (including ministries, universities and NGOs) and arranged consultations with them in the form of interviews, meetingsand workshops.

The lead organisations presented their reports to a multi-stakholder workshop on 25-26 June 2012. The reports are published individually in the Biotopic series published by the Sustainable Management of Biodiversity South Caucasus programme, which is being implemented by GIZ.

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The contents of this report

The eleven situation analyses are presented in this report as eleven thematic chapters. The contents of the thematic chapters are edited versions of the situation analyses prepared by the lead organisations. Material which is relevant to all of the situation analyses and which was duplicated in some of them has been removed to the Overview chapter; none of the substance has been changed.

[1] The name and functions of the Ministry of Environment Protection of Georgia has had several changes of since NBSAP-1 was prepared. The name at the time of finalising this compilation is Ministry of Environment and Natural Resources Protection. Where the name is abbreviated in this report the abbreviation "MoEP" is used for convenience.

Some of the annexes to the situation analyses and the reports of interviews, meetings and workshops with stakeholders that were submitted with the situation analyses have not been included in this report; they are included in the reports published in the Biotopic series.

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OVERVIEW OF GEORGIA'S COMMITMENT TO BIODIVERSITY CONSERVATION

Georgia lies in the the Caucasus, which is one of the most biologically rich regions on Earth. It is one of WWF's 35 "priority places" and one of 34 "biodiversity hotspots" identified by Conservation International as being the richest and at the same time most threatened reservoirs of plant and animal life on Earth. The Red List of Georgia lists 134 animal species and 56 plant species; 42 of the animal species and 18 of the plant species are categorised as endangered or critically endangered; many of the animal species in the list are globally threatened. Georgia's biodiversity includes the ecosystems which, in addition to harbouring animal and plant biodiversity which is used for food and other purposes, provide life-sustaining services: forests protect the quality of water supplies, help prevent erosion and landslides, mitigate the impact of landslides, and help to regulate the global carbon cycle; the Black Sea sustains fish stocks and stores carbon dioxide and methane; Georgia's mountains hold glaciers which regulate the flow of water into the country's river system. Since idependence successive governments have signalled their commitment to conserving the country's rich biodiversity by joining all of the relevant multilateral environmental agreements, adopting national policies and targets, and introducing new mechanisms to help achieve the targets.

Georgia in multilateral agreements related to biodiversity conservation

Convention on Biological Diversity

Georgia joined the Convention on Biological Diversity (CBD) in 1994. The Convention has three objectives: the conservation of biological diversity; the sustainable use of the components of biodiversity (species, genes and ecosystems); the fair and equitable sharing of the benefits arising out of the utilisation of biodiversity. The text of the Convention makes these objectives binding commitments for the parties. Specific obligations include the elaboration of national strategies, plans or programmes for the conservation and sustainable use of biological diversity, biodiversity monitoring and creation of protected areas. Georgia joined the **Cartagena Protocol on Biosafety** in 2009. Georgia has not yet joined the **Nagoya Protocol on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising from their Utilization**.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

Georgia joined CITES in 1996. The Convention aims to ensure that no species of wild fauna or flora becomes or remains subject to unsustainable exploitation because of international trade. It does this by subjecting the international trade in specimens of selected species to certain controls. These controls vary according to the degree of threat the species faces. The species covered by CITES are listed in three Appendices.

- Appendix I includes species threatened with extinction. Commercial trade in specimens of these species is prohibited.
- Appendix II includes species not necessarily threatened with extinction but which may become so unless trade is controlled. Trade in specimens of Appendix II species is regulated with the aim of ensuring that it is not detrimental to the survival of the species.
- Appendix III contains species that are protected in at least one country which has asked other CITES Parties for assistance in controlling the trade.

Convention on Migratory Species (CMS)

Georgia joined the Convention on the Conservation of Migratory Species of Wild Animals (also known as the Bonn Convention) in 2000. The Convention aims to conserve terrestrial, marine and avian migratory species throughout their range. Migratory species threatened with extinction are listed on Appendix I of the Convention. Parties to the CMS strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Migratory species that need or would significantly benefit from international cooperation are listed in Appendix II of the Convention. For this reason, the Convention encourages the Range States to conclude global or regional Agreements. In this respect, the CMS acts as a framework Convention. The Agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions. Several Agreements have been concluded to date under the auspices of CMS including the following which Georgia has signed (the others are not relevant to Georgia):

- African – Eurasian Migratory Waterbird Agreement (AEWA);
- Agreement on the Conservation of Populations of European Bats (Eurobats);
- Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS).

In addition, several Memoranda of Understanding (MoU) have been concluded to date under the auspices of CMS; Georgia has signed one of these (the others are not relevant to Georgia):

- Memorandum of Understanding Concerning Conservation Measures for the Slender-billed Curlew.

Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)

Georgia joined the Aarhus Convention in 2001. The convention establishes the obligation of state authorities to provide access to environmental information. Public authorities are obliged to possess and update environmental information related to their functions and provide to increase the volume of environmental information gradually in the electronic database. Information available in electronic form shall include a report, legislation, strategic and operational plans and programs on the state of environment. The convention also confers obligations to provide for public participation in the decision-making process and access to the justice in this field.

International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) of the Food and Agriculture Organization (FAO) provides for a free exchange of genetic resources of food and non-food crops listed in its annexes among public gene banks and institutions of the countries members of the Treaty under a standard material transfer agreement (MTA). Georgia has not joined the Treaty.

Ramsar Convention on Wetlands (Ramsar)

Georgia joined the Ramsar Convention in 1997. The convention's original emphasis was on the conservation and wise use of wetlands, primarily to provide habitat for water birds. Over the years, the convention has broadened its scope to cover all aspects of wetland conservation and wise use, recognising that wetlands are extremely important for biodiversity conservation as well as the well-being of human communities. The convention contains four major commitments that Contracting Parties have agreed to by joining the treaty:

- The first obligation under the Convention is to designate at least one wetland for inclusion in the *List of Wetlands of International Importance* (the "Ramsar List") and to promote its conservation, including, where appropriate, its wise use.
- Under the Convention there is a general obligation for the Contracting Parties to include wetland conservation considerations in their national land-use planning. They have undertaken to formulate and implement this planning so as to promote, as far as possible, "the wise use of wetlands in their territory".
- Contracting Parties have also undertaken to establish *nature reserves in wetlands,* whether or not they are included in the Ramsar List, and they are also expected to promote training in the fields of wetland research, management and wardening.
- Contracting Parties have also agreed to *consult with other Contracting Parties* about implementation of the Convention, especially in regard to transfrontier wetlands, shared water systems, and shared species.

United Nations Framework Convention on Climate Change (UNFCCC)

Georgia joined the UNFCCC in 1994. The ultimate objective of the Convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The UNFCCC divides countries into three main groups (Annex I, Annex II and Non-Annex I countries) that are subject to different types of commitments. All countries are subject to general commitments to respond to climate change. They are required to compile an inventory of their greenhouse gas emission and submit reports, known as national communications, on actions they are taking to implement the Convention. These reports provide the means to monitor progress made by Parties in meeting their commitments and in achieving the Convention's ultimate objective.

To focus their actions, Parties to the UNFCCC must prepare national programmes containing climate change mitigation measures, provisions for developing and transferring environmentally friendly technologies, provisions for sustainably managing carbon sinks, preparations to adapt to climate change, plans for climate research, observation of the global climate system and data exchange, and plans to promote education, training and public awareness relating to climate change.

As a Non-Annex I country Georgia has no commitments under the convention other than the general commitments that apply to all countries.

United Nations Stockholm Convention on Persistent Organic Pollutants (POPs)

Georgia joined the Stockholm Convention in 2006. is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have adverse effects to human health or to the environment. The convention requires Parties to take measures to eliminate or reduce the release of POPs into the environment. The Convention is administered by the United Nations Environment Programme and is based in Geneva, Switzerland.

United Nations Convention to Combat Desertification (UNCCD)

Georgia acceded to the UNCCD in 1999. The UNCCD is the sole legally binding international agreement linking environment and development to sustainable land management. The convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the dry lands, where some of the most vulnerable ecosystems and peoples can be found. In the 10-Year Strategy of the UNCCD (2008-2018) that was adopted in 2007, Parties to the Convention further specified their goals: *"to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability"*.

The Convention's 195 parties work together to improve the living conditions for people in drylands, to maintain and restore land and soil productivity, and to mitigate the effects of drought. The UNCCD is particularly committed to a bottom-up approach, encouraging the participation of local people in combating desertification and land degradation. The UNCCD secretariat facilitates cooperation between developed and developing countries, particularly around knowledge and technology transfer for sustainable land management. As the dynamics of land, climate and biodiversity are intimately connected, the UNCCD collaborates closely with the other two Rio Conventions; the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC), to meet these complex challenges with an integrated approach and the best possible use of natural resources.

Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention)

Georgia joined the World Heritage Convention in 1992. The convention aims for the preservation of the cultural and natural heritage sites of outstanding universal value. It defines the kind of natural or cultural sites, which can be considered for inscription on the *World Heritage List.* The Convention sets out the duties of States Parties in identifying potential sites and their role in protecting and preserving them. By joining the convention, each country pledges to conserve not only the World Heritage sites situated on its territory, but also to protect its national heritage. The States Parties are encouraged to integrate the protection of the cultural and natural heritage into regional planning programmes, set up staff and services at their sites, undertake scientific and technical conservation research and adopt measures which give this heritage a function in the day-to-day life of the community.

ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention)

The Water Convention is intended to strengthen national measures for the protection and ecologically sound management of transboundary surface waters and ground waters. The Convention obliges Parties to prevent, control and reduce transboundary impact, use transboundary waters in a reasonable and equitable way and ensure their sustainable management. Parties bordering the same transboundary waters shall cooperate by entering into specific agreements and establishing joint bodies. The Convention includes provisions on monitoring, research and development, consultations, warning and alarm systems, mutual assistance, and exchange of information, as well as access to information by the public.

The **Protocol on Water and Health** aims to protect human health and well-being by better water management, including the protection of water ecosystems, and by preventing, controlling and reducing water-related diseases. Parties to the Protocol commit to set targets in relation to the entire water cycle. Georgia signed the protocol in 1999.

The **Protocol on Civil Liability** provides for a comprehensive regime for civil liability and for adequate and prompt compensation for damage resulting from transboundary effects of industrial accidents on transboundary waters. Georgia signed the protocol in 2003.

Convention on the Protection of the Black Sea Against Pollution

Georgia joined the Convention on the Protection of the Black Sea Against Pollution in 1994 together with the other five countries Black Sea coastal states. In 1996 the parties adopted a strategic action plan with specific targets and timetables for implementing the objectives of the Convention. Very few of the targets were accomplished on time. Furthermore, the action plan also suffered from problems of enforcement of national environmental laws and legislation, and the lack of a regional mechanism to ensure compliance with different policy actions. An amendment in 2002 (the 2002 Sofia Ministerial Declaration) aimed to resolve some of these issues and reconfirm commitments of

the Black Sea coastal states to implement the strategic action plan. In 2009 the parties adopted a new strategic action plan which aims to help resolve the transboundary environmental problems of the Black Sea. The plan includes: Ecosystem Quality Objectives (EcoQOs); short, medium and long term targets; and legal and institutional reforms and investments necessary to solve the main environmental problems.

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)

Georgia joined the Bern Convention in 1995. The Bern Convention is a binding international legal instrument in the field of nature conservation, which covers most of the natural heritage of the European continent and extends to some African states. Its aims are to conserve wild flora and fauna and their natural habitats and to promote European co-operation in that field. The Convention places a particular importance on the need to protect endangered natural habitats and endangered vulnerable species, including migratory species.

All countries that have signed the Bern Convention must take action to:

- promote national policies for the conservation of wild flora and fauna, and their natural habitats;
- have regard to the conservation of wild flora and fauna in their planning and development policies, and in their measures against pollution;
- promote education and disseminate general information on the need to conserve species of wild flora and fauna and their habitats;
- encourage and co-ordinate research related to the purposes of this Convention.

and also co-operate to enhance the effectiveness of these measures through:

- co-ordination of efforts to protect migratory species;
- and the exchange of information and the sharing of experience and expertise.

European Landscape Convention

Georgia joined the European Landscape Convention - also known as the Florence Convention, in 2011. The convention promotes the protection, management and planning of European landscapes and organises European co-operation on landscape issues. Parties to the convention undertake to protect, manage and/or plan their landscapes by adopting a range of general and special measures: this entails promoting participation of communities and public authorities in decisions affecting the landscape of the region or locality. Parties also undertake to engage in European co-operation on the consideration of the landscape dimension of international policies and programmes, and to recommend, where relevant, the inclusion in them of landscape considerations. They also undertake to co-operate in technical and scientific matters, to exchange landscape specialists for information or training purposes and to exchange information on all matters covered by the Convention. There is a provision on transfrontier landscapes: the Contracting Parties undertake to encourage transfrontier co-operation on local and regional levels and, wherever necessary, to prepare and implement joint landscape programmes.

Man and the Biosphere Programme (MAB)

The Man and the Biosphere (MAB) Programme was launched by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) to set a scientific basis for the improvement of the relationships between people and their environment globally. The MAB Programme proposes an interdisciplinary research agenda and capacity building that target the ecological, social and economic dimensions of biodiversity loss and the reduction of this loss; its World Network of Biosphere Reserves currently counts 610 biosphere reserves in 117 countries all over the world.

Georgia is a party to the MAB Programme through its membership of UNESCO and its MAB National Committee but has not established any Biosphere Reserves.

Emerald Network

The Emerald Network is based on the same principles as the EU Natura 2000 network of nature protection areas and represents its de facto extension to non-Community countries in the framework of the Council of Europe. Launched in 1999, the Emerald Network is currently in its implementation phase. The cooperation between the Council of Europe and the EU is a logical consequence of their common commitment to the protection of biodiversity. The European Union assists the Council of Europe, through different financial instruments, in the setting-up of the Emerald Network in a regionalised approach.

A joint programme with the European Union was launched in 2009, for a period of three years, in order to substantially develop the Emerald Network in Georgia and six other countries (Armenia, Azerbaijan, Belarus, Moldova, Ukraine and the European part of the Russian Federation). The objective of the joint programme was to identify by the end of 2011 all potential sites of the Emerald Network in the three countries of South-Caucasus and Moldova, 50% of the potential sites in Belarus and the Russian Federation, and 80 % of the potential sites in Ukraine.

Forest Europe process

Georgia is a participant in Forest Europe (the Ministerial Conference on the Protection of Forests in Europe), which is a pan-European political process for the sustainable management of the continent's forests. Forest Europe develops common strategies for its 46 member countries and the EU on how to protect and sustainably manage forests. Forest Europe has adopted guidelines on the sustainable management of forests and is making efforts to consolidate tools for sustainable forest management and improve monitoring and reporting, strength efforts against illegal logging, develop a common approach of valuation of forests ecosystem services with the aim of raising awareness of its contributions to society wellness, and emphasize the social aspects of forestry and the role of forests in the transition to a green economy. At the Forest Europe Ministerial Conference on the Protection of Forests in Europe, which took place in June 2011 in Oslo, Norway, the Ministers responsible for forests in Europe signed a mandate for negotiating a Legally Binding Agreement on Forests in Europe.

Environment for Europe process

Georgia participates in the Environment for Europe process, which is a partnership of member States within the UNECE region, organizations of the United Nations system represented in the region, other intergovernmental organizations, regional environmental centres, non-governmental organizations, the private sector and other major groups. The "Environment for Europe" process and its Ministerial Conferences provide a high-level platform for stakeholders to discuss, decide and join efforts in addressing environmental priorities across the 56 countries of the UNECE region, and is a regional pillar of sustainable development. At the same time, the process focuses on helping countries of Eastern Europe, Caucasus and Central Asia and of South-Eastern Europe to improve their environmental standards. The United Nations Economic Commission for Europe, which has been closely associated with the "Environment for Europe" process since the beginning, serves as secretariat.

Within the Environment for Europe process the **Pan-European Biological and Landscape Diversity Strategy (PEBLDS)** was initiated and endorsed in 1995. PEBLDS is a European response to support implementation of the Convention on Biological Diversity and to stop and reverse the degradation of biological and landscape diversity values in Europe. In the framework of the Pan-European Biological and Landscape Diversity Strategy, the **Pan-European Ecological Network (PEEN)** aims to ensure that: a full range of ecosystems, habitats, species and landscapes of European importance is conserved;

habitats are large enough to place species in a favourable conservation status; there are sufficient opportunities for the dispersal and migration of species; damaged parts of key environmental systems are restored; key environmental systems are buffered from potential threats. The originality of this network is that it intends to link core areas physically through the restoration or preservation of corridors.

National policies, strategies, plans and programmes

The **Constitution of Georgia** (1995) states that: "With the view of ensuring safe environment, in accordance with ecological and economic interests of society, with due regard to the interests of the current and future generations the State shall guarantee the protection of environment and the rational use of nature" (Article 37.4). The National Biodiversity Strategy and Action Plan (2005) - NBSAP-1 - sets out Georgia's goals for biodiversity conservation. A number of other national strategies, plans and programmes impact on the implementation of NBSAP-1. The following are particularly relevant:

Georgia's **Second National Communication to the United Nations Framework Convention on Climate Change** (2009). This document was prepared according to the United Nations Framework Convention on Climate Change. The process included a national inventory of greenhouse gases (GHGs) and the development of current and future climate change scenarios. Measures to reduce greenhouse gases and to adapt to the impacts of climate change were also prepared.

The **State Strategy for Regional Development of Georgia (2010-2017)** is dedicated to the development of agriculture, tourism and ensuring environmental protection. According to this strategy "The goal of the State in the sustainable regional development process is to ensure a balance between environmental protection and the socio-economic development interests of society which will support the realization of the constitutional right of citizens to live in and benefit from a sound environment."

The **Strategic "10-Point Plan" of the Government of Georgia for Modernization and Employment (2011–2015)** sets out the government's strategy for advancing the social and economic development of the people of Georgia. The strategy consists of actions arranged under ten objectives. Actions which are particularly relevant to biodiversity conservation include the construction of hydro-electric power stations and the improvement of the country's transport infrastructure.

The **National Environmental Action Programme of Georgia 2012-2016** (NEAP-2) sets out long-term goals, short-term targets and respective activities for eleven themes, some of which correspond closely to themes selected for NBSAP-2, e.g. Black Sea, biodiversity and protected areas, forests, climate change. NEAP-2 also presents several cross-cutting issues, such as environmental impact assessment and permitting, enforcement, environmental education and public awareness, monitoring, the scientific basis for decision-making and the need for geo-informational systems. Clearly, the goals, targets and activities selected for NBSAP-2 will need to complement those of NEAP-2 where themes overlap.

National laws relevant to biodiversity conservation

A comprehensive description and assessment of Georgian laws that are relevant to biodiversity conservation are presented in the chapter *Thematic Field 8 – Management and Governance of Biodiversity*. In addition, specific provisions are described and discussed in other thematic chapters.

Financial resources for biodiversity conservation in Georgia

In general, in Georgia measures directed towards protection and sustainable utilization of biodiversity are financed by bilateral and multilateral donors. In recent years most donor funding has been provided for the development of the system for Protected Areas (PAS) and very limited funding has been allocated for the protection of individual species.

The **Global Environment Facility (GEF)** acting through **UNDP** and the **World Bank** has supported biodiversity conservation projects in Georgia since 1996. GEF's portfolio of completed projects includes the creation of new protected areas, , and measures to promote the sustainable use of biodiversity in and around protected areas. Georgia has received funding for: i) the development of NBSAP, ii) capacity assessment of implementation of CBD requirements, iii) PA system development, strengthening management effectiveness at site and system level iv) preparation of national biodiversity reports under CBD and, v) conservation and recovery of Georgia's agrobiodiversity.Four new protected areas have been established in Georgia with GEF financing: Vashlovani Protected Areas, Lagodekhi Protected Areas, Tusheti Protected Areas and Kolkheti National Park. **UNEP** provided the funding for a TEEB (The Economics for Ecosystems and Biodiversity) Scoping Study with the view to carry out a national TEEB study.

The **EU** is financing a number of projects in that support biodiversity conservation. WWF is implementing a project in Georgia with financing from the EU's Environment and Sustainable Management of Natural Resources Programme (ENRTP) to pilot measures to make forests more resilient to the impacts of climate change. The EU is financing the Georgian Carnivore Conservation Project, which is designed to develop effective mechanisms and capacity and enhanced advocacy to improve the conservation status of large carnivores in and around the protected areas of the semi-arid landscape of Georgia, and a project in the framework of the EU Twinning Programme to strengthen protected areas management planning capacity. The EU and the **Council of Europe** are supporting the development of the Emerald Network of protected areas in Georgia.

The **Government of Germany** has been supporting biodiversity conservation in Georgia for more than 15 years. Since 2005 it has provided the financing for the creation of Javakheti National Park (through the Federal Ministry for Economic Cooperation and Development (BMZ) and KfW. GIZ is implementing the project Sustainable Management of Biodiversity financed by BMZ; measures include technical assistance for preparing new biodiversity conservation strategies and action plans and developing national biodiversity monitoring systems. The German Federal Ministry for Environment and Nuclear Safety (BMU) has financed climate change adaptation and landscape restoration projects in Georgia. The German government has also provided capital for the Caucasus Nature Fund.

The Ministry of Foreign Affairs of the **Government of Norway** provided the financing for the Mtirala National Park in Georgia and for measures to improve the social and economic conditions of communities around the national park. It has also supported development of Chachuna and Iori managed reserves and has contributed to capacity development of the PA system and elaboration of the NBSAP.

The **United States Agency for International Development (USAID)** funds environmental governance and sustainable use of natural resources projects in Georgia (among many other sectors). With the **U.S. Department of the Interior**, USAID is assisting Georgia to enhance the capacity of the Agency of Protected Areas to manage and commercialize national parks and promote tourism opportunities.

The **MAVA Foundation** financed activities in support of the implementation of the CBD's Programme of Work on Protected Areas in Georgia. The activities included analysis of the legal and institutional frameworks, assessment of management effectiveness and capacity needs of protected areas and action planning, financial needs assessment and sustainable financial planning, and communication activities.

The **Critical Ecosystem Partnership Fund (CEPF)** is a joint initiative of l'Agence Française de Développement, Conservation International, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. Between 2004 and 2009 the CEPF invested $8.5 million in projects in Georgia and the other Caucasus countries supporting the elaboration and subsequent implementation of science-based strategies for species conservation.

The **Caucasus Nature Fund (CNF)** was established on the initiative of the German Government, KfW, WWF and Conservation International. The CNF provides financing to help pay the running costs of protected areas in Georgia and in Azerbaijan and Armenia. The CNF has attracted additional funding from the GEF and private corporations including Bank of Georgia and ProCredit Bank Georgia. In 2012 the CNF was supporting four protected areas in Georgia: Borjomi-Kharagauli National Park, Lagodekhi Protected Areas, Tusheti Protected Areas and Vashlovani Protected Areas.

The **Japanese Social Development Fund** has supported the development of villages located in the support zone of the Kolkheti National Park, through infrastructure development, generation of alternative revenues and raising awareness of local population in order to reduce pressures from local communities on the national park.

BP and its partner companies BTC and SCP initiated an environmental investment programme that supported the development of Ktsia-Tabatskuri Managed Reserve and the elaboration of conservation plans for endangered species. BP and its partner companies also provide financing for annual grant programme in the field of biodiversity conservation.

Important contributions to the implementation of NBSAP-1 have been made by a number of local and international NGOs, including WWF Caucasus office, IUCN Caucasus Cooperation Centre (formerly IUCN South Caucasus Programme Office), REC Caucasus, NACRES, CAMPESTER – Field Researchers Association, ELKANA-bio farmers association and CENN. These organizations have implemented projects targeting individual species, including assessment and development of the conservation plan for leopard, assessment of the brown bear (*Ursus arctos*) and development of a conservation plan for the Surami range, wild goat (*Capra aegagrus*) study in Tusheti National Park, and assessment of the current status of the European Otter (*Lutra lutra*) in Eastern Georgia. In 2004, the Caucasus Regional Seed Bank was established in Tbilisi Botanical Garden in close cooperation with Missouri Botanical Garden under the CRDF/GRDF programme. Kew Royal Botanical Garden (UK) assisted the conservation division of the Georgian Botanical Garden to preserve seeds of over 800 plant species (20% of Georgia's plant diversity) in the seed bank under the project "*Creation of the Seed Collections of Wild Plants of Georgia in Georgian and UK Millennium Botanical Gardens, 2005-2010*". The project has been extended to 2011-2020 with a new title: "*Protection of the Caucasus Flora*".

Achievements of NBSAP-1

Vision, goals and objectives of NBSAP-1

The strategy of NBSAP-1 consists of a **vision** for the future status of biodiversity and its management in Georgia (Box 1), **ten strategic goals** which articulate the vision in a more results-oriented way and **51 specific objectives**.

Box 1 - Vision of Georgia's first National Biodiversity Strategy and Action Plan

"In ten years' time [i.e. in 2015], it is envisaged that Georgia will be a country where biological diversity is sustained and rehabilitated within a political, social and economic context that favours the wise use of natural recourses and adequate benefit sharing through:

1 Comprehensive conservation legislation; ratified global, regional, bilateral and multilateral treaties; and well-developed law enforcement institutions.

2 Harmonized resource ownership management and consumption; established fair distribution of revenues; enhanced system of costs, tax and incentives; and mechanism for balancing demands and provisions of natural resources.

3 An efficient protected areas network that safeguards biological diversity, that is managed by well-equipped and highly qualified staff and is supported by local communities, and the wider

public.

4 Stabilised ecological systems, natural habitats, species, endemic/native varieties and breeds, through the implementation of in-situ and ex-situ conservation activities.

5 Sustainable forestry, employing legally, scientifically, environmentally, and economically sound practices that minimise the impact on the wildlife, preserve forest biodiversity and maintains the integrity of forest ecosystem.

6 Raised public awareness, where the majority of society fully appreciates the value of the country's natural heritage and the importance of its preservation for future generations.

7 Sustainable practices applied in agriculture that minimise the impact on biodiversity, maintaining the wildlife of farmlands and the rich agrobiodiversity of the country, whilst contributing to the welfare of local communities."

The action plan of NBSAP-1 consists of activities that address specific problems and which are designed to achieve the specific objectives and, in turn, the strategic goals and vision of the strategy. The activities are arranged under the strategy's ten strategic goals. The activity plan provides cross references to the problem or problems which an activity is designed to address, the recommended year for implementation, an estimated cost range, the relevant articles of the CBD, cross references to related activities, and indicators to provide a means to monitor and evaluate the implementation of the action plan.

Progress with the implementation of NBSAP-1 is described in the introduction to each of the thematic chapters. A full assessment of the state of implementation of NBSAP1's action plan and of progress towards the specific objectives up to July 2012 is presented in Appendix 1. The assessment is a compilation of the assessments that are contained in the individual situation analysis reports.

THEMATIC FIELD 1. CONSERVATION OF SPECIES AND HABITATS

Lead organisation: Centre for Biodiversity Conservation and Research NACRES

Lead author: Bejan Lortkipanidze.

1. Introduction

1.1. Overview of Georgia's species and habitats and their global importance

Within Georgian flora 4,130 species of vascular plant have been recorded, including 79 ferns, 17 gymnosperms, 4,034 angiosperms. The rich nature of Georgian flora is prominent from its high level of endemism with around 21% of Georgian flora (up to 900 species) being endemic. Among these, around 600 (14% of all species) are Caucasus endemics and 300 (9% of all species) are endemic to Georgia. Endemic genera are also significant, with 16 recorded in Georgian and Caucasian flora.

In terms of the countries faunal components, 16,054 species have been recorded, 758 of which are chordates. One species is endemic to Georgia - the Adjarian lizard (*Darevskia mixta*). Of the Georgian mammals 19 are Caucasus endemics. Of the birds, three are Caucasian endemics. 29 species of mammals, 35 birds, 11 reptiles, 2 amphibians, 13 fish and 56 tree species are registered in the Red List of Georgia. 44 species of vertebrate fauna found in Georgia are globally endangered and registered in the IUCN Red List as vulnerable (VU) or a taxon of a higher category.

The main biomes of Georgia are forests, fresh-water and wetlands, marine and coastal, high-mountain, semi-desert and steppes. Forests cover about 39.9% of the territory of Georgia and contain the largest part of Georgia's species diversity.

1.2. Progress towards the goals and objectives of NBSAP-1

NBSAP 1 included the following Strategic Goals related to the conservation of species and habitats:

> *To maintain and restore Georgia's habitats, species and genetic diversity through in-situ, ex-situ and inter-situ conservation measures, and through sustainable use of biological resources*.

The following specific objectives were set to achieve the given goal:

- To assess the status of species and habitats
- To ensure the conservation of the most threatened species and reintroduce extinct species as appropriate and feasible
- To ensure conservation and sustainable use of biodiversity hot spots located outside protected areas
- To promote ex-situ and inter-situ conservation

A detailed assessment of the state of implementation of NBSAP-1 is presented in Appendix 1. Highlights are as follows:

Red list

The National Commission on Endangered Species has been established under the auspices of the Georgia Academy of Science.

The status of rare plant and animal species has been assessed in accordance with IUCN categories and the results incorporated in the new Red List of Georgia in 2005; the list consists of 197 species, of which 141 are animal species and 56 are plant species. In addition the Caucasus plants "Red List" has been elaborated.

The distribution and the conservation status of endemic plant species of the Caucasus Ecoregion has been assessed in the framework of the project "Coordination and Development of Plant Red list

Assessments for the Caucasus Biodiversity Hotspot". The assessment resulted in the first comprehensive list of plants endemic to the Caucasus region (about 2,950 species/subspecies) with Red List assessments for about 1,200 taxa. Assessments of about 800 taxa were submitted to the IUCN Red List unit.

Conservation of threatened plant species

Information on endemic species assessed for inclusion in the "Red List of the Caucasus Endemic Plant Species" has been used to identify Important Plant Areas (IPAs) in Georgia. Among Georgian endemic plants about 20% are calciphylic lithophytes found on the Kolkheti limestone ranges (Gagra, Bziph, Egrisi, Askhi, Okriba, Khvamli and Racha ranges up to the Rikoti pass). About 80% of local endemics associated with limestone habitats are classified as endangered due to overgrazing, infrastructure development, tourism and recreation and climate change. First efforts on the identification of IPAs are based on existing data on endangered endemic species, 40% of which are associated with limestone habitats. GIS analysis of the distribution of calciphylic endemic plants has made it possible to identify IPAs on limestone ranges; this information provides supportive arguments for carrying out in-situ conservation measures in Abkhazia, Samegrelo and Racha-Lechkhumi.

At present protected areas represent virtually the only effective means of in-situ conservation of endangered species. Ex-situ conservation is implemented in Georgia's botanical gardens (Tbilisi, Batumi, Sokhumi, Kutaisi and Bakuriani) and partially in Tsinandali, Likani, Georgian Youth Palace and Zugdidi dendrological parks. Georgia's botanical gardens collaborate with the international organization Botanical Gardens Conservation International (BGCI). A seed bank has been created in Batumi Botanical garden to carry out ex-situ conservation of endemic species.

Collection and export quotas for the plant species subject to international trade have been determined.

Conservation of threatened animal species

Conservation action plans for some of Georgia's most critically threatened species have been developed and implementation of some of the plans has started. Conservation plans for both species of the Carpinae family – the eastern and western tur (*Capra caucasica, Capra cylindricornis*) – have been elaborated. A conservation plan for leopard (*Panthera pardus*) was prepared in 2010 and the implementation of its individual components has been initiated. Conservation plans have also been prepared for the following: bats; Caucasus salamander (*Mertensiella caucasica*); brown bear (*Ursus arctos*) in the Surami range; lesser white-fronted goose (*Anser erythropus*); white-headed duck (*Oxyura leucocephala*); eastern imperial eagle (*Aquila heliaca*); lesser kestrel (*Falco naumanni*); red-breasted goose (*Branta ruficollis*).

Captive breeding of goitered gazelle in Vashlovani Protected Areas was started in 2009. A national plan for reintroducing the species into the wild in Georgia was developed in 2012.

Conservation of habitats critical for threatened species

Some "hot spots" have been identified in the framework of the joint CoE / EU "Programme for the development of the Emerald Network in Central and Eastern Europe and the South Caucasus". However, in Georgia most of the identified hotspots are inside existing PAs.

Up to now no strategies or action plans have been developed for the conservation and sustainable use of hotspots outside PAs.

2. Current Threats and Conservation Issues

The establishment of new protected areas and the expansion of existing ones during recent years have contributed greatly to the conservation of species and habitats (see Thematic Field 2. Protected Areas for details of new and extended). In parallel with the development of protected areas it is

necessary to ensure the sustainable management of natural and semi-natural habitats outside protected areas. For this, important biodiversity conservation areas should be identified and animal migration corridors studied in order to integrate the sustainable management of habitats and species into local management systems. In this regard the Surami and the Gombori Ranges should be studied - the first is a biological corridor connecting the Greater and the Lesser Caucasus and the second is a corridor connecting the Greater Caucasus and the Iori Plateau.

The creation of a new Red List for Georgia in 2006 was a major development. Species listed in the Red List are designated IUCN conservation categories. However, it should be noted that a country-wide assessment and monitoring of various taxa and particularly Georgian fauna had not been carried out after the break-up of the Soviet Union and the conservation status for the red list species was determined based on outdated information. At present updated information is available only for several taxa; the current status of some species and in particular of large mammals needs to be reviewed and upgraded.

Since 2008, a national biodiversity monitoring system has been under development. The concept for biodiversity monitoring has been prepared, 25 biodiversity monitoring indicators selected and the methodology for data collection and analysis elaborated. Moreover, data collection has started, relevant equipment has been purchased, inventory forms prepared and relevant taxa and species subject to monitoring identified. In addition, a national biodiversity monitoring web-site has been established. Data on the extent of the threats and their impacts are not available due to the absence of a fully-operational monitoring system and this hinders timely and adequate decision making in the field of biodiversity protection. It is necessary to fully operationalize the unified biodiversity monitoring system and to pay particular attention to the red list species.

In the light of recent rapid economic growth (e.g. in transport, energy, mining, industry, infrastructure development, timber production, commercial fishing and other sectors), easing of environmental impact assessment as well as ineffective law enforcement have negative impacts on species and habitats.

The recent revival of animal husbandry and agriculture has resulted in transformation of wild nature – wetlands have been drained and turned into agricultural lands. Current unsustainable agriculture practices have negative impacts on invertebrates, birds and small mammals and result in the reduction of biological diversity. It is necessary to create and maintain small-size intact or managed lands between agriculture lands in order to avoid the above-mentioned problems.

In the light of the growing demand on land and other resources, human beings intrude more intensively into the natural habitats of wild animals. The conflict between men and carnivores is a common phenomenon throughout Georgia. Attacks of wild animals on livestock are caused by destruction of habitats and food base for wildlife. The cases of wolf attacks on livestock are numerous, causing conflicts with people ending with killing of the wolf. Fisheries ponds are the shelters for European Otter and waterfowl; these species eat fish and therefore are killed by men.

In Georgia pastures are severely degraded due to overutilization. Erosion processes are very intensive and this, together with desertification on winter pastures, poses serious threats to biodiversity and local agriculture. Sustainable pasture management should be one of the priority objectives for the protection of biodiversity and local economic development.

In Georgia, aquatic ecosystems have been modified for years: wetlands have been dried and lakes and rivers regulated artificially. Recently intensive development of hydropower has started and it is planned to build tens of hydropower plants in Georgia. This will have serious impacts on local climate, fish composition, river morphology and flow.

As a result of decrease in water flow and river levels the total area of flood plain forests has been diminishing. In rivers fish stocks have decreased dramatically and in some sections have disappeared completely as a result of poaching (killing fish by electrical shock).

All the above factors have resulted in the destruction of migratory routes for fish, decrease in fish stocks and homogenization of fish composition. These, in turn have caused the reduction of habitats for a number of mammals and birds.

Flood plain forests are under serious threat. They represent biodiversity refugiums and are one of the most important components of Georgia's landscape diversity, therefore the conservation and sustainable utilization of flood plain forests is an urgent task.

Black Sea coastal waters and river mouths, particularly the Rioni delta, are habitats for sturgeons. In the light of on-going infrastructure development projects, planned or existing hydropower plants, pollution of rivers or coastal zone and extraction of sand and gravel, it is necessary to identify important fish spawning grounds and migratory routes and to protect and manage these areas sustainably.

Currently eight fish species are caught commercially in the Black Sea, European anchovy (*Engraulis encrasicholus*) being the most commercially important species among them. However, anchovy stocks have dramatically declined in recent years.

As a result of habitat destruction and in particular uncontrolled forest cutting, destruction of wildlife migratory corridors and hunting, large mammals have become particularly vulnerable. At the same time, ineffective management of game hunting has led to a drastic drop in the number of game populations, of which some of the species have become extinct in the wild. There has been no progress in this regard and no conservation measures have been implemented for conservation of game species. Given the restrictions of current legislation as well as the fact that large mammals are mostly found in protected areas, legal hunting on large mammals has not been carried out in recent years. In addition, the majority of large mammals that attract the interest of hunters have been listed in the red list, therefore private hunting farms had no right and motivation to introduce such species in their farms. The majority of hunting farms were located in the eastern part of Georgia and therefore, hunters from the West Georgia had very limited choice. In parallel, a high level of poaching has resulted in dramatic decline in game populations.

Since 2011, efforts have been made to better regulate the hunting sector. With this purpose, basic changes have been made in existing legislation. In accordance with these changes, hunting is allowed in all areas of Georgia apart from settlements nature reserves and national parks. A list of game species has been elaborated and hunting quotas and seasons have been identified. Hunting of red list species, including the species under critical threat of extinction as a result of hunting, is now allowed in Georgia.

An urgent task is to monitor large mammals, in particular the red list species, and to improve hunting procedures and control mechanisms.

Certain species of large mammals require implementation of specific urgent conservation measures. This particularly refers to those species (e.g. leopard and wild goat) which have very small populations or are only met as several individuals. In addition, urgent measures should be carried out to restore those species that have become extinct in the near past, including the goitered gazelle and the red deer.

The majority of marine mammals are in poor condition due to water pollution and overfishing.

Captive breeding programmes for the Wild Goat and the Goitered Gazelle have been on-going in Georgia for some years. Unfortunately the planned increase in the number of individuals has not been achieved so far. At this stage the only successful programme is the breeding programme for Common Pheasant *(Phasianus colchicus).* It is necessary to better plan breeding programmes, expand them and develop specific conservation plans. Along with this, it is important to develop conservation plans for other species and in case of necessity to initiate captive breeding programmes for them. National conservation plans have been elaborated for a numerous species; some of these programmes are implemented and should be continued in the future. There are legal impediments

to implementing species conservation plans. More specifically none of the species conservation plans has a legal status; the species conservation plans prepared in recent years have been only endorsed by the relevant state agency – the MoEP.

3. Current Status of Georgia's Flora

3.1. Status of plant species

The "Red List of Georgia" includes 56 tree species assessed and classified in accordance with "IUCN Red List" categories and criteria.

The distribution and the conservation status of endemic plant species of the Caucasus Ecoregion was assessed in the framework of the project "Coordination and Development of Plant Red list Assessments for the Caucasus Biodiversity Hotspot". The assessment resulted in the first comprehensive list of plants endemic to the Caucasus region (c. 2,950 species/subspecies) with Red List assessments for c. 1,200 taxa. Assessments of c. 800 taxa were submitted to the IUCN Red List Unit.

275 species/sub-species of vascular plants are considered to be Georgian endemics; of these, 152 (approximately 60%) are classed as endangered.

3.2. Conservation of critically endangered species and recovery of extinct species.

In-situ conservation. The rationale behind establishing a number of protected areas in Georgia was to protect certain plant species, floristic complexes or plant types. Comprehensive floristic lists are available for several protected areas and thus, it is known how the endangered species are represented in protected areas. At present protected areas represent virtually the single effective means of *in-situ* conservation of endangered species.

Ex-situ conservation is implemented in botanical gardens of Georgia (Tbilisi, Batumi, Sokhumi, Kutaisi and Bakuriani) and partially in Tsiandali, Likani, Georgian Youth Palace and Zugdidi dendrological parks. Georgia's botanical gardens collaborate with the international organization Botanical Gardens Conservation International (BGCI).

3.3. Conservation and sustainable utilization of important areas located outside protected areas.

Information on endemic species assessed for inclusion in the "Red List of the Caucasus Endemic Plant Species" has been used to identify Important Plant Areas (IPAs)[2] in Georgia.

Among Georgian endemic plants, about 20% are calciphylic lithophytes, found on the Kolkheti limestone ranges (Gagra, Bziph, Egrisi, Askhi, Okriba, Khvamli and Racha ranges up to the Rikoti pass). The species of this ecological group are also found on the Lesser Caucasus and in isolated spots on the Greater Caucasus in eastern Georgia. About 80% of local endemics associated with limestone habitats are classified as endangered due to overgrazing, infrastructure development, tourism and recreation and climate change. First efforts on the identification of IPAs are based on existing data on endangered endemic species, 40% of which are associated with limestone habitats.

GIS analysis of the distribution of calciphylic endemic plants has made it possible to identify IPAs on limestone ranges; this information provides supportive arguments for carrying out in-situ conservation measures in Abkhazia, Samegrelo and Racha-Lechkhumi.

[2] Important Plant Areas (IPAs) are internationally significant sites for wild plants and threatened habitats. Identified at a national level, they provide a framework for implementing target 5 of the CBD Global Strategy for Plant Conservation (ensuring the protection of at least 50% of important areas for plants).

4. Current status of Georgia's Fauna

4.1. Invertebrates

Data on invertebrates are very limited and sporadic. In recent decades arable lands and pastures have covered more and more territory; along with this, weak regulation of the use of pesticides is resulting in the destruction and transformation of the habitats of invertebrates. The expansion of bee keeping businesses will affect the bumble bees (*Bombus* spp.) the most because they are direct competitors of bees.

Information on the current status of beetles *(Coleoptera)* and butterflies and moths (*Lepidoptera*) is very limited. In addition, there is no updated information on medicinal leeches (*Hirudo medicinalis*), which are used extensively in medicine. Mountain Apollo (*Parnassius apollo*) is a red-list species of butterfly which inhabits alpine meadows. Also, it is noteworthy to mention that there is practically no knowledge on species diversity of the family of gossamer-winged butterflies (*Lycaenidae*). By monitoring the two above butterflies it is possible to get a picture of changes in species composition (flowering plants and various groups of animals) and in landscape quality.

4.2. Fish

In recent decades fishing by using illegal methods has caused significant decline of fish stocks in Georgian rivers. It is thought that the trout has been affected the most. However, detailed study of this issue has not been carried out recently. Six species of sturgeon (*Acipenser sturio, A. stellatus, A. gueldenstaedti, A. nudiventris, A. persicus, Huso huso*) are found in Georgia's coastal waters and river deltas. All these species are included in the Red List of Georgia. *Acipenser sturio* is included in the IUCN Red-List with the status Critically Endangered. It can be assumed that the state of these species is poor because of the destruction of their spawning grounds and habitats.

4.3. Amphibians and Reptiles

In Georgia one of the most important amphibians is the Caucasus salamander (*Mertensiella caucasica*), included in the Red List of Georgia and in the IUCN Red List as Vulnerable. It has a patchy distribution pattern and is found on the west slopes of the Trialeti Range and on the Meskheti and Shavsheti Ranges. During the last ten years habitats of the Caucasus salamander have been gradually declining as a result of human activities. Caucasus viper *(Vipera kaznakovi)* is a West Caucasus endemic species and is found only on south-west slopes of the Greater Caucasus and on the Meskheti Range. The viper's habitat has become fragmeneted due to the decline of mountain forests and the species is classified in the IUCN Red List as "endangered". The Caspian turtle (*Mauremys caspica*) is a subject of international trade, though currently it is not exported from Georgia. In recent years the Caucasus frog (*Rana macrochemis*) has been collected intensively on the Kolkheti plain and exported from Georgia, though on a limited scale; it is recommended to monitor this species in the future.

4.4. Birds

In general, information on Georgian birds is insufficient. At present 35 bird species are included in the Georgian Red-List.

Among birds of prey the most threatened species is the eastern imperial eagle (*Aquila heliaca).* In Georgia, this bird has only 15 nesting areas and in recent years some artificial nesting sites have been created. It is necessary to continue to monitoring the nesting areas of the imperial eagle and, if required, to create additional artificial sites. The black vulture *(Aegipius monachus)* is one of the rarest vultures not only in Georgia, but also worldwide. The greatest threats to these species are degradation of nesting habitats in arid ecosystems, disturbance, killing by men and artificial fires made by shepherds.

The black stork *(Ciconia nigra)* exists in small numbers in Georgia: it inhabits flood plain forests and thus its habitats are very limited.

The rock partridge *(Alectoris graeca),* and the quail (*Coturnix*) are the most important gamebirds in Georgia. However, there is no information on the size of their populations. The Caucasus grouse, a Caucasian endemic, has a very low population size, though it is included into the list of gamebirds.

4.5. Small Mammals

The endemic rodents Brandt's hamster *(Mesocricetus brandti)* and to the long-clawed mole vole (*Prometheomys schaposchnikovi Satunin*) are rare species with very limited and fragmented habitats due to grazing and agriculture and intensive use of agro-chemicals.

29 species of bats *(Chiroptera*) have been recorded in Georgia, of which four are on the Red List of Georgia. There is a declining trend of bat populations in Georgia due to the habitat degradation and the nuisance near to sheltering areas. More specifically, the major factors contributing to the reduction of bats numbers are: i) destruction of flood plain forests, which provide habitats for species on which bats prey; ii) unsustainable use of agrochemicals and mineral fertilizers and, iii) destruction of aquatic invertebrates due to the water pollution and poaching of fish by electric shock.

4.6. Large Mammals

Among ungulates the rarest species is the wild goat (*Capra aegagrus*) found only in Tusheti Protected Areas. An inventory of the species carried out during the last two years indicated that the the current minimum population size is 130. It is necessary to conduct further research in order to assess the population dynamics. The red deer is also a rare species, found only in three protected areas (Lagodekhi Protected Areas, Gardabani Managed Reserve and Borjomi-Kharagauli National Park) as completely isolated populations. At present, there is a positive trend of a slight increase in the deer population in Lagodekhi PAs and Borjomi-Kharagauli National Park. The total population size is believed to be about 500-550. It is necessary to recover this species in both wild nature and in a captive environment.

Intensive monitoring has been carried out in Vashlovani and Tusheti Protected Areas for signs of the leopard (*Panthera pardus*); unfortunately, no signs have been found.

Of the two species of tur – west Caucasian tur (*Capra caucasica*) and east Caucasian tur (*Capra cylindricornis*) - the west Caucasian tur has the smallest population size and is found in in only a few areas of Georgia.

In the central part of Georgia genetic studies have been carried out to identify the minimum population size of the Brown Bear (*Ursus arctos*) and the results have been extrapolated to the whole of Georgia. The minimum population size of this species is estimated to be 450.

Studies have been carried out in the east Georgia to identify the current status of the European otter (*Lutra lutra*) and to determine the level of conflict with fish farms. The studies have shown that the number of otters has decreased as a result of decline in fish stocks and habitat destruction. At present the minimum population size is estimated to be 400 individuals.

The Eurasian lynx is classified as “critically endangered” in the Red List of Georgia. However, 2011 studies conducted in semi-arid ecosystems of Georgia by means of photo camera traps showed that this species has relatively large population size.

4.7. Marine Mammals

Since 2009, a programme of ecological research of Black Sea mammals has been implemented in Georgia. As a result of an inventory it has been identified that the population size of the bottlenose

dolphin (*Tursiops truncatus*) is 59 and that of the harbour porpoise (*Phocoena phocoena*) is 2,800. Thus, it is necessary to carry out urgent measures to conserve bottlenose dolphins.

5. Status of Georgia's Habitats

Until recently modern habitats classification systems were not applied in Georgia and this was an impediment towards harmonization of national conservation policies with international and more specifically, with European policies and strategies, identification of priorities, assessment of the current status of individual types of habitats and as well, towards planning of effective conservation measures.

In 2010, a new national habitat classification system based on the EU NATURA 2000 Directive was elaborated in the framework of the BMZ/GIZ Sustainable Management of Biodiversity Programme. The new national classification is a step forwards and it is recommended to develop a unified list of habitats with the participation of all stakeholders. In addition, within the Emerald Network framework, 15 of the habitats listed in annex 4 of the Bern Convention have been selected for Georgia. The Emerald Network extends the EU Natura 2000 programme for habitats protection to non-EU countries and aims at studying and preserving areas with high ecological value. Thus, during the development of the priority habitats list for Georgia the major focus should be made on priority habitats, since Georgia is a party to this wider European initiative and not to NATURA 2000.

Based on the above priorities important habitats have been selected (see annex 3). Existing threats and the habitats' sensitivity have been used for setting priorities. Water resources and plant and animal associations with relic and endemic species have been applied as major criteria. Not only natural habitats are listed as priority areas, but also semi-natural habitats, depending on human interventions (for instance, certain types of meadows, urban and transitional habitats).

Information on the current status of the priority habitats is very limited.

6. Aichi Biodiversity Targets and the Current Situation

The following objectives of the Aichi Biodiversity Targets address species and habitats: # 8, 9, 11, 12 and 14.

Objective 8. By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

In Georgia, environmental pollution has significant negative environmental impacts on coastal and inland waters. One of the major sources for surface and ground water pollution is open pit mining. These activities are always followed by explosions. This also causes emissions of heavy metals and associated minerals into the atmospheric air in the form of dust, which disperses over long distances.

Coastal waters are polluted from various sources, including industrial wastewater and sewage discharges, storm waters, oil spills, agriculture run-off, dredging and discharges of ballast waters. The biggest problem is inadequate treatment/absence of treatment of industrial and municipal wastewaters, which causes discharge of organic matter into coastal waters. Among non-point sources of pollution the largest share is contributed by agriculture run-off due to extensive utilization of pesticides and fertilizers. The coastal zone is also under pressure from air pollution from land-based and marine sources.

Urban and rural landfills/waste disposal sites cause significant pollution of surface waters and sometimes marine waters. Almost all these sites are obsolete; the majority of town and village landfills are illegal and are located very close to river banks.

Georgia is very rich in fresh waters. However, the water quality in surface water bodies often does not meet European standards. The major reason for this is the discharge of untreated sewage into surface waters. This fosters algae bloom leading to oxygen depletion and degradation of aquatic

ecosystems. Currently, fresh water quality monitoring covers only a very small part of Georgian rivers. More specifically, of 26 thousand rivers existing in Georgia, with 60 thousand km total length, regular water quality monitoring is carried out on 39 points of 22 rivers. Regarding the ground waters, the water quality monitoring is not conducted at all.

Thus, pollution of inland and coastal waters is a serious problem and needs comprehensive measures to address it. In addition, pollution control should be improved throughout the country and the environmental monitoring network expanded to check air, water and soil quality on a regular basis.

Objective 9. By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Before adoption of the Law on Wild life (1996) the introduction of invasive species was not controlled. In general, commercial fish species and fur producing or game mammals - e.g. Crucian carp (*Carassius carassius*), silver carp (*Hypophthalmichtliys molitrix*), racoon (*Procyon lotor*), racoon dog (*Nyctereutes procyonoides*) - have been introduced. Many of these species turned out to be very invasive and have spread over large areas of Georgia. Alien species have had negative impacts on native species, ecosystems and biomes. For instance, the introduction of crucian carp has resulted in significant change and homogenization of local ichthyofauna: many native species could not compete with introduced species and have simply disappeared. There is evidence of a reduction in nesting birds after the introduction of racoon in the east of Georgia; however, the scale of impact of the racoon has never been assessed. Alien species make up about 9% of the total plant species of Georgia. Out of a total of 380 alien species, 134 are now completely naturalized. Currently there are 16 invasive species in Georgia.

The non-native species of flora that occur in Georgia have not been well studied. Based on available information we can conclude that invasive species cause transformation of individual ecosystems, including unique ecosystems and represent serious threats to endemic plant species, agricultural lands and human health. It is necessary to carry out intensive research in order to better understand the role of alien plant species and to elaborate both preventive (e.g. legal-regulatory basis, trade and border control, etc.) and control (mechanical, chemical, biological, integrated) measures for the purpose of limiting the distribution of alien species, thus minimizing environmental and economic damage caused by spreading of such species.

Currently the introduction of alien species is regulated by the law, though there is no clear strategy for regulating the alien species that are already widespread in Georgia. It is necessary to study the potential for controlling/eradicating major alien invasive species and to elaborate proper measures.

Objective 11. By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

In 2009-2011, within the framework of the joint Council of Europe and EU Programme for the development of the Emerald Network in Central and Eastern Europe and the South Caucasus, a scientific database and maps were prepared and 20 sites of special conservation interest (ASCI) with a total area of 596,475.63 ha were identified. These areas are currently under review prior to approval. The majority of the sites coincide with existing protected areas and in the future the focus for selecting ASCIs should be on territories outside protected areas.

At present, 7% of total land of Georgia is covered by protected areas. In order to fully meet objective #11 the protected area network would have to be expanded by an additional 800,000 ha.

Objective 12. By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

In 2006 a new national Red List was created, which consists of species with a designated conservation status based on IUCN categories. Currently there is no information on the population dynamics of these species due to the absence of regular monitoring. Without having reliable monitoring data it will be difficult to judge achievement of the objective.

Many in the scientific community think that the present Red List needs review and the status of some species may be changed as a result of this exercise. However, any change would not be due to a change in the real conservation status of specific species but rather to insufficient assessment of their condition in the past.

Objective 14. By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

This issue is more or less addressed for ecosystems located within protected areas. It is necessary to introduce integrated ecosystem management approaches for ecosystems located outside the protected lands.

Annex 1. High Conservation Value Georgian Flora[3]

1. *Acer ibericum* M. Bieb. ex Willd.
2. *Angelica adzharica* Pimenov
3. *Arbutus andrachne* L.
4. *Aristolochia pontica* Lam.
5. *Aquilegia colchica* Kem.-Nath.
6. *Campanula hypopolia* Trautv.
7. *Campanula kachetica* Kantsch.
8. *Campanula kantschavelii* Zagareli
9. *Campanula mirabilis* Albov
10. *Campanula paradoxa* Kolak.
11. *Campanula radchensis* Charadze
12. *Campanula raddeana* Trautv.
13. *Campanula suanetica* Rupr.
14. *Cerasus microcarpa* C.A. Mey.
15. *Cirsium oblongifolium* K. Koch
16. *Corylus colchica* Albov
17. *Erica arborea* L.
18. *Galanthus alpinus* Sosn. subsp. *caucasicus* Gagnidze
19. *Galanthus kemulariae* Kuth.
20. *Galanthus ketzkhovelii* Kem.-Nath.
21. *Galanthus krasnovii* A. Khokhr.
22. *Galanthus platyphyllus* Traub & Moldenke
23. *Galanthus rizehensis* Stern
24. *Galanthus schaoricus* Kem.-Nath.
25. *Galanthus woronowii* Losinsk.
26. *Genista adzharica* Popov
27. *Globularia trichosantha* Fisch. & C.A. Mey.
28. *Gymnospermium smirnovii* (Trautv.) Takht.

[3] The species included in this list of high conservation value Georgian flora were selected based on the opinion of Georgian experts.

29. *Halimodendron halodendron* L.
30. *Hibiscus ponticus* Rupr.
31. *Iris iberica* Hoffm.
32. *Iris winogradowii* Fomin
33. *Kosteletzkya pentacarpa* (L.) Ledeb.
34. *Lens ervoides* Grande
35. *Lilium caucasicum* (Miscz.) Grossh.
36. *Lilium kesselringianum* Miscz.
37. *Lilium monadelphum* M. Bieb. subsp. *monadelhum* M. Bieb.
38. *Lilium monadelphum* M. Bieb. subsp. *georgicum* (Manden.) Gagnidze
39. *Orchis punctulata* Stev. ex. Lindl.
40. *Osmanthus decorus* Boiss. & Balansa
41. *Ostrya carpinifolia* Scop.
42. *Paeonia carthalinica* Ketsk.
43. *Paeonia lagodechiana* Kem.-Nath.
44. *Paeonia mlokosewitschii* Lomakin
45. *Paeonia ruprechtiana* Kem.-Nath.
46. *Paeonia steveniana* Kem.-Nath.
47. *Pancratium maritimum* L.
48. *Pinguicula vulgaris* L.
49. *Pistacia mutica* Fisch & C.A. Mey.
50. *Primula darialica* Rupr.
51. *Puschkinia scilloides* Adams
52. *Pyrus demetrii* Kuth.
53. *Pyrus ketzkhovelii* Kuth.
54. *Pyrus oxyprion* Woronow
55. *Pyrus sachokiana* Kuth.
56. *Quercus hartwissiana* Steven
57. *Quercus იბერიკა* Steven ex Woronow
58. *Quercus macranthera* Fisch. & C.A. Mey.
59. *Quercus pedunculiflora* K. Koch.
60. *Quercus pontica* K. Koch.

61. *Rhododendron smirnowii* Trautv.
62. *Rhododendron ungernii* Trautv.
63. *Salvia garedji* Troitzk.
64. *Sambucus tigranii* Troitzk.
65. *Scorzonera ketzkhovelii* Sosn. ex Grossh. & Sosn.
66. *Scorzonera kozlowskyi* Sosn. ex Grossh.
67. *Solidago turfosa* Woronow ex Grossh.
68. *Spiranthes amoena* (M. Bieb.) Spreng.
69. *Trapa colchica* Albov
70. *Trapa maleevii* V.N. Vassil.
71. *Tulipa biebersteiniana* Schult. & Schult. f.
72. *Tulipa eichleri* Regel
73. *Zelkova carpinifolia* Pall.
74. *Pinus pityusa* Steven
75. *Matteuccia struthiopteris* (L.) Tod.
76. *Osmunda regalis* L.

Annex 2. High Conservation Value Georgian Fauna[4]

1. *Parnassius apollo*
2. *Lycaenidae*
3. *Acipenser spp.*
4. *Mertensiella caucasica*
5. *Vipera kaznakovi*
6. *Mesocricetus brandti*
7. *Prometheomys schaposchnikovi*
8. *Chiroptera*
9. *Ciconia nigra*
10. *Aegypius monachus*
11. *Aquila heliaca*
12. *Phasianus colchicus*
13. *Tetrao mlokosiewiczi*
14. *Capra cylindricornis*
15. *Capra caucasica*
16. *Capra aegagrus*
17. *Cervus elaphus*
18. *Gazella subgutturosa*
19. *Lutra lutra*
20. *Ursus arctos*
21. *Lynx lynx*
22. *Panthera pardus*
23. *Tursiops truncatus*

[4] The taxa included in this list of high conservation value Georgian fauna were selected based on the opinion of Georgian experts.

Annex 3. Priority Habitats of Georgia[5]

1. Coastal lagoons
2. Fixed coastal dunes with herbaceous vegetation (grey dunes)
3. Mezo-oligotrophic marshes with sphagnum (*Sphagneta palustrae*)
4. Tall grass marshes
5. Low grass marshes
6. Tussock sedge wetlands
7. Short rhizome sedge marshes
8. Long-rhizome sedge marshes
9. Caves
10. Rock and true glaciers
11. Subalpine beech woods with *Acer* spp.
12. Limestone beech forests (Cephalanthero-Fagion)
13. Beech forests with Colchic understory (Fageta fruticosa colchica)
14. Tilio-Acerion forests of slopes, screes and ravines
15. Bog woodland
16. Alluvial (flood plain) forests
17. Xero-thermophyte oak forest
18. Bichvinta pine forest *(Pinus pithyusa)*
19. Yew forest *(Taxus baccata)*
20. Chestnut forest (*Castanea sativa*)
21. Zelkova forest (*Zelkova carpinifolia*)
22. Forest with Boxwood (*Buxus colchica*)
23. Kolhketi relic broad-leaved mixed forest
24. Arid open woodlands
25. Sub-alpine birch krummholz
26. Sub-alpine tall herb vegetation
27. Prostrate scrub vegetation (Rhododendron)

[5] The habitats included in this list of high conservation value habitats were selected based on the opinion of Georgian experts.

THEMATIC FIELD 2. PROTECTED AREAS

Lead organisation: WWF Caucasus Programme Office

Lead author: Ekaterine Kakabaze

1. Introduction

1.1. Importance of Georgian Protected Areas

Creation of protected areas is the key effective measure for territorial protection of biodiversity in Georgia today. In addition, protected areas play an important role in the country's economic development and social well-being by protecting vital ecosystem processes and providing comprehensive ecosystem services to meet community needs. These needs include provision of essential resources, regulation of ecological processes as well as supporting and cultural- recreational services. These services provide the population with fresh water and stabilize water resources in the ecosystem, thus protecting the communities from landslides, avalanches, and floods, and providing a stable resource of fresh and mineral water as well as water as a sustainable energy resource that may be used and is used outside protected areas.

Protected areas of respective categories also provide the population with a sustainable supply of wood and offer significant food resources (chestnut, bladder nut (*Staphylea pinnata*), wild fruit, berries (*Arctostaphylos uva*), mushrooms, culinary herbs etc.), medical herbs etc. Regulatory services, except for water regulation, serve the important purposes of carbon accumulation, i.e. stabilization of climate (including microclimate). Protected areas also ensure air quality, natural utilization and detoxification of waste, forest disease control, productivity of pastures in the traditional use zones of protected areas, etc.

Protected areas also ensure conservation of the aesthetic value of landscapes, which is a precondition for tourism and recreation. Protected areas are 'laboratories of nature' that attract researchers from different countries.

The existence of 'healthy' ecosystem services is a necessary factor for sustainable socio-economic development. Accordingly, protected areas are the priority areas where these services should be sustainably conserved.

In 2011, a 'Valuation of the Contribution of Protected Areas Ecosystem Services to Economic Growth and Equity' was conducted in the Borjomi-Kharagauli and Mtirala National Parks in the frame of the WWF Protected Areas for a Living Planet – Caucasus Ecoregion Programme. In the same year, under the framework of the United Nations Environment Programme and Global Environment Facility (UNDP/GEF) Project 'Promotion of Financial Sustainability of Georgia's Protected Areas' a study was conducted on 'Valuation of the Contribution of Ecosystems to Economic Growth and Human Well-Being: Tusheti Protected Areas and Georgian Protected Area Network'. These documents provide an overview of existing ecosystem services in the given protected areas and present their economic evaluation.

Protected Areas also fulfil an important function in the context of global climate change, both in terms of adaptation to and mitigation of climate change consequences. Ecosystem degradation is a significant source of greenhouse gas emissions. Following from their functions, protected areas protect ecosystems and thus promote accumulation of carbon on their territory. In addition, in well-managed protected areas where undisturbed ecosystems are still preserved, no additional activities are usually necessary for ecosystem adaptation to potential climate change, as natural ecosystems and biocenoses self-regulate and gradually, by succession, adapt to the new conditions.

1.2. CBD targets for protected areas

Strengthening of protected areas is one of the targets of the CBD Strategic Plan for Biodiversity 2011-2020. Target 11 reads:

> "*By 2020, at least 17 per cent of terrestrial and inland water areas and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape*".

Georgia as a party to the CBD has committed to contribute to the implementation of the CBD 2020 targets by harmonization of national targets with global ones.

1.3. Progress towards the goals and objectives of NBSAP-1

NBSAP 1 included the following strategic goal related to protected areas:

> to develop a protected areas system to ensure conservation and sustainable use of biological resources.

The following specific objectives were set to achieve the strategic goal:

- To establish an effective protected areas network
- To improve the process of protected areas planning and management
- To improve and/or develop financial mechanisms for protected areas
- To set up a data base of Georgia's protected areas
- To increase the level of political support and develop cross-sectoral cooperation within the Government
- To increase international and transboundary cooperation
- To improve education and interpretation for visitors to protected areas
- To develop ecotourism potential within protected areas
- To increase the involvement of local communities in the planning and management of protected areas.

A detailed assessment of the state of implementation of NBSAP-1 is presented in Appendix 1. Highlights are as follows:

Development of the PA network:
Since 2005 Georgia has established three new protected areas - Mtirala National Park, Javakheti Protected Areas and Machakhela National Park - increasing the total area of area under protection from 431,028.98 ha (6.16% of Georgia's territory) to 519,053.75 ha (7,42% of Georgia's territory). There are still some critical gaps in the PA network, in particular in the central Caucasus mountain range (the regions of Svaneti, Raja, Lechkhumi and Khevsureti).

A draft strategy and action plan for developing the PA network was prepared, though it was not formally adopted. There are indications of increased pressures on the PA network and barriers to completing the network: two protected areas have been reduced in size; in one case to accommodate a high voltage transmission line; in the other case to accommodate a hydro-electric power station. The country's drive for economic development, in particular the country's hydro-electricity generation and regional development strategies, are making it difficult to complete the network.

PA management:
There have been significant improvements in PA management effectiveness. The MoEP adopted new regulations on the content and process for elaborating PA management plans in line with international best practice. Management plans for four PAs have been prepared in accordance with the guidelines; one of them has been formally approved. The Caucasus Nature Fund is co-financing the running costs of four PAs and plans, together with the APA, gradually to increase the number of supported PAs to over the next five years. The UNDP/GEF project "Catalyzing Financial Sustainability of Georgia's Protected Areas" achieved changes in legislation that allow payments to PAs by visitors to be retained and reinvested in the PA network and piloted new ways of capturing income from visitors to Tusheti PAs. This progress is to be welcomed but more needs to be done. The APA and its territorial administrations still lack capacity in PA management planning. The gap between the funding needs of the PA network and actual funding is still substantial and more steps need to be taken to close the gap.

Participation of local communities:
Some progress has been made in involving local communities in planning and managing protected areas. The commissions established by the Ministry of Environment Protection to prepare proposals for new PAs include consultations with local communities; the external boundaries and zonation of the new Javakheti PAs were planned with the full involvement of local communities, whose representatives participated in the various working groups set up by the planning team. The regulations governing the structure and process of preparing PA management plans include participation by local communities as an essential part of the process; all management plans prepared since the guidelines were promulgated were elaborated with the participation of representatives of the local population. The challenge now is to transfer the practice of involving local communities in protected areas management planning to the rest of the PA network and to extend participation into co-management of PAs.

Cross border cooperation:
There has been significant progress in bilateral cross-border cooperation between Georgian and the other countries of the southern Caucasus. The Ministry of Environment Protection of Georgia has signed a formal agreement with the Ministry of Environment and Forestry of Turkey to develop cross-border cooperation between protected areas in western Georgia and eastern Turkey. The Agency of Protected Areas of Georgia and Ministry of Ecology and Natural Resources of Azerbaijan are developing cooperation between Lagodekhi PAs and Zakatala State Nature Reserve with the support of the Transboundary Joint Secretariat for the Southern Caucasus (TJS).

2. History of Protected Areas development in Georgia

Georgia has a long history of nature protection. Until the 20th century natural sites were protected mainly for religious purposes (so-called sacred forests) and for use as hunting territories. The history of protected areas in today's understanding of this concept started in Georgia in the 20th century. The first official protected area, Lagodekhi State Reserve, was established in 1912. In 1920-1930, 28 new state reserves were created. Yet in 1951, under the Natural Resources Mobilization Plan, most of the natural state reserves were cancelled, leaving only Lagodekhi State Reserve. Later, in 1975, some old state reserves were re-established, and by the time the Soviet Union collapsed Georgia had 15 state reserves with a total area of 168,800 hectares covering about 2.4% of the country's territory.

The state reserves were areas under strict protection where any kind of human intervention was prohibited by law, (i.e. the status at that time corresponded to the equivalent status today). Yet the law was frequently violated in most of the state reserves. Objectives for establishing state reserves were not sufficiently justified and an integrated approach was not applied. Rather, the focus was on the protection of forests and/or one species and no attention was paid to other species, to the ecosystem in general, to ecological processes or social and human aspects. There was no protected area legislation in place. As a result, most of the state reserves had low ecological effectiveness.

In addition to state reserves, about 0.8% of the country's territory was allotted for forestry/hunting farms. Another protection category – natural monuments – included 30 living (in particular huge and old trees) and 77 non-living objects (rocks, caves, fossilized plants, canyons and gorges, volcanic forms, etc) included in the USSR Red Book. Some of those natural monuments were located on the territory of the state reserves. There was no management of the natural monuments, yet legal liability was envisaged for their damage and use.

In the soviet period, issues related to protected areas were regulated by the 1958 Law on Nature Protection and at the same time were governed by forestry legislation, which led to contradictions between the objectives and practices of nature conservation and forest use at different levels.

In the early 1990s, after independence, with the support of international donors, Georgia started planning and creating today's protected area system, increasing the area under protection and diversifying protection categories. In 1990–1991, WWF initiated and supported development of the first spatial development plan for Georgia's protected areas, which was later used as a basis for planning. In 1995, the Georgian Cabinet of Ministers formally established Borjomi-Kharagauli National Park and identified opportunities for additional protected areas in the Eastern Greater Caucasus range, Ivri, Kolkheti, Achara-Imereti, Central Greater Caucasus Range and Erusheti, Shavsheti and Abkhazia. Kolkheti National Park was established by law in 1998 and subsequently physically established in the framework of the Integrated Coastal Zone Management Project funded by the World Bank and the Global Environment Facility (GEF). Kolkheti National Park is now a protected area of utmost importance for migrating birds (especially waterfowl) on the eastern Black-Sea coastal zone. Borjomi-Kharagauli NP was physically established in 1999-2003 with financial support from BMZ and KfW and technical assistance from WWF.

The *Law on the Protected Area System (1996)* established protected area management categories and procedures for creating protected areas. The law is largely in compliance with IUCN recommendations; thus Georgia was the first country in the region to adopt international legal standards related to protected areas. Table 2.1 below shows the protected area categories under the 1996 law and corresponding IUCN categories. The 1996 law also regulates the establishment of Biosphere Reserves, World Heritage Sites and Wetlands of International Importance.

Table 2.1. Classification of Georgian Protected Area Categories

Protected Area Category	Key Management Targets	IUCN Category
Strict Nature Reserve/State Reserve	Strict protection of biodiversity, non-manipulated scientific research	I
National Park	Protection of ecosystems and recreation on a comparatively large area	II
Natural Monument	Conservation of small-sized prominent natural site and features	III
Managed Reserve/Sanctuary	Conservation of biodiversity through active management and focusing on particular species	IV
Protected Landscape	Conservation of traditional natural and cultural landscapes	V
Multiple-Use Territories	Sustainable development of natural ecosystems	VI

In 1998-2008, the World Bank and the Global Environmental Facility (GEF) supported implementation of the Georgia Protected Areas Development Project aimed at biodiversity conservation in Georgia through the creation of environmentally and socially sustainable protected areas and implementation of biodiversity conservation policy in agricultural landscapes between protected areas .The project was also supported by the US Department of the Interior (USDoI). In the frame of that project eight new protected areas were created and three existing protected areas were expanded by means of one legislative act –the Tusheti and Vashlovani National Parks were

established; the Lagodekhi and Ilto Managed Reserves, Tusheti Protected Landscape and three managed reserves were created; protected area planning on the Greater Caucasus Range was conducted; documentation (management plans and draft laws) for establishing further protected areas - Central Caucasus, Alazani Floodplains and Davit Gareji - were prepared by the Georgian Protected Areas Programme (GPAP); activities to raise awareness about the importance of protected areas and biodiversity conservation were implemented in three regions of the Eastern Greater Caucasus. Reorganization and institutional strengthening of the Agency of Protected Areas were carried out within the framework of the project.

3. Regulatory Framework

The creation and management of protected areas are regulated primarily by the *Law on the Protected Area System (1996)*. The law complied with the international standards of the time, namely the list of protected area categories and permitted and prohibited interventions within different PA categories. Thus, the law became a pioneering legislation of its kind in the region. However, the law needs to be revised to harmonize it with the current IUCN guidelines[6] on protected area categories and protected area management (the guidelines have been updated recently to take account of the knowledge and experience accumulated over years).

The following laws governing the management of specific protected areas are in force:

- Law on Establishment and Management of the Kolkheti Protected Areas (1998);
- Law on Establishment and Management of the Tusheti, Batsara-Babanauri, Lagodekhi and Vashlovani Protected Areas (2003);
- Law on Establishment and Management of the Borjomi-Kharagauli Protected Areas (2007);
- Law on the Tbilisi National Park (2007);
- Law on Establishment and Management of the Imereti Caves Protected Area (2007);
- Law on the Status of Protected Areas (2007).
- Law on the Mtirala National Park (2007);
- Law on Establishment and Management of the Javakheti Protected Areas (2011).

The *Law on the Status of Protected Areas* regulates issues related to the status, area and boundaries, management and operation of protected areas that were established by the governments of the Georgian Soviet Socialist Republic and the Republic of Georgia. The law changed the status of some state reserves – those of Algeti, Ajameti, Kazbegi and Kintrishi – either partly or totally, resulting in the establishment of Algeti and Kazbegi National Parks and Ajameti Managed Reserve, and a protected landscape on part of the Kintrishi State Reserve; updating of the status of Korugi, Chachuna, Iori, Katsoburi and Gardabani from hunting forests into Managed Reserves.

Other laws related to protected areas include the Law on Fauna (1996), the Forest Code (1999), the Law on Environmental Protection (1996).

A number of by-laws regulate different issues related to protected areas and their management. The mandate of the Agency of Protected Areas is established by APA Regulation approved by decree #27 of the Georgian Minister of Environment of 1 July 2011. The same decree also approved 'Typical Regulations of APA's Territorial Administrations' that specified mandates of protected area administrations. Protected area management planning procedures are specified in the decree 'On Steps and Procedures for Elaborating the Structure, Content and Thematic Components of Protected Area Management Plans' (Decree #39 of the Georgian Minister of Environment of 22 August 2011).

[6] Dudley, N. (Ed.) 2008.Guidelines for applying protected area management categories. Gland, Switzerland: IUCN.

4. Existing Protected Areas

In June 2012 protected areas occupied a total of 512,442.75 hectares, which is about 7,35% of the country's overall territory (see Table 2.2). There are 14 State Reserves, nine National Parks, 18 Managed Reserves, 24 Natural Monuments, two Protected Landscapes, and one Multiple-use Territory. The area under legal protection has tripled since independence.

Table 2.2. Georgia's Protected Areas

#	Protected Areas	Area (ha)	Year Established
State Nature Reserves			
1	Babaneuri	862.10	1960
2	Batsara	2,985.96	1935
3	Bichvinta-Miusera[1]	3,645	1966
	Bichvinta	165	1926
	Lidzava	1,296	1960
	Miusera	2,184	1946
4	Borjomi	14,820.60	1929
5	Vashlovani	10,143	1935
6	Tusheti	12,627.2	1980
7	Kintrishi	10,703	1959
8	Lagodekhi	22,295	1912
9	Liakhvi[1]	6,388	1977
10	Mariamjvari	1,040	1935
11	Ritsa[1]	16,289	1946
12	Sataplia	330	1935
13	Pskhu-Gumista[1]	40,819	1978
	Pskhu	27,334	1978
	Gumista	13,400	1978
	Skurcha	85	1946
14	Kobuleti	331.25	1998
National Parks			
1	Algeti	6,822	1965
2	Borjomi-Kharagauli	61,234.84	1995
3	Vashlovani	24,610.06	2003
4	Tbilisi	23,218.28	1946
5	Tusheti	69,515	2003
6	Kolkheti[2]	44,599.8	1998
7	Mtirala	15,806	2006

#	Protected Areas	Area (ha)	Year Established
8	Kazbegi	8,707	1976
9	Javakheti	14,206.83	2011
Natural Monuments			
1	Abano Mineral Lake	0.04	2012
2	Alazani Floodplain	204.4	2003
3	Artivi (Eagle) Gorge	100.4	2003
4	Bgera Cave		2011
5	Gabzaruli (Cracked) Lake		2011
6	Didgele Cave		2011
7	Tetri (White) Cave		2007
8	Trusos Travertins	4.2	2012
9	Iazonis Cave		2007
10	Melouri Cave		2011
11	Nagarevi Cave		2007
12	Navenakhevi Cave		2007
13	Okatse Canyon	70.5	2007
14	Okatse waterfalls		2007
15	Premetes (Prometheus') Cave (Kumistavi Case)	46.6	2011
16	Sakazhia Cave		2007
17	Satsurblia Cave		2011
18	Sakhiznari Cliff	335.7	
19	Solkata Cave		2011
20	Takhti-Tepa	9.70	2003
21	Gliana Cave		2011
22	Tsutskhvati Cave		2007
23	Tskaltsitela Gorge	21.7	2007
24	Khomuli Cave	1.8	2007
Managed Reserves			
1	Ajameta	5,117	1946
2	Bugdasheni Lake	126	2011
3	Gardabani	3,484	1957
4	Tetrobi[3]	3,100	1995
5	Ilto	6,971	2003

#	Protected Areas	Area (ha)	Year Established
6	Iori	1,336	1965
7	Kartsakhi Swamps	158	2011
8	Katsobura	295	1964
9	Lagodekhi	2,155.2	2003
10	Madatapa Lake	1,484	2011
11	Nedzvi	8,992	1995
12	Sataplia	34	2011
13	Sulda Swamps	320	2011
14	Kobuleti	438.75	1998
15	Ktsia-Tabatskuri[3]	22,000	1995
16	Koruga	2,068	1965
17	Chachuna	5,200	1965
18	Chanchala Lake	839	2011
Protected Landscapes			
1	Tusheti[4]	31,518	2007
2	Kintrishi	3,190	2003
Multiple Use Territories			
1	Kolkheti[5]	842.4	1999

Notes to Table 2.2:
1. These protected areas are in parts of Georgia that are not under the de facto control of the Georgian government.
2. Including 29 323.8 ha of land and 15 276ha of the sea.
3. Boundaries of the Ktsia-Tabatskuri[7]and Tetrobi Managed Reserves have not yet been finally delineated and marked, and the respective lands have not yet been officially transferred to APA.
4. The Tusheti Protected Landscape is managed by local self-government.
5. Boundaries of the Kolkheti Multiple-Use Territories were delineated only in 2011, though the area itself was established by law in 1999.

There is an unclear situation with the governance of multiple-use territories that were established at different times. The *Law on the Creation and Management of Javakheti Protected Areas* mentions the support zone as a multiple-use territory, yet similar to some other laws, fails to specify its boundaries or the management mechanism. Therefore it is necessary to clearly differentiate between the terms 'support zone' and 'multiple-use area' as theoretically a multiple-use area may be established independently and not as a support/buffer zone of a protected area, whereas there could be a support zone established, for instance, within a protected landscape; at least IUCN category I and II PAs need a buffer zone, and for this purpose the zone should be assigned the status of category V or VI. The governance of protected landscapes category also needs to be clarified.

Georgia has two Ramsar sites: the Ispani II and Central Kolkheti wetlands that are part of the existing Kolkheti Protected Areas and Kobuleti Protected Areas. A number of other sites are pending.

[7] Disputes about illegally leased lands of the managed reserves are underway.

5. Spatial Structure of Georgia's Protected Area Network

5.1. Georgia's protected area network and Aichi Target 11

Aichi Target 11 states:

> *by 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed[8], ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes*.

It should be noted that the numerical targets of Target 11 indicators are intended for reference only and may vary from country to country. How realistic are the indicators for Georgia?

Today Georgia's protected area network covers about 7% of the country's total terrestrial and inland water area. There are areas of particular importance for biodiversity conservation that are not included in the network[9].

Expansion of the Georgian protected areas network faces significant challenges (for instance in Racha-Lechkhumi-Svaneti-Samegrelo, between Borjomi-Kharagauli National Park and the Kintrishi Managed Reserve, and in Pshav-Khevsureti). The fact, that about 20% of the country's territory is occupied is a major hindrance on the development of the protected areas network.

In a view of those challenges the indicative target of 17 per cent of terrestrial areas does not seem realistic to achieve in 8-9 years, but 11-12 per cent seems quite feasible: it would require about 280-300 thousand hectares to be added to the existing area under protection. Creation of the Svaneti Glacier National Park and protected areas in Pshav-Khevsureti is realistic even in the nearest future: The APA is working actively on those plans with the support of other national and international agencies. These new protected areas would increase the total area of the network by up to 80-100 thousand hectares. The APA is also planning to create Samegrelo Protected Areas. The Algeti and Kazbegi National Parks will be expanded. The APA has developed a list of nominated natural monuments and submitted a respective draft law to the Parliament. There is a general plan for establishing protected areas in the central part of the Greater Caucasus Range and in other places. There are plans to establish a marine protected area in the Black Sea near to the Georgia's border with Turkey.

Expansion of the protected areas network is hindered by the lack of a vision for the network: the government does not have a strategic plan for the network (though according to the PA Law, protected area planning is a part of the Georgia's Development Strategy and is closely linked to different stages of spatial planning as well as to planning of different branches of economy).

Today's policy environment in Georgia is less favourable towards the further development of the protected area network (Georgia's development priorities now focus on energy and infrastructure development) and this fact makes strategic planning of the network even more necessary. In the Ecoregion Conservation Plan (ECP) (see below) there already exists a strong basis for elaborating a vision for a future protected areas network. Additional studies should be carried out using internationally accepted methodologies such as Key Biodiversity Areas (KBA) gap analysis[10]. The planning should be also supported by studies and data accumulated locally in Georgia (see below).

[8] Management of protected areas is discussed in section 6 of this chapter. The present section focuses on the spatial structure of Georgia's protected area network.

[9] Priority areas are identified in the *Ecoregion Conservation Plan for the Caucasus: 2012 Revised and Updated Edition* published by the Caucasus Biodiversity Council.

[10] See "*Identification and Gap Analysis of Key Biodiversity Areas*" IUCN Best Practice Protected Area Guidelines Series No. 15

Aichi Target 11 envisages "well connected" systems of protected areas. It is critical to transform Georgia's collection of isolated protected areas into an interconnected protected area network. It is clear that the political situation, lack of respective legislation and other reasons would prevent establishment of a comprehensive protected area network in Georgia by 2020. Yet even creation of some important ecological corridors and wildlife corridors would be a serious achievement, especially in some critical regions, such as the Likhi Ridge, the Alazani Valley. Again, we would not have to start from a scratch, as there are already some studies and documents existing in Georgia.

Finally, Aichi Target 11 calls for the integration of protected areas into broader landscapes, namely large conservation landscapes, such as, for instance, the Greater Caucasus Range in Georgia (which can be broken down into the Eastern and Western Greater Caucasus Range), the Smaller Caucasus Range, the Ivri Plateau, the Javakheti Highlands, etc. At a first glance, this objective could seem problematic, yet in reality, if well-planned, ecological network(s) would themselves easily integrated into large conservation landscapes.

The above analysis could be summarized as follows: there are still a lot of critical and sensitive biodiversity sites in Georgia that are located outside existing protected areas (e.g. the Central Greater Caucasus Range). Currently Georgia has no corridors connecting the existing protected areas, so there is no protected area network, and no PA spatial development plan that would provide for development of the existing protected areas and their transformation into a network. Yet a lot of work has been carried out and reports prepared that could support such planning. The most relevant documents are the following:

From 2002 to 2005 more than 130 experts from the six countries of the Caucasus, coordinated by WWF Caucasus Programme Office, identified, mapped and described the region's priority conservation areas and priority corridors. The results of that work are compiled in the Ecosystem Profile for the Caucasus Biodiversity Hotspot[11] and the Ecoregion Conservation Plan for the Caucasus[12] .In 2007 WWF Caucasus Programme Office supported generation of GIS data and a narrative report about proposed forest conservation areas that was then delivered to respective authorities. All three documents and the GIS information on the priority conservation areas, corridors and forest conservation areas are in the public domain.

In the framework of the *Georgian Protected Areas Development Project* funded by WB/GEF implemented by the Georgia Protected Areas Development Project in 2002-2008 ecological corridors were identified, including the Alazani floodplain forests and the Davit-Gareji Protected Landscape, and respective management plans were developed. The management plans were never formally adopted but they still serve as important reference documents.

In 2004 the Ministry of Environment Protection initiated planning of the national Emerald Network. Eight sites were identified and submitted to the Secretariat of the Bern Convention for inscription. The Emerald Network imitative was revisited in 2009–2011 under the project "Emerald Network Creation in the South Caucasus and Central and Eastern Europe" funded by the European Union and the Council of Europe. The project, which was implemented by NACRES, created a scientific database and maps and identified 21 potential sites. The second stage of the project is expected in 2013.

5.2. International spatial mechanisms for biodiversity conservation

Ramsar Convention on Wetlands. As mentioned earlier, there are two Ramsar sites in the country. Georgia also identified other priority sites for nomination as wetlands of international importance that meet three or four Ramsar criteria, and prepared respective documentation packages. The government has not yet approved the sites though their recognition would not have a significant

[11] CEPF Ecosystem Profile for the Caucasus. July 31, 2003 (Updated September 2004).

[12] *Ecoregion Conservation Plan for the Caucasus: 2012 Revised and Updated Edition* published by the Caucasus Biodiversity Council

impact on economic development. It seems likely that the reason for the delay in approval was that Lake Paravani was misinterpreted as the Paravani River, which is an energy resource. One of the sites, Lake Kartsakhi located on the territory of the Javakheti National Park, is shared between Georgia and Turkey and should be considered as a perspective area for future bilateral transboundary cooperation.

UNESCO Man and Biosphere Programme. In 2010, BMZ/KFW funded a feasibility study for the establishment of the Kazbegi Biosphere Reserve. The study recommended expanding the existing territory of the National Park.

UNESCO World Heritage Programme. The process of identification and nomination of potential areas for inscriptions on the UNESCO World Heritage List was re-initiated in 2011 when WWF and IUCN, with support from MAVA Foundation conducted a consultation and planning workshop on World Natural and Mixed Heritage Sites as an Environmental Protection Tool in Georgia. The workshop gave an impetus to future establishment of World Heritage Sites in Georgia.

Establishment of global categories of protected areas, such as the UNESCO World Heritage Sites, Ramsar sites, UNESCO's Biosphere Reserves, would raise international awareness about Georgia, attract additional funds to the protected area sector, and promote tourism development in the country.

5.3. Transboundary cooperation on protected areas

First steps have been already made towards transboundary and regional cooperation between Georgia and Turkey (Machakhela National Park in Georgia and Jamili Biosphere Reserve in Turkey), Georgia and Armenia (Javakheti Protected Areas in Georgia and Lake Arpi National Park in Armenia) and negotiations are underway between Georgia and Azerbaijan (Lagodekhi Protected Areas in Georgia and Zakatala-Balakan Protected Areas in Azerbaijan)

In 2009–2011, a project entitled '*South Caucasus – Creation of the Javakheti National Park in Georgia*' was funded by the Federal Ministry for Economic Cooperation and Development (BMZ) and the German Development Bank (KFW) and supported by WWF Germany/WWF-Caucasus to establish the Javakheti National Park and five Managed Reserves (Lake Khanchala, Lake Madatapa and Lake Bugdasheni Park and the Kartsakhi and Sulda swamps). The project Conservation of Arid and Semi-Arid Ecosystems in the South Caucasus (1999-2002) carried out by NACRES and Fauna and Flora International with financial support from GEF/UNDP, and a conservation plan for the Javakheti plateau developed by AHT, TAESCO and WWF in 2003, served as foundations for the above mentioned project and establishment of Javakheti protected areas. This area is one of the most promising ones for transboundary cooperation because the Arpi lake National Park has been established across the border in Armenia with funding and technical assistance from the same donor. Prospects for cross-border cooperation between the two countries are further strengthened by existence of the Transboundary Joint Secretariat (TJS), which is being implemented by AHT Group and the Regional Environmental Centre for the Caucasus (REC-Caucasus), promoting development of transboundary and regional mechanisms for nature conservation and rehabilitation in the South Caucasus.

6. Planning, Establishment and Management of Protected Areas

In the Soviet period, state reserves and forest-hunting reserves were administered by the Main Agency of Reserves and Hunting Forests, which was part of the Ministry of Forestry. In 1992-1997, the Agency was restructured into the Principal Bureau of Reserves and Hunting Farms of Georgia and over the years was either subordinated to different ministries or functioned as an independent entity. From 1997 protected areas in Georgia were managed by the Georgian State Department of Protected Areas, Reserves and Hunting Farms. In 2004 the state department was reorganized into the Department of Protected Areas subordinated to the Ministry of Environment Protection. In 2008

the department's functions were transferred to the newly created Agency for Protected Areas (APA), a legal entity of public law subordinated to the Ministry of Environment Protection.

Today planning of protected areas in Georgia is the responsibility of the Ministry of Environment Protection, the Agency for Protected Areas and the Ministry of Economy and Sustainable Development. Decisions to establish or cancel protected areas or change their protection category are made by the Georgian Parliament. Public policy in the field of creating protected areas, operation and management and policy coordination and compliance control are the responsibility of the Ministry of Environment Protection. Protected areas are managed by the Agency for Protected Areas through its territorial administrations.

Protected areas established at different times under various legal acts (acts of the Council of Ministries of the Georgian SSR, resolutions of the government of independent Georgia, Presidential Decrees or special laws) had different legal statuses. In 2004, all protected areas were established as legal entities of public law under the subordination of the Ministry of Environment Protection. In 2005 some protected areas had their independent legal status cancelled and became territorial units of the Department of Protected Areas. In 2008 all protected areas became administrative territorial units of the Agency of Protected Areas. At present there are 22 territorial protected area administrations[13].

Management of the protected area network has improved significantly since 2005: new, motivated personnel have been hired, poaching has been reduced, illegal logging has been almost eradicated (except in sections of protected areas located adjacent to populated areas). These improvements have been supported by centralization of management, which replaced the previous, decentralised system, which had proved ineffective and inefficient. However, centralization of management has resulted in the shifting of decision making for almost all matters from the territorial administrations to Tbilisi, which is not efficient. The Agency for Protected Areas envisages gradual decentralization, which will on the one hand alleviate the management burden on the Agency and on the other hand enable the territorial administrations to take more responsibility and authority for planning and implementing management activities.

According to the Law on the System of Protected Areas, the Agency for Protected Areas directly manages strict nature reserves, national parks, natural monuments, managed nature reserves, biosphere reserves, World Heritage Districts and Wetlands of International Importance (Ramsar sites). The law provides that the Agency may manage protected landscapes and, in exceptional cases, managed nature reserves, biosphere reserves, World Heritage Districts and Ramsar sites, together with other organisations; however, the law does not specify other organizations, procedures or regulations of such joint management. According to the PA law, the agency has the function of control over multiple use territories, yet this is not clearly formulated either.

At present all of Georgia's protected areas are managed by the Agency for Protected Areas except the Tusheti protected landscape and Kolkheti multiple use territory, which are managed by the respective local self-governments.

The Tusheti protected landscape has been managed by local self-government since 2006. From 2006 to 2011 the protected landscape was managed by only one employee of the Akhmeta municipality. Since March 2011 it has been managed by the Tusheti Protected Landscape Administration which was established by the Akhmeta municipality. The administration's charter specifies the structure of the administration abnd regulates management issues, competence and functions.

The boundaries of the Kolkheti multiple-use territory were finally determined in 2011 and the area was transferred to the local self-government for management.

[13] Out of those, four administrative units are de jure under Georgian jurisdiction, however de facto, no state control is exercised there as they are located on the occupied territory of Abkhazia and so called South Ossetia.

Establishment of protected landscapes and multiple-use territories faces certain difficulties, as there is no system of spatial planning or a comprehensive land cadastre. Their management approaches are comparatively new and need to be improved, as they require the involvement of various stakeholders and cooperation with respective structures. Also, it is important to strengthen awareness and skills of the staff members. Legislation needs to be improved to properly define powers and competences of relevant governing bodies and other structures as well as to clearly formulate management principles of protected areas in these categories. Provisions for the creation and management of biosphere reserves need to be elaborated. Provisions regarding the management of managed nature reserves and natural monuments also need to be adjusted.

Current legislation only provides for the creation of protected areas of national importance and does not envisage establishment of regional, municipal or local protected areas. Thus at present there is only one form of governance of protected areas – governance by the government (either through the national ministry/agency; or through regional or municipal government. International practice acknowledges and uses three more forms of governance – co-management, private governance and governance by indigenous and or local communities. In future, along with socio-economic development of the country, after the population has become less dependent on the natural resources in protected areas, these additional forms of governance should be included in Georgian legislation, as such diversification may facilitate establishment of new protected areas, expansion of current ones and help to create a connected network of protected areas.

Current legislation defines the forms of land ownership that are allowed in different categories of protected area. Land in state reserves, national parks, natural monuments and managed reserves may only be owned by the state. In protected landscapes and multiple use territories the law allows other forms of ownership. Land ownership in Ramsar Sites, World Heritage Sites depends on the category of protected areas where these are established.

Overall against the existing background, PA management in Georgia should be considered successful even despite the existing objective challenges that are discussed in detail below. The success is illustrated by the fact that in 2007 Borjomi-Kharagauli NP was admitted as a member of the PAN Parks Foundation, the European Protected Area network, following a comprehensive evaluation of compliance of management with international standards.

6.1. Human Resources Issues

Lack of staff in general and qualified staff in particular is a significant problem for the management of Georgia's protected areas.

Over the years various projects have carried out activities to improve the knowledge and skills of the staff of the Agency for Protected Areas and its territorial administrations. Within the framework of the WB/GEF-funded Georgia Protected Areas Development Project training was given to the staff of the Tusheti, Lagodekhi, Batsara-Babaneuri, Vashlovani, Kolkheti and Borjomi-Kharagauli protected areas). BMZ/KfW financed training for the staff of the Borjomi-Kharagauli Protected Areas administration. The capacities of Kolkheti National Park and Kobuleti Protected Areas were built under the WB/GEF-funded Integrated Coastal Zone Management Project. The Norwegian Government and WWF supported trainings in Chachuna Managed Reserve and Mtirala National Park. Since 2008, with the support of GIZ, within the framework of the International Technical Assistance Programme of the US Department of the Interior (USDoI/ITAP), various trainings and workshops have been conducted for staff of the APA and protected areas administrations and other governmental agencies. With the assistance of BP/BTC, IUCN Caucasus Cooperation Centre held trainings in protected area management planning. USDoI/ITAP and the TJS supported study tours to protected areas in the USA and Europe. The TJS has established a permanent twinning arrangement with the Eifel National Park in (Germany) which provides for sharing of experience with protected area managers from Georgia and Armenia and Azerbaijan. In the frame of EU-funded Georgia Carnivore

Conservation Project, awareness raising programmes were carried out for local communities in Tusheti and Vashlovani PAs, by Fauna and Flora International and NACRES.

Despite these efforts, lack of qualified staff remains a pressing problem because of low salaries and lack of social benefits. In some protected areas there are vacant positions of natural resources experts and rangers.

Introduction of a permanent system of regular training consisting of various modules is necessary for protected area staff. Dedicated training programmes have been developed with USDoI/ITAP support, yet lack of funding remains the major obstacle.

6.2. Management Planning

Management plans are the main instrument for protected areas management and are a requirement laid down in the PA Law. Over the years, management plans for some protected areas have been prepared with the support of different donor organizations; for example, management plans for Kolkheti, Kobuleti, Vashlovani, Tusheti, Lagodekhi and Batsara-Babanauri protected area were prepared in the framework of the WB/GEF-funded Georgia Protected Areas Development Project. However, the majority of those management plans have already expired. Only three protected areas - Batsara-Babaneuri, Kolkheti and Kobuleti protected areas - have current management plans and they expire in 2012. All other protected areas are managed under temporary regulations adopted by the Agency for Protected Areas (Order of the Minister of Environment no. 53, *On Approval of Temporary procedure for regulation of some Protected Areas*, December 6, 2011). The lack of a management plan hinders planning and implementation of relevant measures for a protected area and reduces the opportunities for involving local communities in planning and management.

All management plans need to be updated and brought into compliance with APA's recently developed standards[14] and approved by an order of the Minister of Environment. Progress is being made to that end:

In 2006-2008, with funding from BP/BTC Co, the IUCN South Caucasus Programme Office developed a draft management plan for Ktsia-Tabatskuri Managed Reserve. In the same period, a management plan was developed for Mtirala National Park with funding from the Norwegian Government and technical assistance from WWF.

In 2009-2011 a draft management plan for the new Javakheti Protected Areas was elaborated with the support of the German government and with technical assistance from WWF (presently the document is being updated to new standards).

In 2010-2912 a management plan was elaborated for Tusheti Protected Areas in the framework of the UNDP/GEF-funded "Facilitation of Financial Sustainability of Georgian Protected Areas" with technical assistance from Fauna and Flora International.

New management plans for Vashlovani Protected Areas and Borjomi Kharagauli Protected Areas are being prepared with the support of, respectively, the BMZ-funded project "Sustainable management of biodiversity: South Caucasus/Georgia" and the Caucasus Nature Fund (CNF) together with WWF Caucasus Programme Office.

Management plans will be developed for the Ajameti Managed Reserve, Imereti Caves PAs, Lagodekhi PAs and Mtirala NP in the frame of the EU-funded twinning project "Strengthening Management of the Protected Areas of Georgia", which is expected to start at the beginning of 2013.

Work is also due to start on a management plan for the Tusheti Protected Landscape with the support of the Czech Republic.

[14] Decree #39 of the Georgian Minister of Environment of 22 August 2011 "on Steps and Procedures for Elaborating the Structure, Content and Thematic Components of Protected Area Management Plans".

The above information shows that most of the management planning efforts has been so far been funded by donors under various projects. The APA and its territorial administrations do not have the capacity to prepare management plans by themselves due to lack of funding and of personnel with the necessary skills.

6.3. Equipment and Infrastructure

Over the years, different projects have supported technical capacity building efforts for Georgia's protected areas. This has helped to improve infrastructure and provide basic equipment in many protected areas. In this regard, the situation is much better in protected areas established and/or rehabilitated with donor assistance, or with substantial investments by the business sector, such as: Borjomi-Kharagauli National Park (German Government, CNF and some others), Tusheti, Lagodekhi and Vashlovani PAs (GEF/WB, CNF and some others), Kolkheti National Park (GEF/WB), Mtirala National Park (government of Norway) and Sataplia PAs (BP/BTC). The government of Norway has also invested in improvements in the Chachuna Managed Reserve, and BP/BTC in the Ktsia-Tabatskuri in recent years.

Under the respective programme financed by the Government of Germany through KfW the development of the Javakheti PAs infrastructure and provision of equipment are planned for the nearest future. The same donor is planning to support significant improvements in Algeti National Park and Kintrishi State Reserve. Potentially, the same donor would support improvement of infrastructure in Khazbegi NP and the planned Pshavi-Khevsureti protected areas. The CNF is planning to offer substantial support to Mtirala NP, Kintrishi State Reserve and some other protected areas. The Ministry for Environment Protection has applied to the GEF for funding to physically establish Machakhela National Park. WWF Caucasus Programme Office is implementing a BMZ-funded project which will comprise a component aimed at improving infrastructure and equipment for reintroduction of gazelles in the Vashlovani National Park.

The APA tries to use its own scarce funds to improve the existing infrastructure, but the issue is still pressing and equipment/infrastructure of Georgia's protected areas need significant further development, especially in those areas that are not in receipt of donor assistance. In many protected areas infrastructure is not compatible with the protected areas' functions; maintenance of the existing infrastructure requires significant expenditure; lack of equipment is obvious in many protected areas (for example, Tbilisi National Park has only one GPS).

6.4. Research and monitoring

The existing monitoring system in Georgian protected areas is imperfect. Rangers regularly gather information that is compiled in the annual Chronicle of Nature prepared by each protected area. Yet the methods for the data collection do not comply with modern scientific approaches; a modern unified methodology needs to be developed and applied.

One monitoring mechanism recently introduced in some protected areas is photo-traps. At present the number of photo traps is insufficient to create a comprehensive picture, and in some protected areas there are no photo-traps in place; in others there is a lack of trained staff.

Data are gathered in different projects and during scientific research conducted in protected areas:

In 2003 a male leopard was discovered in Vashlovani Protected Areas during baseline research which was being conducted in the framework of the GEF/WB-funded Georgia Protected Areas Development Project. Since then NACRES has been studying large mammals, including leopards. In 2009 WWF Caucasus Programme Office and NACRES jointly started a study of leopard in the Tusheti PAs; a similar study is planned for the proposed Pshavi-Khevsureti protected areas.

In the scope of the UNDP/GEF-funded project Facilitation of Financial Sustainability of the Georgian Protected Areas Syste (2009-2011) NACRES developed a programme for monitoring tur and bezoar goat in Tusheti Protected Areas.

Various projects are being implemented in Borjomi-Kharagauli Protected Areas: the administration is implementing a black-grouse monitoring project, targeted at identification of black-grouse population areas, their number and current ecological status; the Institute of Zoology is conducting a study of "Biodiversity of dragonflies, semi-coleopterous, thin winged and coleopterous species". The NGO "Biosphere" is collaborating with the administration in a project to promote chamois conservation.

Information on the number of deer population is systematically gathered by administrations of the Lagodekhi and Borjomi-Kharagauli Protected Areas.

The Institute of Ecology of Ilia State University (ISU) carried out a study to support the conservation of the Caucasian salamander in Borjomi-Kharagauli National Park, Nedzvi Managed Reserve and Kintrishi Protected Areas. The study identified habitats of the salamander and assessed the population status. Researchers of the ISU Institute of Zoology implemented a project to support the establishment and development of inter-state monitoring Network for the Caucasus *Chiroptera*. As part of this project scientific research was carried out in Kumistavi and Gliani caves; the *Chiroptera* and dragonflies in Gardabani Managed Reserve were also studied.

In 2009, NACRES implemented a project for brown bear conservation in Georgia, financially supported by Dutch fund Alertis. The purpose of the project was to study brown bear ecology in Vashlovani State Reserve and National Park and to conduct monitoring of large predators (including bear, leopard, lynx, and wolf).

Studies in protected areas are mainly conducted by research departments of universities and NGOs in the frames of different projects. The APA has identified gaps in different aspects of protected area management, developed a list of research needs and submitted it to respective scientific and educational institutions.

Despite the ongoing monitoring efforts discussed above, the monitoring system is insufficient. This is due to a number of factors: a) lack of funding to establish a modern monitoring system and to implement relevant measures (namely, trainings and monitoring capacity building); b) lack of staff in general and qualified specialists in particular: there are vacant positions of natural resources experts and rangers in some protected areas due to the low salaries and sometimes difficult working conditions.

In the scope of the GEF/WB-funded Georgia Protected Areas Development Project NACRES developed a biodiversity monitoring manual and implemented relevant trainings for staff of the APA and its territorial administrations in eastern Georgia. There is still a need for human capacity building for monitoring; also, lack of a local modern monitoring system (including relevant equipment) makes it very hard to implement substantial changes in terms of monitoring.

Data collected in protected areas are compiled centrally by the APA. A partial database exists but there is currently no unified electronic database with the corresponding software in place. The condition of biodiversity in protected areas and trends in condition is hard to evaluate because there are no up-to-date and effective mechanisms for data collection, data storage and analysis, so it is difficult to judge whether a particular protected area is achieving its objectives. All these are impediments for the efficient management of protected areas, for biodiversity conservation and resource management.

Creation of a unified, well-equipped monitoring system using modern methodologies is one of the complex and challenging tasks which needs to be addressed by the APA. This implies not only biodiversity monitoring, but monitoring of resource use by local communities in protected areas

(wood cutting, use of pasturelands, etc), tourism development (APA has made very important steps in this regard), cases of poaching, staff statistics, etc.

There is also a need for regular monitoring of management efficiency of protected areas individually and at system level using an internationally practiced evaluation approach (e.g. METT or RAPPAM).

6.5. Resource Management in Protected Areas

Illegal and uncontrolled use of natural resources poses a risk for protected areas as well as adjacent territories, especially in the case of protected areas located close to communities that largely depend on natural resources. In some cases this results in conflicts.

Various measures implemented over the years, including policing, high penalties, increased responsibility of the personnel and awareness-raising campaigns for the local population, have significantly reduced illegal logging, grazing, poaching, etc. Yet problems still remain: There are still some cases of poaching for sport and economic purposes. Difficult socio-economic conditions, lack or high cost of alternative energy sources for heating, remoteness of timber cutting areas from the communities (increasing the product cost), lack of benefits (e.g. subsidized prices for gas, or compensation for lost opportunities) provoke illegal logging and trigger conflicts. Long and early winters in recent years have been an additional obstacle to obtaining designated firewood, also increasing its consumption period. There is also a high demand for construction timber; restrictions in harvesting construction timber causes discontent among the population.

Grazing is another potential hazard for protected areas that have summer or winter pastures. Legal and illegal grazing, large-scale and uncontrolled grazing trigger land erosion, negatively affect composition and productivity of vegetation and create favourable conditions for invasive plants.

Today, there are no established grazing norms and no pasture management plans in place (there is a plan only for Borjomi-Kharagauli National Park which includes an unrealistic action plan); currently, a similar but simpler pasture management plan is being developed for Javakheti National Park.

The reasons for the above-mentioned problems include the poor socio-economic status of the population living in and around protected areas, low environmental awareness, poor availability of information and low degree of public participation in protected areas planning.

Recent liberalization of legislation regulating resource use (timber, hunting) together with misinterpretation of information by local communities bring significant new challenges for biodiversity conservation both inside and outside protected areas.

A number of projects in the protected areas sector have included a socio-economic development component for communities living around protected areas. The WB/GEF-funded *Georgia Protected Areas Development Project* was the first initiative to include such a component. The project implemented alternative income generating and nature protection activities in communities around the protected areas of Tusheti, Lagodekhi and Vashlovani, Batsara-Babaneuri State Reserves and Ilto Managed Reserve. The activities included construction of plant nurseries, restoration of agrobiodiversity, development of sustainable management planning of grazing lands, development of guesthouses, restoration of traditional, historical-cultural infrastructure and promotion of traditional crafts.

The Japan Social Development Fund implemented the project *Improving Livelihood Security in Kolkheti Lowland*. Project activities included upgrading of village infrastructure, alternative income generation, construction of drinking water supply systems, rehabilitation of school and kindergarten buildings, roads and bridges, and capacity building.

With the financial assistance of the German Government a similar approach was implemented to develop communal utilities in villages around Borjomi-Kharagauli National Park. With funding from the CEPF and facilitation and facilitation by WWF Caucasus Programme Office a number of pilot

development projects were implemented in the village of Chakvistavi surrounded by the Mtirala NP and in some adjacent areas. The objectives of the pilot projects included development of family tourism, beekeeping and construction of traditional plant nurseries. Implementation of socio-economic sustainability projects is also intended in the surroundings of Javakheti Protected Areas. The TJS also supports some socio-economic development activities in a regional and transboundary context.

Implementation of socio-economic development projects is highly important for improving the conditions of local communities and developing a positive attitude towards protected areas, but their implementation is associated with significant costs.

Another hazard is extraction of natural resources in the immediate vicinity of protected areas. The main reason is the lack of legislation regulating buffer zones. The Law on the System of Protected Areas provides for the creation of support zones around all categories of protected areas but makes support zones mandatory only in the case of biosphere reserves. Article 20 of the law provides for the control of activities outside protected areas but the law does not assign powers to any organisation to implement the controls. The APA does not have powers to finance or implement activities outside protected areas and can act only where a support zone has been legally established in the form of a multiple use zone.

Allocation of parts of protected areas to economic projects also has an adverse impact on protected areas. This has happened in Kolkheti National Park where a part of a Ramsar site was allotted for construction of the Kulevi terminal. In 2011 the Larsi hydropower project was approved for construction on the River Tergi and part of Kazbegi National Park was allocated for this. The planned project will cause river degradation and ecosystem and landscape change. There is a similar problem is regarding Kintrishi State Reserve. Such activities have a critical impact on protected areas and their biodiversity. If such infrastructure projects are necessary, removal of lands from protected areas should be at least compensated with allocation of some other areas, and the procedure should be legalized.

Inaccurate delineation of boundaries of some protected areas causes disputes with local communities and local self-government. Lands within some protected areas are either municipal lands, privately owned lands, or leased lands. In the framework of the WB/GEF Georgian Protected Areas Development Project carried out legal and physical demarcation of the protected areas. This process was especially successful in Vashlovani, Tusheti, Batsara-Babanauri, Ilto and Lagodekhi protected areas.

6.6. Restoration Measures

A number of reintroduction and conservation measures have been implemented in protected areas in the frame of different projects.

Steps have been made towards re-introduction of fauna species:

Since 2006, WWF has been supporting the 'Bezoar Goat Reintroduction Project' in Borjomi-Kharagauli National Park. The project has not been successful. The TJS, CNF and WWF are going to support an analysis of the causes of project failure and to re-start the project if the analysis provides a sufficient basis for that.

A project to reintroduce the goitered gazelle into Vashlovani National Park has been supported by the Ministry of Environment and Forestry of Turkey, the US DoI/TAP, GIZ, EU, NACRES, FFI, Tbilisi Zoo, Ilia State University, and WWF. In 2009, gazelles were brought from Turkey and placed in a fenced area for captive breeding with a view to release into the wild. Currently the potential for reintroducing the gazelle countrywide is being assessed and a reintroduction plan is being developed. Ilia State University conducted a genetic study of gazelles brought from Turkey as well as those to be brought from Azerbaijan. The APA is currently negotiating transfer of additional gazelles

with their counterparts from Azerbaijan. The fenced areas need to be expanded, stable veterinary services be ensured and other measures implemented.

In 2011, the Friends of Vashlovani PA Association established a Kolkhetian pheasant (*Phaseanus colkhicus*) breeding centre to facilitate restoration of the Kolkhetian pheasant in their natural habitats. The project was supported by the Eurasian Partnership Fund and BP/BTC.

In some protected areas measures are carried out to control forest diseases. The situation with the Imeretian oak-tree is a serious issue in the Ajameti Managed Reserve where the forest is affected by pests and there is no significant potential for natural regeneration. There is a nursery for the Imeretian oak in the vicinity of the Managed Reserve and restoration measures are being conducted.

The Kolkhetian box-tree is affected by diseases, and establishment of a nursery is needed to supply seedlings for restoration measures. The status of chestnut trees is also a problem, not only in protected areas but countrywide. Lack of funding is again a barrier to more or less comprehensive restoration measures in protected areas.

7. Stakeholder participation in the management of protected areas

According to the Law on the System of Protected Areas the APA cooperates with other governmental agencies and local authorities by means of Scientific-Advisory Councils that are established for each particular protected area.

Pursuant to the laws amended in 2007, the reasons for establishing the Councils were defined differently in respective laws. According to amendments to the *Law on Creation and Management of Tusheti, Batsara-Babaneuri, Vashlovani and Lagodekhi Protected Areas* (2007), the councils are required to ensure public involvement in the PA management. On the other hand amendments made in 2007 to the *Law on the System of Protected Areas* state that the Ministry of Environment Protection establishes the Scientific and Advisory Councils for cooperation with other governmental agencies and local authorities. Thus the amendments are apparently contradictory.

Councils created in 2007 included representatives of the Ministry of Environment Protection, APA, local authorities, NGOs and academia. The mechanisms for creating the councils were quite transparent. Council meetings were intended to be monthly. Yet only one meeting was held in the two years after the council was created, which was justified by the fact that high-ranking members of the council were busy with their principal occupations.

In 2008, the Ministry of Environment Protection created new Scientific-Advisory Councils for inter-agency cooperation and cooperation with local authorities in protected area management. The purpose of the councils was to involve the local population and NGOs in protected area management and make recommendations to the Ministry of Environment Protection. Today the councils includes PA administrations, the APA, local authorities, respective governmental agencies, NGOs, universities, research institutions and other stakeholders. Local stakeholders, including local NGOs and community representatives, are not represented in the councils. The councils do not hold regular meetings because of poor enthusiasm of their members resulting from lack of funds and motivation.

With regard to cooperation with local population and NGOs, the *Law on the System of Protected Areas* gives the right (but not an obligation) to the APA to cooperate with stakeholders and the local population in making decisions on PA establishment, development, changes in the PA territory and status, management planning, consideration and amendment of administrative acts and other documents; however the PA Law does not define respective cooperation mechanisms.

First steps towards involving stakeholders in protected areas management were made in 2003 during the establishment of protected areas in the framework of the WB/GEF-funded Georgia Protected Areas Development Project. Social surveys and meetings were held. In recent years even more important steps have been made in this direction: public disclosure and public consultations were

held prior to establishment of Javakheti Protected Areas and Machakhela National Park and the proposed Pshav-Khevsureti Protected Areas. Local participation was especially high during planning of the Javakheti Protected Areas: there were four working groups actively involved in planning the PA.

The APA uses various mechanisms to encourage public participation, e.g., sociological studies, festivals, educational events for children and teenagers, and contests. In 2009, IUCN Caucasus Cooperation Centre with the assistance of Eurasian Partnership Foundation and grants received from BP/BTC established "friends associations" in three protected areas (Tusheti, Lagodekhi, and Vashlovani) to strengthen participation and involvement of local stakeholders in PA management. Similar associations should be also established in other protected areas. Financial stability is a critical prerequisite for the existence of the associations.

Despite a number of implemented actions, stakeholder involvement is still insufficient. This is mainly due to lack or inadequacy of relevant regulations, lack of specific mechanisms of participation, lack of awareness and experience, low environmental awareness in the society and insufficient funding.

8. Environmental Awareness

Over the years, the APA, PA administrations and various international and national NGOs have conducted environmental education under different programmes and projects, for different target groups (schoolchildren, students, local population, and local governmental and nongovernmental organization, broad public).

The APA has been especially active in this regard. They have prepared many publications, TV programmes, social marketing clips and photo exhibitions, banners, etc. PA administrations cooperate with NGOs and schools for the purposes of environmental education and awareness-raising, trainings are arranged for schoolchildren and teachers, etc. Joint efforts are undertaken with the Ministry of Education and Science, Aarhus Centre, supported by the Organization for Security and Cooperation in Europe (OSCE), Georgian Society of Nature Friends (Telavi); public awareness raising and communication plans are updated yearly, public surveys are carried out, etc.

The conducted activities have succeeded in significantly raising the awareness and recognition of protected areas in the society. Yet there is still a need to expand the existing educational programmes and to develop new ones, so that the broader public will understand multi-functionality of protected areas and the critical importance of Georgian nature conservation, which ultimately is a major determinant of the Georgian population's well-being. It is a long-term objective that requires capacity building of PA administrations and significant funds.

In 2012 the Ministry of Environment Protection and Ministry of Education and Science developed an instrument called *'Environmental Education for Sustainable Development: Georgia's National Strategy and Action Plan 2012–2014'*. Implementation of the plan should facilitate overall environmental awareness-raising in the Georgian society.

9. Funding

State budget funding of the protected area network is not sufficient to ensure the effective management of the existing network or the further development of the network. The expansion of the network in recent years has been made possible only by the substantial financial support from various bilateral and multilateral donors. 50 per cent of current spending on the protected areas network is funded by donors.

Georgian state budget spending for protected areas has increased in recent years. Establishment of the APA as a legal body of public law has enabled protected areas to generate additional revenues from visitor services and concessions. Such revenues make up about 12-13 per cent of the APA's annual budget and there is scope to increase the amount of revenues taken. Current legislation does

not place any significant restrictions on diversification of funding sources and implementation of effective revenue generation mechanisms; however changes to the law to provide a clear definition of protected areas' funding diversification and mechanisms and of opportunities for the APA to generate additional income would help to enhance financial sustainability of the protected areas by giving

Despite the increased funding and additional revenues the existing state budget funding still covers only a part of the protected area network's needs. In its 2012 report on its audit of the APA's eco-tourism activities the Georgian Chamber of Control remarked that state budget funding of protected areas is inadequate[15].

Donor funding for Georgia's protected areas network has generally been channelled through short to medium term projects. They have not tackled the problem of financing operating costs (salaries, maintenance of infrastructure and equipment, purchase of materials and payments for utilities); on the contrary, investments made with donor funding (construction of new buildings, purchases of new equipment) have tended to push operating costs upwards. The only mechanism operating in Georgia to supplement state budget funding is the Caucasus Nature Fund (CNF). The CNF has been supporting Georgia's protected areas since 2009 and now finances up to 50% of the running costs of Borjomi-Kharaguali, Lagodekhi Protected, Vashlovani and Tusheti protected areas. The CNF will add more protected areas to its portfolio in the next three years.

The UNDP/GEF-funded project "Catalyzing Financial Sustainability of Georgia's Protected Areas" which closed in 2012 developed a ten-year investment plan[16] for 2012–2022 that should assist the Agency for Protected Areas in identifying and attracting investments in protected areas. The project identified the following as being in need of financial support:

- human and institutional capacity building of the Agency for Protected Areas and more especially of territorial administrations;
- updating/development of protected areas' infrastructure;
- maintenance of protected areas' infrastructure;
- expansion of existing public education programmes (formal and informal);
- provision of equipment for field staff;
- management planning;
- monitoring and evaluation programmes;
- funding and support of advisory councils and friends associations for increased stakeholder participation;
- local community-centred socio-economic projects;
- expansion of existing tourist marketing and PR programmes.
- facilitation of public-private and public-public partnerships to increase revenues (requiring investments capacity building to initiate and develop such partnerships). It is also recommended to create a business development unit in the Agency to be responsible for commercial and business issues related to protected areas and for relations with donors.

[15] Chamber of Control of Georgia (2012), Compliance Audit Report # 8100.

[16] ECFDC, GCCW, AMECO (2012). Ten-year investment plan of the financial status of the Protected Area System. Capacity building of the Agency of Protected Areas for managing cost efficiency of Protected Areas. Promotion of the Georgian PA System Financial Status. UNDP/GEF (unpublished).

10. Summary: Key Problems and Obstacles

The situational analysis identifies the following key problems existing in the protected area system today:

Structure of the protected area network:

- Strategic development goals for protected areas under Aichi Biodiversity Target 11 are not defined; in the same time:
- the territorial distribution and general area conserved are not sufficient for Georgian biodiversity conservation;
- transformation of existing PAs into a PA network has not been initiated;
- there is no drafted and adopted plan for the development of Georgian protected areas.
- Prioritisation of economic development, in particular of new hydro-electricity stations and other large infrastructure, is acting as a barrier to the development of the PA network and has resulted in land plots being removed from existing PAs;
- Territorial protection and international recognition instruments, like Ramsar Sites and UNESCO World Heritage Sites are not sufficiently applied;
- Transboundary cooperation mechanisms are underdeveloped;

Protected area design

- Deficient legislation, in particular related to establishment and management of protected areas of IUCN categories V and VI, and Biosphere Reserves. This problem is closely related to establishment and management of buffer/support zones, so high categories of protected areas in Georgia actually have no buffer zones. Also, improvements need to be made to legislation related to natural monuments and Managed Reserves (e.g. permission for hunting on the territory of natural monuments seems to be an obvious misunderstanding).
- There is deficient legislation in terms of provision of some PA lands for different uses, and the laws fail to define adequate compensation mechanisms.

Management of protected areas

- There is a lack of staff, including qualified personnel; no regular professional advancement/training; Most of the protected areas have no management plans;
- Most of the protected areas have no adequate infrastructure and equipment;
- There are no adequate mechanisms for local self-government and public involvement in PA planning and operation;
- Research and monitoring systems are incomprehensive; there is no unified database, no regular evaluation of protected area management effectiveness is conducted;
- There are few species reintroduction activities, and they are limited in scope (especially fauna re-introduction);
- There are no sufficient educational and awareness-raising programmes and activities dedicated to protected area relevance and functioning, especially community-oriented;
- There are no sufficient projects for socio-economic development of local communities that depend on protected areas or their resources; there are no benefit-sharing mechanisms to enable the population to generate more income from the existence and functioning of protected areas;
- Almost all components of the PA management structure and functioning are under-financed, including salaries and operational costs as well as costs for additional research, monitoring and educational activities, this being one of the major causes of the above-listed problems and obstacles.

THEMATIC FIELD 3. AGRICULTURAL BIODIVERSITY

Lead organisation: Biological Farming Association ELKANA

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1. Current State of the Agricultural Sector in Georgia

> *"The name Georgia was given because of the hard work and diligence of Georgians (as Georgia means a farmer)"*
> Vakhushti Bagrationi "Description of the Kingdom of Georgia" (1745)

Georgia has traditionally been an agrarian country; historically the country was able to meet its needs and at the same time food and exceptional wine were exported from Georgia from ancient times to neighbouring countries. The export of agricultural goods was one of the main sources of the country's income. For example it is known that the vineyards were cut down by the Muslim invader not to keep religious order but to reduceg income from exporting the wine, and this diminished the economic status of the country during the occupation (Javakhishvili, 1987).

In the Soviet period Georgia become a country of industrial agriculture, where exports of agricultural products exceeded import by 70%. The sector brought important income to the country's population and was one of the factors behind the economic development of the country. In the Soviet period Georgia supplied the Soviet Union with wine, citruses and tea. Fruit growing and production of early vegetables were also highly developed during this period. Livestock breeding and production of cereals were focused mainly on meeting the country's own needs. The main import products in the Soviet period were wheat and other grains, processed vegetables and meat, dairy and fish products.

With the breakdown of the Soviet Union and loss of traditional markets the agricultural industry collapsed fruit production reduced to half, grape production to one third, production of citruses to one eighth, and production of tea to one twentieth in comparison with the levels in the late 1980s. The production of vegetables and livestock were also significantly reduced. At the same time production of legumes, grain crops and oil producing plants increased about two times. The area of cultivated agricultural land fell almost by half.

The land privatization reform carried out in 1990-s resulted in significant fragmentation of agricultural land. In 2004, when the most recent agricultural census was carried out, there were 691,000 farms in Georgia, which employed about 47% of the country's work force. More than 25-30% of arable lands and lands covered with perennials were owned by farms of more than 1 hectare. 74% of the farms were operating only to meet household demand. The share of "home produced" food in the country was also high: 53% in villages and 25% in small cities, 51% in mountainous regions and 31% in plains.

According to 2009 data the percentage of the population living below the poverty line was 1/3 higher in rural areas than in the cities. In terms of food security, small farms and people residing in high mountainous regions belong to high risk groups and are especially sensitive. Keeping the given situation in mind it is alarming that the share of agriculture in GDP (14.8% in 2005, and 7.3% in 2010) and per capita production on almost all major products (with the exception of eggs and potatoes) is decreasing and 70% of agricultural products consumed by the country's population are imported. At the same time the reduction of the share of the agricultural sector in GDP is not only the result of the

dynamic development of other sectors of the industry but is significantly determined by very slow development of agricultural sector itself: during 2006-2008 nominal GDP increased by 72%[17]; however agriculture sector grew by only 5%. Besides this, the negative balance of the export of agricultural products from the country was 75% in 2008.

It should be noted that as a result of the trade embargo introduced by Russia on Georgian agricultural products in 2006, small farmers were most severely of all. While the large companies made some market diversifications and managed gradually to recover their sales to prer-embargo levels, small business owners found it much more difficult.

In the current unstable economic situation food security is a very serious issue for Georgia. In the last quarter of 2010 and beginning of 2011 Georgia experienced a high increase in food prices that threatened to create social tensions. In response the Government implemented so called "Corn and Wheat Programmes". In the frame of the programmes the Agriculture Corporation of Georgia distributed high yield industrial seed material of US variety of "Jagger"' wheat and hybrid corn (produced by "Pioneer") to the farmers on condition that they paid for the seed after the harvest.

Agriculture is one of the main priorities of the**"10 Point Strategic Plan on Modernization and Employment for 2011-2015"** of the Government of Georgia. According to this document, the Government is focused **"on development of primary and processing production in parallel with development of traditional household-based rural farming"** in Georgia. The main targets of the Strategic Plan are the following:

- **Area cultivated for agricultural purposes is increased by 50%**: active reclamation of non-used pastures and other lands, continuation of land privatization, rehabilitation of degraded lands;
- **The rate of self-sufficiency of the country is increased:** 50% of local demand for wheat is satisfied by local production, Georgia becomes a maize exporting country;
- Establishment of nurseries and demonstration/education centres in all regions;
- **The value of wine exports is doubled, wine production is increased by 50%** (means: diversification of export markets; creation and promotion of the "Qvevri wine" brand; development of wine tourism).
- **Productivity and export potential of cattle-breeding is increased:** development of breeding farms, artificial insemination and feed production;
- **Development of agricultural machinery service-centres:** geographic representation of service-centres increased for equal accessibility.
- Development of a network of logistics centres;
- Rehabilitation of irrigation systems.

2. Definition of Agricultural Biodiversity

Agricultural biodiversity is an important constituent part of global biodiversity. The definition of agricultural biodiversity used by the CBD is very board and includes all components of biological diversity of relevance to food and agriculture, and all components of biological diversity that constitute agricultural ecosystems**.** Agricultural biodiversity is the outcome of the interactions among genetic resources, the environment, and the management systems and practices used by farmers. The CBD's definition of agricultural biodiversity includes:

1) **Plant genetic resources**, including crops, wild plants harvested and managed for food, relatives of cultivated and domesticated species, pasture and rangeland species;

[17] Sourced from Geostat (the National Statistics Office of Georgia)

2) **Animal genetic resources**, including domesticated animals, wild animals hunted for food, wild and farmed fish and other aquatic organisms;

3) **Microbial and fungal genetic resources;**

4) **Components of biodiversity that support ecosystem services** upon which agriculture is based. These include a diverse range of organisms that contribute, at various scales to, inter alia, nutrient cycling, pest and disease regulation, pollination, pollution and sediment regulation, maintenance of the hydrological cycle, erosion control, and climate regulation and carbon sequestration.

5) **Abiotic factors**, such as local climatic and chemical factors and the physical structure and functioning of ecosystems, which have a determining effect on agricultural biodiversity.

6) **Socio-economic and cultural dimensions,** such as traditional and local knowledge of agricultural biodiversity, cultural factors and participatory processes, as well as tourism associated with agricultural landscapes.

The present report includes an analysis of issues related to plant, animal, microbiological and fungal genetic resources important for food and agriculture, their *ex situ* and *in situ* conservation issues and traditional knowledge related to them, also issues related to the proper functioning of agricultural ecosystems and traditional agricultural landscapes of Georgia and problems related to their ecological state, and soils and pollinators.

3. Importance of Georgia's Agricultural Biodiversity

Georgia is a traditional agrarian country. The country's landscape, varietal and species diversity, rich hydro resources, and centuries-old agricultural and food production traditions created the prerequisites for the sector's development.

> *"Is there another country so wonderful and fertile ...yielding so many man-grown crops: rice, wheat, barley, oats, maize, Italian millet, millet, chickpea, beans, lentil, broad beans, cowpea, hemp, flax, and others"*
>
> Vakhushti Bagrationi "Description of the Kingdom of Georgia" (1745)

Evidence from archaeological studies prove that agriculture has been practiced in Georgia since the 6th-5th millennium BC. Researchers believe that the first domestication of plants and animals and, correspondingly, the beginnings of agriculture occurred within the area of Asia Minor – the so called Fertile Crescent zone (Western Asian Centre of Cultivated Plants) - approximately 9-10 thousand years ago. The area directly borders Georgia, partially representing at the same time the area of distribution of the Kartvelian (Georgian) tribes in the prehistoric age. The great morphologic and genetic diversity of the oldest crops and their wild relatives, as well as some ancient species of domesticated animals that have been preserved up to now makes it possible to think that Georgia itself is one of the centres of origin of some of the important cultivated plants (e.g., vine and wheat) and domestic animals. At the same time, the geographic position of Georgia conditioned that the territory was used as a trade corridor connecting Europe and Asia, for which reason Georgia for ages was a recipient of new genetic material, while the country's climatic conditions and soils created good conditions for these new crops. Thus many landraces have been developed from numerous introduced crops. To this should be added plant and animal varieties developed by Georgian breeders in the 20th century.

Thus, local cultivated plant and animal species of Georgia constitute a significant part of the world's cultural heritage.

Agricultural biodiversity encompasses not only the species and varietal diversity, but also agro-ecosystems, rural landscapes, microorganisms and fungi, as well as traditional knowledge used in food production. In this respect, Georgia is also particularly rich.

Georgia's agro-ecosystems are the economic basis of Georgian agriculture, while the local plant and animal landraces, as well as microorganisms and fungi that take part in food production, have not only cultural, but also great economic and scientific value:

- Traditional quality food production is based on local genetic resources, which is important for the development of both agriculture and tourism;
- Local varieties are well adapted to local conditions and are noted for resistance to unfavourable weather and pests and diseases, for which reason:
    a) Local varieties represent the most important breeding material, including for developing improved varieties adapted to Georgia's conditions. The importance of local varieties is particularly topical in the context of global climate change;
    b) Cultivation/breeding of landraces requires minimal expenditures and therefore, irrespective of their relative low-productivity, the use of traditional varieties in small farms and under unstable economic conditions (within so-called low-input production systems) is economically more justified in comparison with costly industrial varieties; in addition, in some mountain regions only local varieties can be produced (e.g., the Georgian endemic wheat dika can be grown at an altitude over 2000 m.a.s.l; also irreplaceable for the Georgian highlands is the Georgian mountain cow);
    c) Commercial utilization of local genetic resources is one of the means of generating income for the country;

Owing to the reasons listed above and against the background of global climate change, the conservation and sustainable use of local agricultural biodiversity is of great importance for ensuring the country's long-term food security.

4. Objectives of NBSAP-1

NBSAP-1 included the following strategic goal related to the conservation of agricultural biodiversity:

> "*To conserve Georgian agrobiodiversity through ensuring its sustainable use and by promoting of ex-situ and in-situ conservation measures*".

Five specific objectives were set to achieve the strategic goal:

- To improve capacity for the recovery and preservation of, and research into, agrobiodiversity
- To create an agrobiodiversity inventory and a red list of Georgian domestic plants and animals
- To conduct research and conservation relating to the wild relatives of native domestic species and varieties
- To promote agrobiodiversity, its products and associated traditions, as well as national and international knowledge of the use of agrobiodiversity
- To evaluate Georgian agrobiodiversity as part of the national cultural heritage.

Progress has been made along several paths:

Controls over the export and import of genetic resources have been improved through increases in the capacity of Georgia's customs service. National expertise in agricultural biodiversity conservation and the capacity of research institutions working in the field of agricultural biodiversity have been strengthened; in particular a gene bank of field crops became operational in 2006 at the I. Lomauri Institute of Farming of the Agrarian University of Georgia.

Significant steps have been taken to rehabilitate or improve existing collections, selection stations and seed farms. The collections of I. Lomauri Institute of Farming of the Agrarian University of Georgia, of Tbilisi, Kutaisi and Batumi Botanical Gardens and collections of microorganisms at various

research institutes have been enriched with new samples. A non-commercial legal entity "Agro – National Centre of Production of Grapevine and Fruit Planting Material" was established, with rich collection of local fruit and grapevine varieties. Since 2011 the Centre is multiplying and distributing the planting material of local varieties to interested farmers and organizations for free. In the frame of the GEF/UNDP financed project Conservation and Sustainable Use of Georgia's Agricultural Biodiversity six landraces of different species of grain crops, five landraces of different species of legumes and one landrace of oil producing crop were reintroduced in Samtskhe-Javakheti region. On the demonstration plot of the Project local varieties of grapevine and fruits were collected and are multiplied with the purpose of the distribution of them to the farmers. For legume crops marketing chain developed. In the frame of the project financed by BP and administered by Eurasia Foundation the seed material of the local landrace of wheat – Akhaltsikhis (Meskhuri) Tsiteli Doli was multiplied, distributed to the farmers of Samtskhe-Javakheti and marketing chain for the production developed.

There has been significant progress in the take-up of organic farming. 71 producers were certified as organic according to international standards in Georgia in 2011; among them is the company Hipp Ltd which is supplied with organic apples by 1,103 smallholder farmers; "Kula" Ltd - one of the main producers of processed fruit and vegetables products in Georgia – has started to produce organic juices. ELKANA Biological Farming Association, which has been working on the development of organic farming since 1994, now serves about 600 farmers. Since 2006 the organic certification body "Caucascert" Ltd has been operational in Georgia. In 2008 "Caucascert" Ltd received European accreditation, issued by the German accreditation body DAP, and thus is authorized to issue certificates valid in the EU.

Progress with other agricultural biodiversity elements of NBSAP-1 has been limited. No significant steps have been taken towards adopting a national programme of agricultural biodiversity conservation or towards a legal basis for the conservation and sustainable use of agricultural biodiversity. The capacity of government agencies with powers and responsibilities related to agricultural biodiversity requires further strengthening. There is still no inventory of Georgia's agricultural biodiversity and no steps have been taken towards producing a "Red List" of domestic plants and animals or towards developing action plans for endangered species and varieties. Other activities in NBSAP-1 on which no significant steps have been taken are: setting up reserves for the conservation of wild relatives of domestic species and medicinal plants; revising legislation in order to provide access to genetic agricultural biodiversity resources in accordance to the provisions of CBD; encouraging seed production and exchange among local farmers; develop effective mechanisms for information exchange and experience sharing within the country and internationally; and integrating agricultural biodiversity issues into general education.

5. Agricultural Biodiversity of Georgia – Overview

5.1. Plant Genetic Resources Important for Food and Agriculture

The flora of Georgia is characterized by high endemism and great diversity. More than 2,000 species of Georgia's flora have direct economic importance as food, timber, edible fruits and nuts, forage and fodder, medicine, colorants, industry and essential oils.[18]

5.1.1. Landraces and Local Varieties

Oldest local landraces: Georgia belongs to the Western Asian Centre of origin of cultivated plants: cereals (wheat, barley, rye, sorghum, proso millet), legumes (faba bean, grass pea, chickpea, lentil), also flax, onion, garlic, and various fruits (grape, apple, quince, plum, cherry, cornel etc) and nuts (almonds, hazelnuts) have been cultivated here from ancient times and through millennia many of the landraces of these crops were developed by local farmers. It should be mentioned that wild

[18] National Report on the State of Plant Genetic Resources for Food and Agriculture in Georgia, 2008 http://www.fao.org/docrep/013/i1500e/Georgia.pdf

relatives of most of the above listed fruit crops still found in Georgia show genetic and morphological relations with landraces, which can be considered as evidence that local landraces of some of these crops were obtained by domestication of their wild ancestors. It should be especially mentioned that Georgia is also considered to be one of the origins of domestication of wheat and grape. Out of 20 wheat species spread in the world 5 are endemic to Georgia; also Georgia is characterized by very high diversity of grape varieties (about 500).

Landraces of introduced crops: Georgia is located at the crossroads of Europe and Asia. Many cultivated plants have been introduced since ancient times to Georgia from other regions of the world (Javakhishvili 1987). Some crops, for example millet, oats, lentil, chickpea, mulberry, peaches, pomegranate, nuts and others which were domesticated in Minor and Western Asia, have been cultivated in Georgia for many hundreds of years. Other crops that were introduced later became very popular and widespread: cucumber (*Cucumis sativus)*, eggplant (*Solanum melongena*), marigold (*Tagetes patula*), and black pepper (*Piper nigrum*) were introduced from India; Watermelon (*Citrullus lanatus*) from South Africa; Maize (*Zea mays*), sunflower (*Helianthus annuus*), tomato (*Solanum lycopersicum*), bean (*Phaseolus vulgaris*), pepper (*Capsicum annuum*), and potato (*Solanum tuberosum*) were introduced from the Americas at about the same time as in Europe (Javakhishvili, 1987). Tea (*Camellia sinensis*) and citrus fruits (*Citrus limon, Citrus reticulata, Citrus sinensis*) was introduced from China in about 1830. Many landraces of these introduced crops have been developed; for example Georgian botanists and agronomists identified 61 varieties and 406 forms of common bean of local origin (Bedoshvili 2008).

Modern Breeders' Varieties: Professional plant breeding started in Georgia in the Soviet period. Georgian plant breeders developed new varieties of such crops as tea, maize, wheat, apples and pears. During the 20th century the practice of co called "zoning" of agricultural crops and attribution of them to the different districts was introduced and information about introduced varieties was published annually. Besides modern breeders' varieties developed by local scientists or imported from other countries, the Catalogue of the Georgian Released Varieties included numerous landraces which were still cultivated by the state owned farms (so called Kolkhozes) till 1950s. The latest official edition of the Catalogue of the Georgian Released Varieties of 1997 (published in 1996) listed 195 varieties of field and vegetable crops and 195 varieties of fruits (Bedoshvili, 2008). These varieties were part of the collections that existed at the end of the 1980s and beginning of the 1990s; however many of these varieties were eradicated in recent years because of scanty financing and/or abolition of collection centres in the 1990s.

Since 1996 there has not been an official catalogue of agricultural varieties cultivated in Georgia, thus there is no official information on distribution and diversity of landraces or local and imported varieties cultivated on farms of Georgia, including varieties obtained by modern biotechnology methods. At present there are 37 applications on protection of breeders' rights submitted to the National Intellectual Property Centre; among them are imported local and varieties of agricultural crops (hybrid maize, wheat, sunflower, soy, stevia and others.)

Crop Wild Relatives

Crop wild relatives (CWRs) are taxa related to species of direct socio-economic importance, which includes the progenitors of crops. According to present day understanding CWRs include all species related to any cultivated plants and to ornamental, food, fodder and forage, medicinal, condiment and forestry species/plants used for industrial purposes, such as oils and fibre i.e. to all plants of economic importance (Laguna, 2004). The importance of CWRs is determined by their ability to exchange genes with cultivated crops introduced by domestication and thereby improve their quality.

The Caucasus is considered to be the centre of evolution for many unique life forms and is a natural museum for rich genetic resources (Vavilov, 1992). The flora of the Caucasus region is rich in

economically important and edible plants, particularly CWRs such as grape, wheat, barley, rye, oats, seed and forage legumes, fruits and vegetables.

A list of CWRs of Georgia has been published in Plant Genetic Resources (PGR) Forum - CWR Catalogue of Europe and the Mediterranean (Maxted et al., 2008). This catalogue lists 1,784 species of vascular plants that have considerable economic importance providing food, fuel, timber, forage, hay and habitats for animal life. A large number of taxa used in folk and scientific medicine are also included among economically valuable plants.

CWRs of landraces: In a recent evaluation of the diversity of CWRs of landraces in Georgia (Akhalkatsi et al., 2011) a large number of species were identified which belong to the genera of traditional crops. It was shown that in total 20 plant families, 76 genera and 479 species are wild relatives of ancient crops in Georgia, of which 114 (23.8%) are endemic to the country. Most of these plant species are closely related genetically to landraces and might be their progenitor species.

Among CWRs field-dwelling CWRs have an important place. In rural areas of Georgia roadsides are completely covered by *Aegilops cylindrica* and *Hordeum leporinum*. Agricultural land is covered with wild relatives of legumes, herbs and grasses. Many wild fruit trees and shrubs occur on roadsides and in urban areas.

Most fruits, nuts and berries in Georgia grow wild in forests. These are: pear (*Pyrus communis, P. caucasica*), apple (*Malus domestica, M. orietalis*), quince (*Cydonia oblonga*), plum (*Prunus domestica, P. domestica* var. *insititia, P. spinosa*), myrobalan (*Prunus vachushti*), sour plum (*Prunus cerasifera* var. *divaricata*), cherry (*Cerasus avium, C. vulgaris*), cornelian cherry (*Cornus mas*), medlar (*Mespilus germanica*), mulberry (*Morus alba, M. nigra*), pomegranate (*Punica granatum*); red raspberry (*Rubus idaeus*), currant (*Ribes rubrum, R. nigra, R. alpinum, R. biebersteinii*), fig (*Ficus carica*), bladdernut (*Staphylea pinnata*), hazelnut (*Corylus avellana*), almond (*Amygdalus communis*) and walnut (*Juglans regia*). The CWR species of grape *(Vitis vinifera* subsp. *sylvestris*) reveals the genetic and morphological relation with local landraces, which confirms the domestication of grape in Georgia (Ekhvaia et al., 2010).

Some CWRs are included in the "Red List of Georgia" e.g.: Georgian almond (*Amygdalus georgica* Desf.), Colchic hazelnut (*Corylus colchica* Albov), Walnut tree (*Juglans regia* L.), Noble Bea Leaf (*Laurus nobilis* L.), Wild Pear of Demetre (*Pyrus demetrii* Kutath.), Wild Pear of Ketskhoveli (*Pyrus ketzkhovelii* Kutath.), Wild Pear of Sakhokia (*Pyrus sachokiana* Kutath.), Caucasus Red Elder (*Sambucus tigranii* Troitzk) and Colchis bladdernut (*Staphylea colchica* Stev).

5.1.2. Wild Plants Important for Food and Agriculture

Wild plants harvested and managed for food: Wild plants harvested and managed for food in Georgia are mainly wild and naturalized fruits and nuts collected by local households in natural habitats – pear, apple, quince, plum, sour plum, cornelian cherry, meddler, mulberry, pomegranate, red raspberry, currant, fig, bladdernut, hazelnut, walnut etc. The green biomass of many herbs - called *mkhali* in the eastern Georgia and *pkhali* in western Georgia - is used by local households for food, especially in the spring when the deficit of vitamins is substituted by plants collected in the wild such as: nettle (*Urtica* L.), goosefoots (*Chenopodium* L.), purslane (*Portulaca oleracea*), greenbrier (*Smilax* L.) etc. There is no official list of these edible herbs available in Georgia. Some spices, such as caraway (*Carum carvi*), savory (*Satureja*), hyssop (*Hyssopus angustifolius*), wild thyme (*Thymus serpyllum*), oregano (*Origanum vulgare*), caraway (for Svanetian salt), dog rose (*Rosa canina*), rhododendron (*Rhododendron caucasicum*), Christ's thorn (*Paliurus spina-christi*), savory (*Satureja spicigera*), *Thymus karjaginii* Grossh (in Georgian Kondari – included in the red list of Georgia) etc. are collected in the wild as herbal tea or spices.

Medicinal plants: 1,200 vascular plant species are listed as medicinal plants in Georgia (MedGeoNet, 2011). 418 vascular plant species have been recorded in the Samtskhe-Javakheti region of Georgia

alone (Akhalkatsi et al., 2009). Among them are endangered, rare and endemic species which demand both *in situ* and *ex situ* conservation.

The rural population in Georgia has great experience in the traditional use of medicinal plants in folk medicine. Local people actively use herbal medicine and have valuable indigenous knowledge from ancestors about the preparation of remedies. Some people involved in the preparation of herbal remedies have informal education in herbal medicine, have books on medicinal plants and often serve as homeopaths in villages. One can find a person who is healing patients using herbal medicine in almost every village of Georgia. Such "public doctors" are much respected and trusted among rural people.

5.1.3. Pasture and Rangeland Species

The following analysis covers only general issues related to pasture biodiversity in Georgia, as pasture species are covered more concretely by other thematic fields (Conservation of Species and Habitats, Protected Areas, Assessment and Sustainable Use of Biological Resources).

There are two types of pastures in Georgia - summer and winter pastures. Summer pastures are subalpine and alpine meadows mainly used for sheep and cattle. Winter pastures are located in arid zones and are used mainly for sheep grazing. Grass, sedge and polydominant grass-forb meadows are characteristic for alpine pastures. Grass-forb- and legume-dominated meadow communities are characterized by high diversity. There are several types of grass meadows with dominant species of *Festuca ovina, Bromopsis variegata, Poa alpina, Koeleria caucasica, Nardus stricta* or *Festuca varia.* Dominant species in sedge meadows are *Carex humilis* or *Carex brevicollis*. *Trifolium ambiguum* is dominant in legume meadows. Polydominant grass-forb meadows are composed of *Sibbaldia procumbens, Alopecurus vaginatus, Bromopsis variegata, Phleum alpinum, Trifolium ambiguum, Festuca ovina, Galium verum, Stachys macrantha,* etc. Polydominant alpine meadows comprise *Festuca ovina*, *Potentilla alpestris, Gentiana septemfida, Carum caucasicum, Trifolium repens, Aster alpinus, Luzula spicata, Campanula collina, Potentilla gelida,* etc. Alpine pastures are also rich with medical plants. Pastures located near arable lands are rich with wild relatives of legume crops.

5.2. Animal Genetic Resources Important for Food and Agriculture

The concept of agricultural biodiversity includes animal genetic resources for food and agriculture; in particular genetic resources of domestic farm animals, game animals, fish and other aquatic organisms.

Game animals, fish and other aquatic organisms: The present report concerns issues related generally to the conservation of local species of domesticated farm animals; issues related to the conservation of game animals and fish are considered in reports of other thematic directions: Conservation of Species and Habitats, Protected Areas, Assessment and Sustainable Use of Biological Resources.

Hunting of game animals in Georgia is conducted mainly for sport and commercial purposes and does not play a significant role in the provision of the food for households. Notwithstanding this, most of these resources (West Caucasian tur (*Capra caucasica*), chamois (*Rupicapra rupicapra*), deer (*Cervidae*), wild goat (*Capra aegagrus*), ruddy shelduck (*Tadorna ferruginea)*, and white-headed duck (*Oxyura leucocephala),* etc.) became subject to unsustainable hunting. For this reason, most classically usable game species have been entered in the Red List of Georgia. In addition to unsustainable hunting, populations of game animals are dramatically affected by forest degradation. Protection of game animals is generally carried out within protected areas. Out of game birds mention should be made of the reduction in the population of the common (Kolkhetian) pheasant (*Phasianus colchicus*) caused by the introduction into hunting estates of the Afghan white-winged pheasant.

The major fish species – these include the Russian sturgeon (*Acipenser gueldenstaedti* Brandt & Ratzeberg), the Persian surgeon (*Acipenser persicus* Borodin), the river/lake brown trout (*Salmo fario* Linnaeus), Colchic capoeta (*Varicorhinus sieboldi* Steindachner), Paliastomi herring (*Alosa caspia paleostomi* Eichwald) and Black Sea salmon (*Salmo fario labrax* Pallas) - are included in the Red List of Georgia. The populations of some mountain freshwater fish species - capoeta, barbell (*Barbus barbusI*, *Barbus mursa*), Kura carp, and trout - are gradually decreasing – these fish species do not exceed 1-2 kg per km in the rivers. The construction of hydropower plants has a particularly adverse impact on river fish propagation, especially in the places of spawning. The State should care for restoration and propagation of the local fish species at risk of extinction, including through their farming in artificial ponds.

Local Breeds of Domestic Farm Animals: Georgian animal husbandry is rather diverse; here almost all major domestic animals are bred: cattle, sheep, goats, pigs, buffalos, dogs, horses, chickens, and geese. Local beekeeping and silkworm breeding are also rooted in ancient times. Turkeys, guinea fowl, ducks, rabbits, etc. have been reared here since the 19th-20th centuries.

Georgia belongs to the Central Asia and Caucasus centre of livestock domestication. According to archaeological findings, animal husbandry in Georgia has been practiced since the 6th millennium BC. At the same time, the territory of Georgia borders Mesopotamia and the highland plateau of Anatolia, where the first such important domestic animals species as cattle, goat, pig, and sheep were domesticated. Thus, Georgian domestic animal species are of great interest to researchers in respect of studying the history of animal husbandry.

The local breeds of domestic farm animals distributed in Georgia have been established thanks to the combined effects of popular selection and the environment. While constituting an integral part of a specific ecological zone, they are noted for a number of unique characteristics, including tolerance of changing climatic conditions, resistance to certain diseases, the ability to equally well assimilate swampy and/or steep-sloped mountain pastures, lack of fastidiousness in respect of feed quality and less expenditure on nutrients (feeding costs) per unit of production. In addition, by using minimum inputs of, for example, supplementary feed and labour they yield a useful product and are one of the most significant sources, frequently the only one, of income of rural households.

The merits of local animal breeds are also evidenced by the fact that under local conditions they yield better than the universally recognized industrial breeds. Research work outcomes and their introduction in agricultural practice have clearly outlined special biological traits and high economic value of the aboriginal farm livestock breeds.

The introduction of industrial livestock and poultry breeds in Georgia began in the second half of the 19th century. During the Soviet period **statistical data** on the breeds and head of domestic livestock distributed in Georgia was published on a yearly basis.
Principal breeds of Georgian local domestic animals:

Georgian Mountain cattle: Georgian mountain cattle are the oldest landrace of cow in Georgia; the first written evidence of the it comes from Aristotle (4th century BC). Several sub-landraces can be distinguished within the landrace - Pshav-Khevsuruli, Tushuri, Rachuli, Svanuri, Osuri, Abkhazuri, and Acharuli. Out of 17 dwarf cattle breeds known in the world the Georgian Mountain cow is among the smallest ones. The breed's merits include its adaptability to changing climatic conditions, foraging abilities on stony and steep (up to 30 per cent) pastures, cost-effective feeding, and also high resistance to certain diseases and high output per animal with minimum feed. One particular characteristic is that the concentration of butterfat does not decrease in the milking period, which is very important for practical animal husbandry.

Megruli (Megrelian) Red cattle: This breed was developed in the late 19th and the early 20th century based on the Georgian mountain cattle under strict selection conditions. The brothers Kvaratskhelia were very successful in developing this breed, which is frequently named after them. Free grazing under nomadic conditions and adaptability to severe climate conditions determine high hardiness of

the cattle. In addition to other unique qualities of the Megruli Red cow, it should be mentioned that these cows successfully feed on the plant "khaia" (sedge) (*Carex elata bellardi*), widespread within the Kolkhetian marshland biocenosis, while other cow breeds do not eat it. The breed is noted for good working properties – strength, endurance and mobility and draught capacities.

Caucasian Brown cattle: This is the most widely distributed cattle breed in the Caucasus region, developed in the South Caucasus countries and Dagestan by crossing the local Caucasian cattle with bulls of the Brown Swiss (Schwyz) breed, then with the related Kostroma and Lebedin breeds. The first attempts to develop this breed are associated with activities of the German landowner Kuchenbach, who in 1864 brought Brown Swiss cattle from Switzerland, which, however, failed to adapt to local surroundings and were prone to diseases. As a result, crossbreeding of the Brown Swiss cattle with the local, Georgian Mountain cattle was initiated. The Caucasian Brown optimally combines traits of its ancestor forms: high live weight and milk yield inherited from the Swiss Brown; relatively high milk fatness and good adaptability to the environment from the Georgian Mountain cow.

The **Georgian population of the Caucasian buffalo** belongs to the Caucasian buffalo landrace, consisting of four independent, more or less isolated populations (Armenian, Azeri, Georgian and Dagestani). The Georgian buffalo is black or grey in colour. Occasionally white spots occur on various parts of the body. In live weight, height at withers and oblique body length, the Georgian buffalo outperforms other buffalo populations spread in other countries of the Caucasus; certain differences are also observable in the type of build.

Tushuri (Tushetian) sheep: This breed was developed under extreme nomadic conditions based on a purposeful centuries-long selection by Georgian shepherds; it belongs to a fat-tailed, coarse-wool sheep breed of the mutton/wool/milk direction; distributed in East Georgia, also in the North Caucasus. According to M. Rcheulishvili, the old Georgian sheep used to be lean-tailed, which at different stages of the selection work was crossed with coarse-wool, fat-tailed and fat-rump sheep breeds. In the currently existing form the Tushuri sheep was developed in the 14^{th}-15^{th} centuries. The breed is characterized by its strong build, hardiness, and its ability to endure long-distance (500 km) driving under mountain conditions.

Imeruli (Imeretian) sheep: According to M. Rcheulishvili (1988), the Imeruli sheep is the offspring of the ancient Colchian sheep. The breed is farmed in Imereti, Racha-Lechkhumi and Zemo Svaneti. It is equally well adapted to humid and arid climates and can tolerate extreme cold and heat. Imeruli sheep is noted for unique reproductive characteristics – early maturity (1), fertility (2) and fecundity (3).

1) A six-month old ewe lamb is physiologically mature (its live weight reaches 75% of the adult *Imeruli* sheep) and stands to mating. Gestation length is 138-143 days. The average age of first lambing is 15.5 months.
2) In contrast to most sheep breeds, it has no "dead season» of breeding and, as a rule, the ewe lambs twice a year.
3) 94% ewes give birth to two or more (up to five) lambs per delivery.

Local pig populations: According to a widely held opinion, the pig traditionally distributed in Georgia has been developed by popular selection, through domestication of the Caucasian short-eared wild hog. According to another opinion, the local populations of pig distributed in Georgia are descendants of the pig domesticated within the highland plateau of Anatolia. Three pig populations – **Kakhuri (Kakhetian), Svanuri (Svanetian) and Rachuli (Racha)** - are distinguished in Georgia, which were also bred for commercial purposes in the Soviet period. The Rachuli and Svanuri populations of the local pig are actually unstudied.

The **Kakhuri (Kakhetian)** pig outwardly strongly resembles the wild hog, is adapted to harsh free grazing conditions, has a well-developed defence, mothering and herd instinct and is noted for

perfect foraging abilities. Based on the generally extensive conditions of care and maintenance, its productivity is frequently and closely associated with forest productivity. The wide distribution of this breed was conditioned by a number of its unique and valuable traits: hardiness, easy to care for, the ability to feed effectively on deciduous forest products and grasses of natural pastures. In addition, in the wintertime, the Kakhuri pig utilizes well the waste from grape processing; the pig fattens well on a small amount of cereal feed to produce very tasty and reasonably fatty and cost-effective pork (I. Shubitidze *et al*., 2009). The breed is characterized by a rough form, black skin covered with rather long, thick bristle and short undercoat, which makes the pig tolerant to cold. Some individuals have curly bristle that can be explained by crossing of the Kakhuri pig with the Mangalica breed in the 1940s. The majority of the Kakhuri pigs are black, although one can come across dark-grey, liver-coloured and dark-red individuals. Research and production experiments have shown that when kept under woodland conditions the daily live weight gain of a gilt can be from 280 to 310g without supplementary feeding. In addition, a gilt easily adapts to the sharp environmental changes, is characterized of vitality, satisfactory slaughter productivity and yields more tasty pork as compared with some industrial pig breeds.

Megruli (Megrelian) goat: is the oldest landrace of goat in Georgia, developed by a centuries-old selection targeted at milk productivity. It is distributed in Samegrelo, Svaneti, Adjara, and Abkhazia, also in the North Caucasus. Most animals (64%) are of white colour, although straw-colour, black, grey and red individuals are also met. A. Gigauri *et al*. (1980) and V. Ghlighvashvili (1999) differentiate two types within the breed: mountain and lowland. According to them, mountain-type animals are bigger in size and are of milk/meat direction. The Megruli goat breed is quite productive; two out of every five she-goats give birth to twins. The Megruli goat is especially well adapted to mountain climatic conditions, can feed on hardly accessible, mountain, cliffy and lowland pastures and thorn bushes, is less fastidiousness in respect of care and feeding, has good herd and mothering instincts, and has high resistance to diseases.

Tushuri (Tushetian) horse: belongs to the group of Caucasian horse landraces, which are noted for good temper, endurance, good orientation and good working abilities in mountains and under harsh natural conditions. The Tushetian horse is distributed in East Georgia, mostly within the nomadic pastoralist districts/municipalities (Akhmeta, Telavi, Sighnaghi, Dedoplistskaro, Gurjaani, Dusheti, Tianeti, etc.); is developed in a mountain environment under herd horse-rearing conditions by natural selection; is characterized by a small body, sturdy form and strong skeletal structure. Because of good orientation combined with courage it is considered best for using in the mountains. It can also be used as draught for harnessing in light two-wheeled carts and vineyard ploughs. Historically, it was successfully used in wartime and by nomadic shepherds. It is perfect for riding and draught performance in the mountains.

Megruli horse: also belongs to the group of Caucasian mountain horse landraces. According to widely held opinion it is the descendent of the ancient Georgian (Colchian) horse. It is a saddle and draught horse. It has developed under herd horse-rearing conditions and is adapted to highly humid highland and lowland environments. The Megruli horse has good grazing capacities on steep-mountain - and lowland boggy pastures; it has good orientation and a special ability to walk carefully. It is mostly bay in colour, can be also grey and, rarely, black (A. Kobalava, 1983). In the past and today the breed was and is successfully used in national equestrian sports *Tskhenburti* (Georgian polo), *Isindi* (Georgian equestrian martial art), and *Marula* (Long-distance race).

Local chicken populations: Georgia is noted for the diversity of its chicken populations. They include: **Bare-neck, Megrula, Straw-colored, Black** and **Grey** (R. Nozadze *et al*., 2007). Eggs of the local hens have good incubatory properties. The rate of hatching in most cases exceeds 85%. The meat of local chickens outperforms that of cultivated breeds and crosses in taste and because of this it competes well with imported poultry products (K. Natsvaladze, 2008). Broodiness in the local hens is high, amounting to 80% in one-year hens and 100% in two-year hens. The Megrula hen has the highest egg laying of all Georgian populations. The following traits of external form are characteristic of all the

local chicken populations: wide head, red-colour leaf-like comb, short and somewhat thick neck, wide breast and long back; the Megrula hen's feathering is striped, whereas the *Bare-neck* is completely devoid of hackle (R. Nozadze, 1997). Under household garden conditions local chickens are distinguished from other strains and crosses by vitality, good adaptability to changing environmental conditions and satisfactory egg laying. Thanks to such qualities, local households give preference to the rearing of these chicken populations (K. Natsvaladze, 2008). Notwithstanding the above, the number of the mentioned populations has significantly decreased to date.

Javakhuri (Javakhetian) goose: there are different opinions on the origin of this landrace among scientists. According to A. Chagelishvili and R. Mitichashvili, the Javakhuri goose has developed as a result of domestication of the wild grey goose that used to live in the region; according to another opinion, it was brought into the area from Russia in the 19th century by the *Dukhobors* (a religious group founded in Russia in the 16th or 17th century, some of whose members; some members of the group were forcibly moved to Georgia in the 19th century). The Javakhuri goose differs in the colour of its plumage (white, grey, ash-grey, and motley). The colour of plumage is associated with the colour of the eye and beak; for example the eyes of white geese are blue, those of motley geese dark-grey, and those of grey geese brown.

Georgian sheepdog: is a subspecies of aboriginal Caucasian mountain shepherd dog. The Georgian sheepdog belongs to a large family of "Alpine shepherd dogs" and its distribution supposedly coincides with the period of sheep-breeding development. The traditional sheepdog breeders are the Tushetians who traditionally migrated together with their sheep through Georgian regions (Eldar winter pasture) and North Caucasus (Kizlar winter pastures), taking their sheepdogs with them wherever they went. From the 1950s, the mass breeding of the Caucasian shepherd dog was initiated in the Soviet Union at the national level. By the 70s-80s of the last century Soviet breeders had significantly improved the breed through their purposeful work (at the expense of the best specimens taken in 1950-1960, mainly from Georgia); after dissolution of the Soviet Union, Russia has internationally registered the *Caucasian Shepherd Dog* as a Russian breed.

Insects and worms used in agricultural production:

Caucasian Mountain (Georgian) Grey Bee: the Georgian (Caucasian Mountain Grey) bee (*Apis mellifera caucasica*) is distributed on the southern slopes of the Great Caucasus Range, also in the provinces of Turkey bordering West Georgia. Several populations of the Mountain Grey bee can be distinguished: Abkhazuri, Megruli, Kartluri, Kakhuri, and Guruli. The Georgian bee is grey in color, without a yellow stripe on the tergites. The Georgian bee is generally known for its long proboscis (the Megruli population has the longest proboscis of all). The breed is characterized by less inclination to swarming, building of a small number of queen cells, good orientation, good nectar searching capacities, high productivity and maximum utilization of the honey yield (M. Peikrishvili, 2009). Thanks to its unique characteristics the Georgian bee's brood and female bees are the focus of attention of world beekeepers and are being exported to 45 countries. They are used both for pure reproduction of the breed as well as for crossing with local breeds. The Georgian grey bee has been awarded with three gold medals at international exhibitions and competitions (1961, Erfurt; 1965, Bucharest; 1971, Moscow). Many scientists regard the Georgian grey bee as one of the best in the world (K. Gardava, I. Mumladze).

Silkworm: silkworm breeding has been practiced in Georgia since the ancient times. In the middle ages silkworm breeding was one of the main directions of agricultural production in Kakheti, Imereti, Guria, Samegrelo, and other Georgian regions where mulberry trees are grown, and Georgian silk used to be exported to Iran and other countries. Unfortunately, the old Caucasian species of silkworm were lost as a result of spread from Europe into Georgia of the silkworm disease pebrine in the 60s of the 19th century. Although in the second half of the 19th century, new silkworm species were brought in Georgia and actively used up to the last years. In the years of independence, silkworm production was actually destroyed. One of the silkworm species – the Balkan silkworm

(*Lemonia balcanica* Herrich-Schhffer) has been included in the Red List of Georgia. At present the basis for silkworm breeding – silkworm eggs and the unique species of mulberry tree with a powerful root system are facing a real danger of loss.

5.3. Microbiological and Fungal Genetic Recourses

Micro-organisms provide beneficial services in food processing, for example fermentation by bacteria or fungi (yeasts and moulds). Besides this, micro-organisms establish mutually beneficial symbiosis with the roots of agricultural plants and some fungi, or with ruminant livestock such as cows, sheep or goats, living in their guts.

In the process of fermentation, through the activity of microorganisms the raw material is transformed into the final product. Microorganisms are used in brewing, winemaking, production of vinegar, vodka and non-alcoholic beverages, baking (leavening of bread), pickling, production of matsoni and cheese and other food-making processes. There are bean-, grain-, vegetable-, fruit-, honey-, dairy-, fish-, meat- and tea- based fermentation processes known in the world.

Humans have been controlling fermentation processes since ancient times. Most of the about 2,000 fermented foods known in the world are distributed among small ethnic groups; some of them from Mesopotamia, Egypt and India, have been known since the VIIIth-VIIth millennium B.C.

Fermentation has been used in Georgia in the production of traditional foods and drinks for millennia. Such traditional products as wine, beer, cheese, matsoni, dambali khacho (dried cottage cheese), kupati (a type of sausage), bread, dried fruits, pickles, adjika (spicy sauce), tkemali (wild plum sauce) and others are prepared though fermentation. In the process of food preparation fermentation is aided by adding different ingredients (spices, herbs, salt, sugar etc.) to the main raw material and regulation of temperature which causes an increase in the amount of the microorganisms naturally existing in the ingredients. Another way of fermentation is adding small quantities of whey or cream (yeasts, sour dough etc.) retained from the successful manufacture of a fermented product of a previous day to the main raw material and using this as the inoculum or starter. This practice has been called various things but the term 'back-slopping' is the most widely used.

It should be mentioned that natural whey starters are still widely used in Georgian villages in the production of traditional products; the starters determine the taste and quality of these products. Research carried out on the traditional yogurt-type product matsoni showed a significant difference in the microbiological composition of Caucasian matsoni compared to that of Bulgarian yogurt and a great genetic diversity of microbiological cultures among samples.

5.4. Agricultural Ecosystems

Ecosystems consist of plants, animals, microorganisms and fungi related and interacting with each other and with the abiotic environment around them. The sustainability of ecosystems is determined by the diversity of their elements; the definition of agricultural biodiversity covers all of this elements.

Soils: The organisms living in the soil connect organic and non-organic matter to each other. Countless organisms take part in decomposition and recovery of substances, by transferring the nutrition elements in the form assimilative for plants and creating new integrity which is called the fertile soil. Thus, the optimal biological activity of the organisms living in the soil is substantial for the good development of plants.

Georgia is characterized by very diverse and interesting types of soils. More than 50 soil types have been described on the territory of the Georgia. Some of the soils (among them Cinnamonic (*Cambisols Chromic*), Meadow-Cinamonic (*Cambisols Chromic*), and Yellow-Brown Forest (*Acrisols Haplic*)) were first described in Georgia and only afterwards distinguished in many other countries.

Such diversity is a result of complex bioclimatic and different lithological and geomorphologic conditions. Soil formation conditions are influenced also by long- and short-term anthropogenic factors.

The total surface area of soil in Georgia is 69 958 724 ha: brown forest soils make 24,4 % (17 089 287 ha); mountain-meadow – 19,7 % (13 791 065 ha); cinnamonic – 8,9 % (6 218 847 ha); alluvial – 8,2 (5 733 897 ha); raw humus calcareous – 7,1 % (4 939 482 ha); yellow brown forest - 6,5 % (4 529 358 ha); meadow-cinnamonic – 4,8% (3 371 334 ha); subtropical podzols – 4,3 % (2 983 831 ha); yellow – 4,1 % (2 898 094 ha); black – 3,6 % (2 507 539 ha); grey-cinnamonic – 2,6 % (1 841 357 ha); chernozems – 2,3 % (1 618 394 ha); red soils – 2,2 % (1 533 308 ha). In 2009 the Soil Map of Georgia developed in accordance with the international classification of soils (WRB) was published with a scale 1: 500 000.

The soils of Georgia are characterized by a high level of agricultural use and natural fertility of arable lands. It should be also mentioned that the area of agricultural land is permanently changing quantitatively and qualitatively. The structure of the agricultural land and change of their quality is influenced by reclamation of new agricultural lands, melioration processes etc. Unfavourable conditions reduce the area of arable land and deteriorate their quality.

Landscapes: Diverse natural area systems (landscapes) existing on the territory of Georgia range from semi desert (eastern Georgia) and Colchian humid subtropical (Western Georgia), to eternal snow and glaciated (glaciated - niveal) landscapes. Here, as in any mountainous country, alternation of natural systems according to altitude, and altitudinal zonality of landscapes is well expressed, with a full spectrum of landscape zones; more than 100 types of landscapes are found in Georgia.

13% of the whole territory of Georgia is plain; 33% - hilly and 54% - mountainous. About 43.4% (a little bit more than 3 million hectares) of the whole territory of Georgia is agricultural land, including pastures and meadows.

According to data of 2003, 39.7% of agricultural lands are arable, 26.5% are covered with perennial crops, 4.8% are moving lands, and 59.4% are the natural pastures. It should be noted that only 35% of arable lands were cultivated in 2010.

The land resources of Georgia, according to vertical zonation, are grouped as follows: 1st zone (up to 250 meters above sea level) – where the subtropical crops of West Georgia are mostly widespread; 2nd zone (250-500 m altitude) is the area of horticulture, viticulture, vegetable and field-crop farming (mostly maize); the 3rd zone (500-1000 m altitude) is used mostly for cereals and livestock farming; the 4th zone (1000-1500 m) is mainly occupied by hay meadows and grazing lands and field-crop farming is developed poorly; the 5th zone (1500-2000 m) is occupied by grasslands and pastures.

Traditional agricultural activities also play an important role in the formation of diverse landscapes. The traditional rural landscapes in Georgia in the first, second and third zones are very diverse. Fruit, vine, and field crops in some regions, form traditional rural landscapes; sheep, cattle and grain crops form the traditional landscapes in mountainous areas.

Organisms contributing to ecosystem services (beneficial insects, earthworms and microorganisms): beneficial insects, earthworms and microorganisms inhabiting soils and agro-ecosystems facilitate the circulation of nutrients, control of pests and diseases, pollination, waste management, water cycle maintenance, erosion control, climate regulation and carbon sequestration.

Fungi and bacteria living in the soil help to decompose organic matter, transforming it into a form that plants can assimilate. Some bacteria that are in symbiosis with legumes fix nitrogen from the atmosphere. Some fungi and bacteria decompose organic matter and mineralize it, while others loosen soil and thus improve soil structure.

Earthworms play an important role in soil formation; they are found in moist soils, the surface of which is covered with rotten plant material. Earthworms' excreta contain nutrients in a form that plants can assimilate. Earthworms break down soils and mix in humus particles. Beneficial bacteria also grow in the tunnels made by worms. Earthworms improve soil aeration and water circulation in the soil.

The habitat of insects is mainly the layer of the soil where the mineralization of organic matter takes place. A diversity of insects contributes to maintaining an interspecific balance between the insects, where one type of insects does not oppress others. Especially useful are the predator insects (natural enemies), which annihilate plant pests; natural enemies are predatory ground beetles, lady-birds, bumblebees, also some types of mites, bugs, etc.

The role of pollinator insects is extremely important in agriculture. After cross pollination the plant gives greater, more powerful and more fertile seed. Some plants (fig-tree, cherry, etc.) do not produce fruits by self-fertilization. 90% of fruit-trees, vegetables and melons are pollinated by insects; for example, the existence of bee families in a fruit garden (1-2 bee families per hectare) increases the harvest at least by 30%. For pollination of coriander per hectare 10-20 bee families are needed. Some plants have personal pollinators; for example, tobacco is pollinated only by moths. Honey bees (*Apis mellifera*) are responsible for 80% of cross pollination. Bumble bees (*Bombus*), lonely bees (*Megachile rotundata, Xylocopa virginica*), butterflies and other insects are responsible for fertilising the other 20%.

Some worms and insects important for agriculture are entered in the Red List of Georgia. For example: Transcaucasian earthworm (*Eisenia transcaucasica* Perel), Lagodekhi earthworm (*Eisenia lagodechiensis* Michaelson), valley earthworm (*Dendrobaena faucium* Michaelsen), Kintrishi earthworm (*Alollobophora kintrishiana* Kvavadze.), bumblebee species (Bombus fragrans Pallas), (*Bombus eriophorus* Klug), Alpine bumblebee (*Bombus alpigenus* Morawitz), Oersian bumblebee (*Bombus persicus* Radoszkowsky).

Water resources: Georgia is rich in water resources. Average annual volume of water available per person is 12,481 cubic meters. This indicator is 12 times more than the water deficit indicator for a country defined as 1,000 cubic meters per capita. However, water resources are unevenly distributed in Georgia: the rainfall indicators decline from west to east; the average annual rainfall indicator for west Georgia is 1400 mm and for east Georgia 500 mm. As a result the efficient development of agriculture in eastern and southern parts of Georgia requires the implementation of irrigation works; in west Georgia drainage systems are required. The rainfall indicators reveal fluctuations: droughts have been registered on average every 3-4 years during harvest time; therefore even for the regions with high rainfall indicators, implementation of irrigation works is required during low rainfall periods. Agricultural use of water resources, especially the unrecovered water consumption, particularly irrigative melioration, results in the decrease of water level, i.e. in reduction of water resources. Even more important and problematic is increasing pollution. The main reasons for deterioration of water resources quality are: the use of water irrigation, melioration of salty soils, waste waters, poor organization of water reservoirs, skidding of cut trees down slopes. The annual volume of all types of waste water pollutes 12-15 times more natural water.

Climate: Georgia has almost all the climatic zones that exist in the world - climate varies from humid and warm subtropical to very severe with permanent snow in the high mountains. This climatic diversity is connected with location of the country on the crossroads of the subtropical zone, Aral-Caspian zone and arid areas of Front Asia (in east Georgia). The great Caucasus mountain range has a great influence on formation of the country's climate and protection from cold air streams from the North. The Likhi range determines the climatic contrasts between the different parts of the country. The climate of the lowlands of west Georgia (Colchis lowland) is humid subtropical, the climate of the lowlands of east Georgia is more continental.

6. Conservation and Sustainable Use of Plant Genetic Resources Important for Food and Agriculture

6.1. *In situ* Conservation of Plant Genetic Resources Important for Food and Agriculture

In situ conservation is the conservation of plant genetic resources where they occur naturally. For landraces this is on farm conservation and for CWRs and medical plants – conservation in their natural habitats. *In situ* conservation is the most desirable but can be the more complex and difficult approach.

Local landraces: *In situ* conservation of local landraces is largely dependent on preserving their production value.

The first change in the relative importance of local crops was observed after the 17th century, when maize, bean, sunflower and some others plants were brought to Georgia from America.[19] Introduction of these crops caused significant reduction in the distribution of legumes (faba bean, grass pea, chickpea, lentil, etc.), Italian millet, millet and flax.

The shift to industrial agriculture and monoculture production in the Soviet period, especially after the 1950s, and the specialization policy which characterized the planned economy of the Soviet Union, contributed to a significant reduction in the local plant genetic resources important for food and agriculture. This policy had particular influence on the production of grain (wheat, barley, oat, rye etc.) and grapevine landraces. By the 1990-s many of the landraces of the above-mentioned crops were kept only in the collections of different research institutes. In the case of field crops the genetic material was exported to Russia and kept at the Nikolai Vavilov Institute as there was no gene bank operating in Georgia. However, the greatest reduction of local genetic resources started after the collapse of the Soviet Union when, because of poor financing and the unstable political situation, state breeding stations collapsed and the maintenance of the genetic material kept in research stations proved to be under threat of deterioration.

The importance of traditional knowledge for agricultural production was neglected in the Soviet period. Together with the reduction of the local landraces, important knowledge and traditions related to agriculture and production of traditional products were lost. For example, the traditional knowledge related to the inoculation of fruit trees, rotation of pastures are no more applied by farmers. Furthermore, traditional crops are no longer cultivated in mountainous areas (Tusheti, Khevsureti etc.) and traditional knowledge of their cultivation is also forgotten.

The main reasons for the disappearance of landraces from Georgia's gardens and fields are lack of farmers' knowledge of the techniques for cultivating local landraces, in some cases the considerably lower yield of landraces in comparison with industrial varieties, poor recognisability of the landraces and their products on the market and shift to monoculture production.

Besides the above, the seed material of the landraces and local varieties, including those demanded on the market (e.g. local variety of tomato "Choportula") is not produced any more because of the collapse of the system of the research institutes, closure of breeding and experimental stations and underdeveloped production of seed and planting materials. At present plant breeding activities are very limited in Georgia and imported seed and planting material is dominating on the market. As a result, many landraces and local varieties of field crops, vegetables, fruits and grapes are only maintained in various *ex situ* collections.

In recent years various programmes have been carried out aimed at reintroduction of the landraces on farms and their conservation including recovery of their seed material, distribution of them among farmers and establishment of marketing chains for the products produced from landraces

[19] National Report on the State of Plant Genetic Resources for Food and Agriculture in Georgia, 2008 http://www.fao.org/docrep/013/i1500e/Georgia.pdf

though branding, promotion and development of their market potential. An example of such a programme is the GEF/UNDP-financed project "Conservation and Sustainable Use of Georgia's Agricultural Biodiversity" implemented by Biological Farming Association Elkana. In the frame of this project six landraces of different species of grain crops (*Triticum carthlicum* Nevsky*, Triticum aestivum* L*., Hordeum vulgare var. nudum, Secale cereale* (L.) *M. Bieb, Panicum miliaceum* L. and *Setaria italica (*L.*) Beaur)*, five landraces of different species of legumes *(Cicer arietinum* L*., Vicia faba* L*., Lens culinaris* Medic*., Vigna unguiculata* L.Walp. and *Lathyrus sativus* L*.)* and one technical crop *(Linum usitatissimum* L.) were reintroduced in Samtskhe-Javakheti region. On the demonstration plot of the project local varieties of grapevine and fruits were collected and multiplied with the purpose of distributing them among farmers. Marketing chains were developed for legume crops.

In 2009-2010 in the frame of a project financed by BP and its partner organizations BTC and SCP and administered by Eurasia Foundation (implementing body Association Elkana) the production potential and market chain for of the local landrace wheat – Akhaltsikhis (Meskhuri) Tsiteli Doli – were developed. *In situ* conservation activities carried out by Biological Farming Association Elkana are financed also by German NGOs: EED and Misereor.

Generally on-farm conservation activities in the country are limited and fragmented because of the lack of a state strategy and vision on the issue.

CWRs, medical plants, and pastureland species: Natural populations of many species of CWRs are increasingly at risk. The primary causes of diversity loss of wild plant species are habitat loss, degradation and fragmentation. Many cereal wild relatives, including relatives of wheat and millet, which occur in arid or semi-arid lands, are severely affected by over-grazing and desertification. Forest species are affected by habitat disturbances because of illegal forest cutting. Climate change is having significant impacts on habitats and the distribution of species. One of the most serious threats to the diversity of CWRs is genetic erosion and pollution (including threat of genetic pollution by GMOs).

Part of the CWRs, pastureland species and medical plants in Georgia are preserved *in situ* through the protected area system. Unfortunately there are no detailed, mapped data on the diversity and distribution of landraces, CWRs, pastureland species, harvested wild and medical plants within the territories of the protected areas, which would make it possible to determine which part of the agricultural biodiversity of Georgia is preserved though protected area system.

The conservation of wild populations growing as weeds mixed with cultural crops (in rural habitats and near arable lands) depends on the farming practices applied in the area. A big threat for the maintenance of such crops is intensive/monoculture production in the area, where wild populations occur in the neighbourhood of the cultivated fields. The use of herbicides and mineral fertilizers can also endanger the populations of crop wild relatives.

Degradation of pastures and range lands, which also represents a big threat for CWRs, started intensively in Georgia after the 1960s; however in recent years this process has reached an especially alarming point. In areas of intensive grazing the vegetation cover has been changed and erosion processes intensified. At present grazing in Georgia is carried out in a non-systematic, unorganized manner. The traditional practices related to the zoning of alpine pastures are no longer applied by the farmers. To avoid overgrazing and degradation of pastures it is important to keep the grazing rules such as: periodicity of grazing, height of grass, frequency of grazing (no more than three times per year), livestock density on pastures (one cow or 7-8 goats/sheep per hectare), pastureland rotation, and measures for avoiding soil degradation during driving of livestock from one pasture to another. For improvement of hay meadows it is important to clean them from stones (because they hinder the rise of vegetation cover) and to choose an appropriate time for mowing. Besides this the government should implement policies which prevent the genetic erosion of CWRs with high conservation value near arable and pasture lands.

The spread of new pests and diseases also has a great influence on populations of landraces and CWRs. Phytosanitary controls are not applied effectively in Georgia; five new pests entered the country in 2010 alone[20].

One of the problems for the conservation of medical plants is overharvesting, mainly for commercial purposes, when plant is collected for pharmaceutical industry to produce drugs in large amounts. Such harvesting can lead to extinction of populations. At present medicinal plants such as *Origanum vulgare*, *Helichrysum plicatum and Hypericum spp.,* which were once very widespread in the country, are endangered (Bedoshvili 2008). However collection of plants by households for their own use generally does not threaten natural populations of species (Akhalkatsi et al., 2009).

The crops cultivated in Georgia since ancient times (endemic species and landraces) and their wild relatives (as possible sources of the domestication of landraces) are of the highest conservation importance. Among fruit crops of the highest importance are grape (*Vitis*) and its wild relative species *Vitis vinifera subsp. Sylvestris,* as well as *Malus, Pyrus, Prunus* and *Corylus*. As for field crops wheat (including five endemic cultural species, a wide range of landraces and seven species of wild relatives - *Aegilops*), barley and other grain and legume crops have the highest conservation value.

In general the genetic resources of plant landraces and CWRs of Georgia are very poorly studied and information about their distribution is scattered in different field survey reports which are difficult to access. Therefore the first step for the *in situ* conservation of the landraces and CWRs in Georgia should be their inventory, characterization and mapping as well as identification of the degree of endangerment of particular species and varieties. Also important is research of the economic value of landraces and CWRs. These measures will allow planning of the conservation and utilization of landraces and CWRs in a rational and sustainable way.

As mentioned above, seed and planting material for the most landraces is not available in quantities required for their commercial cultivation. Therefore in order to make on farm conservation possible there is a need to further multiply their seed material. Also, since the loss of the traditional knowledge related to cultivation and use of the landraces hinders successful reintroduction of the landraces on farms, there is a need of reintroduction of this knowledge among farmers as well.

According to the scientists, the best way of *in situ* preservation of genetic diversity of valuable plants is the creation of nature reserves on territories where natural populations of CWRs occur. From this point of view the experience of German legislation, establishing the concept of "protected biotopes" in the system of protected areas, is very interesting; however, such kind of regulation is effective in countries where the system of land use and landscape planning is well developed.

There is also a need to improve legislation in order to regulate collection on the wild of economically important plant species.

One of the priorities for the improvement of *in situ* management is strategy formulation and adoption of action plans/programmes encouraging farmers' participation in conservation activities.

Another problem is related to the erosion of landraces and CWRs because of the spread of GMOs. This problem is generally poorly studied in Georgia and risk management strategies have not been developed.
Summarizing the main *in situ* conservation needs the following urgent actions can be listed:

1) Studies on local landraces/CWRs, their inventory and characterization;
2) Ethno-botanical and social economic studies to better understand the mechanisms of on-farm conservation of landraces;
3) Improvement of local landraces by simple breeding methods such as mass selection;

[20] Unofficial information from the Food Agency of the Ministry of Agriculture.

4) Assessment of landrace adaptability to local agro-ecosystems;

5) Strategic planning at national and regional levels.

6.2. *Ex situ* Conservation of Plant Genetic Resources Important for Food and Agriculture

Ex situ conservation is the conservation of plant genetic resources outside their natural habitats – in gene banks, breeding/research collections, botanical gardens etc. *Ex situ* conservation is an extremely important way of conservation as landraces and CWRs are under increasing threat and their conservation on farms or in the wild is sometimes ineffective or costly. At the same time *ex situ* collections represent the main and most easily accessible source for scientists to conduct inventory and genetic studies, as well as breeding activities.

The collections of local plant genetic recourses important for food and agriculture (landraces, CWRs) are kept in the largest gene banks of the world and in local research institutes. Georgia's research and breeding collections own the following samples:

1. Agricultural University of Georgia [21]:

- Gene bank of the I. Lomauri Institute of Farming – 3,057 samples of field and vegetables crops;
- Institute of Horticulture, Viticulture and Oenology – 1,519 samples of grapes, stone and pip fruits, nuts, and berries;
- Institute of Tea, Subtropical Crops and Tea Industry – 155 samples of citruses, tea and fruits;
- Biotechnology Centre – 75 *in vitro* samples of potatoes;
- Institute of Sericulture – collection of mulberry trees;

2. A non-commercial legal entity "Agro – National Centre of Production of Grapevine and Fruit Planting Material" – 430 samples of local landraces of grapes; 200 varieties of 15 different fruit crops, small in vitro collection of local landraces of cucumber and tomatoes;

3. Tbilisi Botanical Garden – small collection of CWRs and rare plant species;

4. Batumi Botanical Garden – small collection of CWRs and rare plant species;

5. Collection of the Biological Farming Association Elkana – small collection of local landraces of grain crops, grape, fruits and berries;

A number of samples is also kept by various Georgian breeders in their private collections.
The most important collections from the above-mentioned are the collections kept by the gene bank of the I. Lomauri Institute of Farming and the Institute of Horticulture, Viticulture and Oenology. The Gene Bank of the I. Lomauri Institute of Farming, established with ICARDA support in 2004, is the only gene bank for PGRFA in Georgia. The purpose of the gene bank is to conserve genetic resources of field and vegetables crops. It became fully functional in 2006.

The above-mentioned collections can be described as "museums" of the cultural heritage of Georgia; they preserve the public good of the country. Without these collections conservation of agricultural biodiversity of Georgia as well as research, further study of cultural flora of Georgia, functioning of breeding stations, development of seed and planting material production and production of some traditional products would not be possible. It should be mentioned also that the maintenance and enrichment of these collections in last two decades was conducted mainly in the frame of international aid programmes.

[21] National Report on the State of Plant Genetic Resources for Food and Agriculture in Georgia, 2008 http://www.fao.org/docrep/013/i1500e/Georgia.pdf

The number of samples preserved in the collections however is small: vegetable, maize, forage crops are especially badly represented in the collections; there are very few samples of such traditional Georgian crops and land races as sorghum, millet, flax etc. in the collections; pip fruit and grape collections also need significant improvement.

Field missions with the purpose of enriching collections are mainly carried out by the Institute of Botany of Ilia State University, the National Museum, the Institute of Farming, the Institute of Horticulture, Viticulture and Oenology of the Agricultural University of Georgia, and by various projects. Besides this the collection are enriched through obtaining genetic material from world's largest gene banks and live collections. It should be mentioned that many of the landraces preserved in foreign gene banks are not available in Georgian collections.

The number of living collections of fruit trees and grapes is not satisfactory. At present there are only two collections and the future of one of those - namely the collection preserved by the Institute of Horticulture, Viticulture and Oenology of the Agricultural University of Georgia - is under threat because of the reforms carried out in the Agricultural University of Georgia. The collection of the Institute of Tea, Subtropical Crops and Tea Industry is also in bad condition because of lack of financing. The number of the living collections does not correspond to international standards: in order to guarantee the protection of the samples preserved in the collections from natural disasters, diseases and genetic erosion the living collections of fruits, grape and citruses should be located in three different places.

The germ plasm of CWRs is a very valuable source for the improvement of the quality of cultural crops and their resistance to fungal and microbial diseases. The living collections of CWRs in Georgia are few. Tbilisi and Batumi botanical gardens have small collections of CWRs collected in the frame of international collaborative projects. However, because of the absence of appropriate financing, it is impossible to maintain these collections after the projects come to an end and they end up being cancelled.

Unfortunately the State does not have the strategic vision of *ex situ* conservation of plant genetic resources and the maintenance of the collections is largely dependent on financial support from international donors and private investors. In order to preserve the collections of the PGRs there is a need to renew the infrastructure and build the capacity of the staff of the research institutes maintaining collections. The management system of the collections should be also improved, especially in terms of the improvement of the protection of the samples from diseases and linking the collections with breeding activities (Bedoshvili 2008).

For the improvement of *ex situ* conservation the collections need to be further enriched and renewed and a State strategy of *ex situ* conservation should be defined. The State should have responsibility and a coordinating function for in *ex situ* conservation.

7. Conservation and Sustainable Use of Animal Genetic Resources Important for Food and Agriculture

7.1. *In situ* Conservation of Animal Genetic Resources Important for Food and Agriculture

In situ conservation of local domestic animal breeds is carried out in breeding and livestock farms.

Landraces of farm domestic livestock used to be relatively better conserved than in recent times. During the Soviet period, breeding work in the country was coordinated by the State Farm Animals Breeding Service under the Ministry of Agriculture and the breed councils operating therein. Almost every region had its regional breeding and artificial insemination stations. By 1990, the following farm breeding farms were functioning in Georgia:

- 1 animal-rearing, 1 breeding farm, and 46 breeding stations of the Caucasian Brown cattle breed, holding 36,165 head, including 12,723 dairy cows;

- 6 breeding farms of the Megruli Red cattle (in Lanchkhuti, Martvili and Baghdati districts), holding over 2,200 head of cattle, including 542 dairy cows;
- 1 breeding farm of the Georgian Mountain cattle (in Dusheti district);
- 2 breeding farms of the Georgian buffalo (in Dedoplistskaro and Zugdidi districts);
- 22 breeding farms and teams of the Tushuri sheep, holding 500 thousand head of high-class animals (in Kazbegi, Dusheti, Akhmeta, Telavi, Dedoplistskaro, and Sighnaghi districts);
- 1 breeding farm of the Imeruli sheep (in Sachkhere district);
- 2 breeding farms of the Kakhuri pig (in Telavi and Kvareli districts);
- 1 breeding farm of the Megruli goat (in Chkhorotsku district);
- 1 breeding farm of the Tushuri horse (in Kvemo Alvani);
- 6 Georgian bee-raising farms (in Abkhazia, Guria, Samegrelo, Imereti, Kakheti).

Part of the head of livestock of these breeding farms was destroyed during the civil war of the 90s of the last century; the remainder was completely transferred into private ownership as a result of State property privatization. The abolition of animal breeding farms endangered the existence of the local domestic animal breeds; for example, the Georgian fine-wool fat-tailed sheep's breed developed in the 50s of the last century has been practically lost, and the semi-fine wool fat-tailed sheep breed is nearing extinction, its total number today not exceeding 250-300 head *(V. Ghlighvashvili).* The population of straw-colored *(Tianetian)* turkey, developed by B. Antadze, has been lost.

In Soviet times statistical data on domestic animal breeds distributed in Georgia and of their number used to be published on a yearly basis, but such data has not been published since the 1980s; for that reason specific expedition reports are now used to determine the number of animals. In spite of this, the National Statistics Office of Georgia publishes annual statistics of the head of basic farm livestock (see Table 3.1).

Table 3.1. Number of livestock and poultry

Year	2006	2007	2008	2009	2010
Cattle (thousand)	1,080.3	1,048.5	1,045.5	1,014.7	1,049.4
Dairy cows among them	591.2	541.0	560.6	537.6	561.6
Pig	343.5	109.9	86.4	135.2	110.0
Sheep and Goat	789.2	797.1	769.4	673.8	654.1
Poultry (thousand)	5,400.7	6,149.7	6,682.2	6,674.8	6,521.4

Source: National Statistics Office of Georgia, Agriculture of Georgia 2011

The information concerning breeds of domestic animals distributed in Georgia has been entered in FAO's Domestic Animal Diversity Information System (DAD-IS) http://www.fao.org/dad-is; the system contains the currently available data on local breeds, and breeds imported during the Soviet period, of domestic animals distributed in Georgia. The placing of information in the database was carried out by the Georgian National Association for Animal Production (GNAAP) within the framework of a FAO project. After completion of the project there is no longer a structure in Georgia responsible for periodic updating the Georgian part in the database.

The number and vulnerability of the breeds of local domestic animals:

Georgian Mountain cattle: until the 1990s, a Georgian Mountain cattle–rearing and breeding farm was functioning in Dusheti district (v. Magharoskari). According to the 1980 census of breeding animals the number of Georgian Mountain cattle totalled 58.5 thousand head, including 17.6 thousand cows (N. Gotsiridze *et al*.). Data from a 2009-10 survey expedition (L. Tabatadze) indicated that the number of conventionally purebred animals of the Pshav-Khevsuruli sub-breed did not

exceed 3,000 head. Some strains of this landrace have been completely lost (*Abkhazuri* and *Osuri*), while others (e.g., *Acharuli*) have dramatically reduced.

Megruli Red cattle: distributed in Samegrelo and Guria, also in the adjoining regions. According to the 1980 census, the number of animals throughout the breed totalled 26.0 thousand (N. Gotsiridze *et al*.). In 1996-1999, an expedition study of Samegrelo and Guria regions showed that the total number of conventionally purebred livestock kept in farms and households amounted to 10.6 thousand head (T. Makharadze).

Caucasian Brown: by 1990 a Caucasian Brown cattle breeding station operated in Georgia; in 1 animal-rearing farm and 47 breeding farms over 36 000 head of livestock of this breed were kept, including over 12,700 cows. Today, the Caucasian Brown cow, in the more or less purebred form, has been preserved in Dmanisi, Tsalka, Akhalkalaki, and Ninotsminda districts, also in Kakheti districts of Dedoplistskaro and Sighnaghi.

Georgian buffalo: according to the 2004 census, the number of the Georgian buffalo totalled 29,541 head, including 17,358 female animals.

Tushuri sheep: 22 Tushuri sheep breeding farms and teams used to function during the Soviet period, holding 500 thousand high-class animals (in Kazbegi, Dusheti, Akhmeta, Telavi, Dedoplistskaro, and Sighnaghi districts). Today, the Tushuri breeding farms no longer exist and the Georgian sheep is actively mixed with the Azeri and North Caucasian sheep populations. As a result, no reliable data on the number of purebred animals is available.

Imeruli sheep: a breeding and animal-rearing farm for this breed was set up in the village of Korbouli in the late 70s of the 20th century. Now, individual farmers, for the purpose of increasing the live weight of the sheep, cross Imeruli ewes with larger-sized rams of Tushuri, Karachaev and other breeds. As a result, the share of crossed sheep has increased in the Imeruli sheep distribution area, for which purpose the breed's valuable traits are gradually lost; for example, - the occurrence of twins has fallen to 30% (A. Mushkudiani, 2009).

Megruli goat: a Megruli goat breeding farm was established in 1935 and encompassed four major districts: Tsalenjikha, Chkhorotsku, Martvili, and Senaki. In 1941, the first and single volume of the breed's herd book was published, where 103 animals were entered (A. Ghlighvashvili, A. Gigauri, 1983). The total number of the goats in 1952-1953 amounted to 250-300 thousand, in 1980-1985 - 100-102 thousand; by 2000 – the number of this breed totalled 20-22 thousand head (V. Ghlighvashvili, 2003). Today, the number is even smaller.

Kakhuri pig: was widely distributed in Dusheti, Tianeti, Kvareli, Lagodekhi, Gurjaani and other districts. Until the 1990s, two breeding farms of this breed were operating in Telavi and Kvareli districts (N. Melitauri *et al*.). According to the 1969 census of domestic animals the number of Kakhuri pigs was 6,000; in 1990 the number was 3,100. By today, reliable information about the number of Kakhuri pigs and the share of purebred animals in them is no longer available. Under expeditionary studies conducted by the Biological Farming Association Elkana in 2011 it was found that individual specimens of the conventionally purebred Kakhuri pig had been preserved in Dedisperula and Bakilovani villages within the community (*sakrebulo*) of Sakobiano village of Akhmeta municipality (G. Gogoli, T. Kurashvili, R. Barkalaia, 2011). Such a situation is rather serious, since the risk of complete loss of the breed is not excluded. Alarming also is the fact that farmers resort to the mating of the Kakhuri sows with white-colour boars, which is dictated by market requirements: the skin of the animals developed by such mating is white and therefore their pork is more demanded on the consumer market in contrast to that of the pigs with darker skin.

Data on the **Svanuri and Rachuli pig populations** is not available, although expeditions conducted lately have found evidence for the existence of individual specimens of these breeds. The local pig populations were found at risk of extinction because of the spread in Georgia of "swine plague" in 2006.

Tushuri horse: in the past breeding activities were carried out in the purebred direction. Today, cases of crossing with horses of other breed are rather frequent; because of this the number of purebred Tushuri horses has dramatically decreased; as a result, the unique traits characteristic of this landrace are being gradually lost (V. Ghlighvashvili, 2010).

Megruli horse: the number of purebred animals has dramatically decreased and practically no work is carried out in terms of the breed's improvement. This unique horse gene pool is at risk of complete extinction (A. Chubinidze, 2003).

Chicken populations: the populations of local chickens are popular among small farmers because, under conditions of extensive maintenance and in comparison with modern breeds and crosses they are characterized by vitality, good adaptability to changing environments and satisfactory egg laying (K. Natsvaladze, 2008). Despite this, the number of local chicken populations has dramatically decreased.

Javakhuri goose: no updated statistics on the status and number of the Javakhuri goose are currently available.

Georgian sheepdog: several Georgian sheepdog breeding farms are currently in operation in Georgia. Regrettably, these farms mostly use the Caucasian shepherd dogs imported from Russia and give less attention to the use of the indigenous genetic sources. The main direction of sheepdog breeding in Georgia should be the focus on the **indigenous**, purebred, rather rare **white sheepdogs**, which are becoming more and more demanded on a global scale (to compete with Russian and Euro-American shepherd dog breeders is rather difficult).

Georgian bee: Georgian bee is threatened with genetic erosion. The bee breeding farms that existed in the Soviet period in Abkhazia, Samegrelo, Guria, Imereti, Kakheti are no longer operating. According to the National Statistics Office of Georgia (GeoStat), 250-270 bee families exist in Georgia at present. It should be mentioned that in order to preserve purity of the Georgian bee, the importation of other bee species is prohibited (Law on Veterinary Service, 1997); as a result, only the local Georgian (Caucasian mountain grey) bee (*Apis mellifera caucasica*) is distributed in Georgia. Since Georgia is the centre of origin of this species, the conservation of its gene pool is very important. Lately, a new disease/syndrome (it has the status of a syndrome, for researchers failed to identify its causes) named as Colony Collapse Disorder (CCD) has constituted a serious problem to the health of bees. In Georgia this disease was first recorded 10-11 years ago and has spread over the entire country. Based on the USA's and European countries' statistics, CCD is the cause of death of and disappearance of 20-40% of the available bee populations. Among the possible causes of CCD are named: (i) the distribution of genetically modified plants (the nectar or pollen of any of them might contain insecticides); (ii) pesticide poisoning through exposure to pesticides applied to crops; (iii) general contamination of the environment; (iv) extensive monoculture farming (foraging habitat modification); (v) a combination of all the above-mentioned factors. The mass application of insecticides is another threat to bee populations.

Silkworm: as has been mentioned, the ancient Caucasian silkworm species were lost in the 1960s. Later-introduced species have also disappeared because the silk industry is no longer running in Georgia. Individual enthusiasts are still engaged in the silkworm breeding and cultivation in small numbers. The State Silk Museum holds a unique collection of silkworm specimens from various countries, numbering more than 5 000 breeds and varieties, including specimens of the 19th century.

The majority of local landraces and breeds of domestic animals are at risk of extinction due to their uncontrolled crossing with introduced breeds. The number of preserved pure-bred animals is rather small. Also the purity of the breeds is not certain because since the animal identification system is absent and the identification of purebred animals is carried out based on the phenotypic evaluation. The spread of animal epidemics and the inefficiency of the veterinary control system create serious problems in terms of preserving local breeds (e.g., the spread of the African swine plague in 2006 has brought the oldest local Kakhuri pig population to the verge of extinction). The change to industrial

agricultural production and orientation at standard products constitute additional threats to local breeds (e.g., since the Kakhuri pig has a dark skin, butchers avoid purchasing it and, correspondingly, its market price is lower). Thus raising of awareness on the products of Georgian breeds and their branding is of importance to improvement of this situation.

Monitoring of the distribution of local breeds of domestic animals is being carried out within the framework of different projects, although expeditions' findings are scattered in different project reports, which makes it difficult to get a comprehensive understanding of the state of local animal genetic resources in the country. Necessary measures to be taken in this direction include the purposeful conduct of expeditions and inventory of local breeds, and distribution maps of local breeds, given that the distribution of local breeds has altered significantly during the last twenty years.

7.2. *Ex situ* Conservation of Animal Genetic Resources Important for Food and Agriculture

In terms of *ex situ* conservation of animal genetic resources for food and agriculture, the situation in Georgia is particularly unfavourable. Georgia lacks a gene bank of animal genetic resources. The existing artificial insemination centres (e.g., Caucasus Genetics) are holding only the semen of local cow breeds (Caucasian Brown and Georgian Mountain). It is of interest that since the 1970s semen samples of Georgian domestic animals have been maintained in Russia, in the Saint Petersburg Semen Bank.

8. Conservation and Sustainable Use of Microorganisms and Fungi Important for Food and Agriculture

8.1. *In situ* Conservation of the Microorganisms and Fungi Important for Food and Agriculture

In rural regions of Georgia the fermentation process is in many cases still initiated by traditionally used micro-organisms which condition the taste and quality of the products. However, in many cases starters obtained by traditional methods of fermentation (inherent micro-organisms) are a mixture of unknown cultures, are unstable and doubtful in terms of food safety.

To start the fermentation process usually small quantities of whey or cream retained from the successful manufacture of a fermented product on a previous day are used as the inoculum or starter for the next day's production. This practice has been called various things but the term 'back-slopping' is the most widely used. In the fermentation process of cheese rennet derived from animal slaughter called *kveti* in Georgian (also *matshiki* or *dvrita*), and for production of bread yeast obtained from fungi living in hops is used.

In another type of fermentation, designated as 'controlled' or 'pure culture fermentation', the microorganisms associated with fermentation of food are first purified from the original food product, identified, and maintained in the laboratory. When required for the fermentation, these microbial species are grown in high volumes and added to the raw material (e.g. milk) in very high numbers. These microbial species, when used in controlled fermentation, are referred to 'starter cultures'. Nowadays fermentation is initiated with pure starter cultures with predictable performance potentials (appearance, body, texture and flavour). At the same time isolation and screening of micro-organisms from naturally occurring processes allows genetically and biotechnologically characterized useful cultures to be obtained, which then may be used for scientific and commercial purposes.

As a result of the more strict food safety requirements, development of the food industry and increased popularity of local products, the diversity of microorganisms and fungi used in the production of traditional foods is attracting more attention. In spite of significant scientific and technological interest towards artisanal cultures all over the world, relatively little research has been

undertaken on natural starters of the traditional products originated from Georgia; the only exceptions are natural starters of matsoni, cheese and wine.

Study of microbiological diversity of traditional fermented products could give us important information on microbiological diversity, safety and quality characteristics of traditional products. Such information is very important for the development of their industrial production as well.

The traditional processes of fermentation and microorganisms and fungi involved in the fermentation processes are also important for the registration of the Geographic Indications of traditional products. Very often a special character and quality of the product, connected with particular geographic location, is determined by its microbiological content; for example the French cheese "Roquefort", which has a Protected Geographic Indication, is made only from milk of a particular breed of sheep and matured in the natural caves near the town of Roquefort in the Aveyron region of France, where it is infected with the spores of a fungus (*Penicillium roqueforti*) that grows in these caves.

Unfortunately the traditional fermentation methods of some products, such as bread, dambali khacho (dried cottage cheese) and traditional beer, are almost forgotten in Georgia. With the loss of traditional fermentation methods authentic products obtained though these processes are also disappearing. The decline in microbiological biodiversity and even its complete replacement by imported cultures is apparent in the production of such traditional Georgian products as e.g. matsoni, cheese, wine. Imported industrial starters are diminishing the authenticity of local products and at the same time are sometimes not in line with food safety requirements (e.g. pepsin is often used as a starter for homemade cheese).

In the 1990s local dairy factories were using so called "spontaneous starters" in the production of traditional Caucasian dairy products, but they did not meet the requirements of European market standards. Thus starting from 2000 local dairy producing companies were forced to use standard starters in the production of dairy products including traditional ones such as matsoni, nadugi (whey curd) and cheeses including Imeruli (a curd cheese), Suluguni (a type of Mozzarella cheese), Kartuli and Guda (hard cheeses). At present Georgian dairy companies use starters imported from Russia, Turkey, Denmark, Bulgaria and other countries. Imported standard starters do not originate from the Caucasian region and thus their use by the local companies may lead to diminishing of the existing biodiversity and even its complete replacement by imported cultures, since, for example, many households, even in rural regions, are inclined to use commercial dairy products available in supermarkets for the 'backslopping' domestic fermentation of matsoni.

The importance of traditional starter cultures is can be easily understood from the example of research outcomes carried out on matsoni. Traditionally matsoni has been applied as a supplement of the infants' diet, as a remedy against intestinal disorders, for treating burns and dermatitis, in domestic cosmetics for the improvement of the skin and hair conditions, and as a base for special food-preserving solutions. Hence, matsoni can be considered as a potential genetic pool of strains of microbes that act against pathogens causing human and animal diseases and food-spoiling micro-organisms. In addition to health beneficial value these microorganisms may be have other important yet unknown properties. In spite of the long-term use of matsoni among the Caucasian population the bacteriological composition of matsoni and the genetic diversity of its components are poorly studied. Previous researchers assumed that matsoni starter is completely identical to the Bulgarian yogurt. According to another group, one of the major components of matsoni starters was the bacterium *Bifidobacterium bifidum*. However the most recent studies performed during 1995 - 2010 and based on the results of a study of the microbial composition of 40 domestic starters originating from different villages and towns in Georgia located at the altitudes of 380-1700 showed that the bacterial composition of Caucasian matsoni is remarkably different from Bulgarian yogurt. Genetic studies recently performed on 49 strains of *S. thermophilus* isolated from the domestic samples of matsoni demonstrated a significant genetic diversity of these cultures. It should be also mentioned

that practically nothing is known about the genetic peculiarities of such other major components of matsoni as *Lactobacillus delbrueckii ssp. lactic* and secondary components such as *Lb. casei, Lb. paracasei, Lb. acidophilus* and matsoni yeasts.

Therefore much importance is attached to studying the yeast and starter cultures of traditional products (cheese, cottage cheese, matsoni, beer, bread, wine, etc.), identifying phenotypic properties of their bacterial cultures and selecting and conserving biotechnologically important species. Of particular importance in this respect is a dialogue between researchers and business representatives. Implementation of research projects to develop local product starters is decisive for conserving the biodiversity of these species on the one hand, and to initiate registration of geographical indications of traditional products and industrial production of traditional products, on the other hand.

Worthy of mention is Georgia's cooperation with the European Union to ensure protection of geographical indications for a whole number of Georgian milk products, such as: matsoni, dambali khacho (cottage cheese) and cheeses such as Tushuri Guda, Imeruli, Kobi, Svanuri Suluguni, Sulguni, Guda, Kartuli, Tenili, Acharuli Chechili, Meskhuri Chechili. Exactly in this direction it is of decisive importance that **the microbiological composition of these products is identified and their starters are easily accessible to producers within the areas of the geographical indications**. Special attention in this respect should be given to the regulation of the issues concerning the **protection of intellectual property rights for traditional product starters**. These measures are necessary for preventing monopolization of the market since in today's conditions there is a possibility for company or person producing traditional products to identify the microbiological composition of, and patent the rights on, the starters of major traditional products and thus restrict the production of the particular product by other manufacturers within the area of geographical indication.

8.2. *Ex situ* Conservation of the Microorganisms and Fungi Important for Food and Agriculture

The *ex situ* collections of microorganisms and fungi important for food and agriculture are scattered in different research institutes of the country; at the same time the number of cultures preserved in collections is very low and cultures separated from many important traditional products are not preserved in the collections at all. Besides this, the culture collections do not have an official national or international status and there is no database of the samples kept in the collections. The main culture collections of microorganisms and fungi important for food and agriculture are preserved in:

- **George Eliava Institute of Bacteriophage, Microbiology and Virology** – the culture collection of the Institute includes approximately 400-450 dairy (matsoni and cheese) cultures originating from different regions of Georgia and related to species: *Lb. Delbrueckii ssp. Bulgaricus, Lb. Delbruekii ssp. Lactic, Lb. casei, Lb. paracasei, Lb. acidophilus, S. thermophilus, Lc. Lactis, Lc. Diacetylactis* and *Entecoccus* sp.
- S. Durmishidze Institute of Biochemistry and Biotechnology under the Agricultural University of Georgia – the Institute has collections of edible and medical mushrooms, bacteria and mould and yeast fungi;
- Institute of Horticulture, Viticulture and Oenology under the Agricultural University of Georgia – has a collection of wine yeasts.

9. Conservation and Sustainable Use of Agro-ecosystems

The ecological state of agro-ecosystems and specific diversity of agrarian landscapes are one of the main factors determining the environmental state of the country. Environmental problems that result from climatic change and anthropogenic impact, such as soil degradation and contamination, are one of the main challenges for Georgia's agricultural sector.

The intensive application of agricultural chemicals, contamination with industrial waste and improper agricultural practices starting from the 30s of the 20th century contributed to soil degradation and activation of erosion processes. Degradation of agro-ecosystems has also increased during the last twenty years: disruption of melioration and irrigation systems, as well as cutting down of windbreaks further activated erosion processes. The poor state of the phytosanitary and veterinary prevention and control system has resulted in the spread of new pests and diseases, which poses a serious threat to local agricultural biodiversity. Restriction of access to traditional pastures in Azerbaijan and Dagestan has increased pressure on local pastures.

Soils and landscapes: The ecological condition of the soil cover of Georgia is very poor. Large areas of the soil cover are polluted by radionuclides, heavy metals, and pesticides.

Radionuclide contamination in Georgia took place during nuclear weapon tests in Soviet times and during the Chernobyl nuclear power station disaster. The regions of western Georgia (Adjara, Samegrelo, Abkhazeti, Guria, Imereti, Racha-Lechkhumi, Kvemo Svaneti) are more polluted by radionuclides than regions of eastern and southern Georgia.

Soils of Georgia are polluted by heavy metals in the Mashavera river basin of eastern Georgia and in the Kvirila river basin of western Georgia. Unfortunately, there are no soil and water analyses have been conducted in these zones and products produced in these places are freely available at markets.

Water-induced and wind-induced erosion are widespread in eastern Georgia, while in western Georgia mainly water-induced erosion occurs. In the 1980s more than 300,000 ha agricultural land was eroded, among them 200,000 ha by water erosion (in western Georgia) and 100,000 ha by wind erosion (in eastern Georgia). The total area of eroded soils is nearly one million ha, of which 380,000 ha are arable land and 547,000 ha are pastures. In total about 38% of the agricultural lands of Georgia are eroded and about 18% are degraded (acidity - 11%, salinization 7%); this is an alarming indicator for a country with little land. The main causes of erosion are cutting of windbreaks, incorrect irrigation practices, incorrect use of fertilizers and plant protection means, no application of crop rotation method, etc. Ruined drainage systems and incorrect irrigation practices cause secondary salinization of soils. Removing lime from upper layers of the soil and natural processes occurring in the soil contribute to soil acidification.

Prevention of soil pollution and maintenance and improvement of soil fertility are the major factors for healthy functioning of agro-ecosystems. The status of agricultural lands and soils depends on the agricultural practices that are used; i.e. diversity of crops in farming systems, grazing density, crop rotation, rotation of pastures, windbreaks and hedges, melioration, drainage and irrigation systems, quality of irrigation water, proper application of fertilizers, pesticides and herbicides, cultivation methods.

According to "*The Second National Environmental Action Plan of Georgia for 2012-2016*" land degradation is a serious problem in Georgia. Soil erosion, which is a natural phenomenon in some cases, is aggravated by the unsustainable use of soil. Soil fertility also depends on the degree of soil salinization. Soil fertility is declining due to increasing soil acidity caused by unsustainable use of fertilizers containing hydrolytic and acid salts and acid precipitation. In addition, soil pollution is caused by the unsustainable use of fertilizers (organic and mineral), toxic chemicals and heavy metals. Land degradation can be avoided / mitigated by effective land use policy on national, regional and local levels. In spite of the existence of a legislative basis for landscape planning, in practice planning is weak in Georgia. For this reason during the allocation of the land plots for various purposes, damage to high value rural areas and important natural ecosystems is not taken into the consideration.

Climate: Scientists believe that climate change will further activate erosion and soil salinization processes, especially in southern part of eastern Georgia and in the zone of alpine pastures. According to studies, climate change will have a negative impact on the production of wheat,

sunflower, vegetables, corn and potatoes in eastern and southern Georgia; land degradation will cause more active spread of pests-diseases.

As a result of research carried out in the frame of the Second National Communication on Climate Change, to assess vulnerability to climate change and to develop adaptation measures, Dedoplistskaro municipality, the territories of which are under the threat of desertification, has been selected as a "pilot region". This municipality has been characterized historically by a dry climate and a tendency of land degradation. Recently, activation of land degradation process caused by a rise in temperature and frequency of strong winds has been observed. Currently irrigation systems and windbreak rehabilitation programmes are being implemented in the pilot region.

Organisms that promote ecosystem services: the habitats of beneficial insects are affected by factors such as a reduction of plant cover, monoculture production, soil degradation, and over-application of insecticides. For creation of the favourable conditions for beneficial insects the arrangement of buffer zones such as windbreaks, where natural habitats for beneficial insects would be maintained, are required. Windbreaks provide a habitat for beneficial insects, a source of nectar for bees and facilitate pollination. Plants that create a feeding reserve and cover for useful insects and organisms are called nurse plants. These plants, as a rule, grow along the edges of fruit and vegetable gardens (e.g., dandelion, valerian, milfoil, chamomile, marjoram, etc.).

Frequently, natural enemies of the pests of introduced crops' are brought in from the country of origin (e.g., natural enemies of citruses have been brought in Georgia from China).

Unfortunately, no up-to-date research on the state of pollinators has been carried out in Georgia in recent years.

It is of interest that for production of biohumus Georgia imports Californian red hybrid-earthworms, whereas such earthworms can be produced also locally.

Georgia has one *ex situ* collection of beneficial organisms: the Agricultural University of Georgia-based Plant Protection Institute holds a collection of viruses, natural regulators of harmful organisms and parasitic nematodes, totalling up to 100 samples.

To preserve and restore agricultural ecosystems in Georgia it is necessary to rehabilitate irrigation and drainage systems, restore windbreaks, improve the management of common pastures, introduce the principles of "model agricultural practices" and restrict monoculture production. The development of organic production can play its role in achieving the above.

10. Institutional, Political and Legislative Environment for Agricultural Biodiversity Conservation and Sustainable Use in Georgia

10.1. International Agreements and National Action Plans Relating to Agricultural Biodiversity

Convention on Biological Diversity. According to a decision of the 5th Conference of the Parties (COP5), agricultural biodiversity has been determined as one of thematic programmes of the Convention. The programme elements include:

1) **Assessments** – provision of the comprehensive analysis of status and trends of the world's agricultural biodiversity and of their underlying causes;
2) **Adaptive management** - adaptive management practices, technologies and policies;
3) **Capacity building** - strengthening the capacities of stakeholders for increase of their benefits and promotion of the awareness and responsible action;

4) **Mainstreaming -** supporting the development of national plans and strategies for the conservation and sustainable use of agricultural biodiversity and to promote their mainstreaming and integration in sectoral and cross-sectoral plans and programmes.

Programme activities in agricultural biodiversity should be based on the *ecosystem approach* and promote study of the impacts on the agricultural biodiversity of such factors as trade liberalization and production of terminator seeds (plants that have been genetically modified to render seeds sterile at harvest). The Programme's targets are not limited to the conservation of agricultural biodiversity and preservation of the sustainability of the ecosystems but also envisage the mitigation of adverse impacts of agricultural practices on the environment (water and air pollution, soil degradation, etc.) and ensuring human wellbeing.

Within the framework of the Convention, Georgia has presented 4 national reports (http://www.cbd.int/reports/search/) outlining the actions implemented by the country and existing problems relating to agricultural biodiversity.

The Conference of the Parties to the Convention has also elaborated the following initiatives:

1) **International Initiative for the Conservation and Sustainable Use of Pollinators** (V/5 decision, second section) and Plan of Action (VI/5 decision, Annex II);
2) **International Initiative for the Conservation and Sustainable Use of Soil Biodiversity** (VI/5, paragraph 3), **Framework for Action** (Decision VIII/23 B);
3) **International/Cross-cutting Initiative on Biodiversity for Food and Nutrition** (Decision VIII/23 A).

The priorities of the Thematic Programme on Agricultural Biodiversity were highlighted in NBSAP-1.

A **List of Biodiversity Indicators** was approved in 2009 by an order of the Minister of Environment Protection and Natural Resources (#293 of 22 May 2009), (http://biomonitoring.moe.gov.ge/). Some of these indicators directly **(e.g. S2)** or indirectly relate to the status of biological diversity. However, most of them have not been determined up to now, owing to limited access to information about them (for example, no information is available on the number of heads of specific breeds of domestic animals and agricultural crop varieties existing in Georgia). From the agricultural biodiversity standpoint the following indicators are of significance**:**

- **Pressure Indicators:** P1. Fragmentation of landscape (Change in the average size of landscape patches)**;** P4: Intensity of fishery (Change in the total catches of fish stock)**;** P5. Intensity of agricultural land use (Change in agricultural production in relation to the total area of agricultural land)**;** P6: Releases of Genetically Modified Organisms (GMOs) (Change in the total number of general release permits for genetically modified organisms)**;** P7: Intensity of grazing (Change in livestock density on total pasture land);
- **State Indicators:** S2: Agrobiodiversity (Change in the number of all domesticated livestock breeds and agricultural plant varieties recognized in Georgia);
- **Response indicators:** R6: Agriculture according to the principles of organic farming (Change in the total area of agricultural land managed according to the principles of organic farming); R9: Public awareness on biodiversity (Change of the public attitude to biodiversity).

Georgia acceded to **the Cartagena Protocol on Biosafety** to the Convention on Biological Diversity under the government resolution #305 of 26 September 2008. The relevant national legislation has not been passed. In respect of agricultural biodiversity, implementation of the Protocol's requirements is important because the uncontrolled entry of living modified organisms in the country for the purpose of their cultivation can have an adverse impact on local plant species and their wild varieties. Specially endangered in this respect are the species that have been cultivated in Georgia over the millennia and thereby have high conservational importance.

At present Georgia is considering whether to sign the **Nagoya Protocol on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising from their Utilization** to the Convention on Biological Diversity. The Protocol aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components. The Ministry of Environment Protection of Georgia is considering the possibility of developing a form of mandatory agreement with the State on fair and equitable sharing of benefits arising from the collection and use of genetic material in Georgia by commercial organizations and scientific institutions of foreign countries (the benefit-sharing may not only be the monetary remuneration, but also the involvement of local scientists into research, improvement of their skills, equipping local laboratories and research institutes with modern technologies, the delivery of the collected genetic material duplicates to local *ex situ* collections, etc.). Legislation on accessibility of genetic resources and fair and equitable sharing of the benefits arising from their utilization is important for preventing "biopiracy" and improving working conditions for local researchers.

International Treaty on Plant Genetic Resources for Food and Agriculture: Georgia is not a party to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) of the Food and Agriculture Organization (FAO). This treaty provides for a free exchange of genetic resources of food and non-food crops listed in its annexes among public gene banks and institutions of the countries members of the Treaty under a standard material transfer agreement (MTA). Georgia's non-accession up to now creates problems for Georgian gene banks and cultural flora collections in exchanging genetic material with international gene banks and collections: gene banks of member countries refrain from transferring their plant genetic resources to non-member countries.

Several of the other international agreements and treaties described in the Introduction to this compilation are relevant to the conservation of agricultural biodiversity.

The importance of traditional agricultural production is outlined in Chapter 4 of the **EU-Georgia Five-year Action Plan (2006)**, dealing, among other things, with fostering the development, promotion and protection of quality production (traditional products, organic products, geographical indications, etc.). Within **the Eastern Partnership Programme of the European Union** work on promoting a **green economy** is underway in Georgia, supported by the Ministry of Economy and Sustainable Development (http://www.greengeorgia.ge). The development of sustainable production and organic agriculture is one of the directions in the development of the green economy. Also, in the *Comprehensive Strategy and Legislative Approximation Programme in Food Safety* approved by the Government of Georgia on 28 December 2010 it is mentioned that "the preservation of traditional methods of food production, processing and distribution is one of the main priorities of the Government of Georgia."

10.2. National Legislation and Government Strategy Documents Relating to Agricultural Biodiversity

Georgian legislation regulates a number of matters that are significant in terms of preserving agricultural biodiversity:

The Constitution of Georgia (1995): Article 37.4 of the Constitution states that: "With a view to ensuring a safe environment, in accordance with the ecological and economic interests of society, with due regard to the interests of the current and future generations the State shall guarantee the protection of the environment and the rational use of nature." Thus, under the Constitution of Georgia, the State has assumed the obligation of preserving biological diversity in general and agricultural biodiversity as its integral part.

Article 37 of the Constitution imposes on the State the obligation of preserving the cultural heritage of Georgia. However, the **Law of Georgia on Cultural Heritage** (2007) does not regard agricultural biodiversity as part of the cultural heritage and does not provide for the protection of local plant and animal species, traditional agricultural landscapes and/or the knowledge associated with local genetic resources and agricultural production traditions.

10.2.1. Environmental Policy and Legislation Relating to Agricultural Biodiversity

According to Article 3.1 of the **Law on Environmental Protection** (1996), the main aim of the Law is: "to promote the preservation of biological diversity, the rare, endemic and endangered species of flora and fauna typical for the country...". The law considers protected territories as the main instrument of biodiversity preservation. The Law does not mention agricultural biodiversity and does not include it in its definition of biological diversity; the law provides in a general way that human activity must not lead to the irreversible degradation of biological diversity.

The **Law on the Red List and Red Book of Georgia** (2003) establishes a list of endangered species of wild plants and animals. As mentioned above, species that are important in terms of agricultural biodiversity are generally absent from the list; exceptions are some species of wild relatives of cultivated plants and medicinal plants, also some worms and insects. The reason of this is that landraces, as cultural crops and breeds, do not fall under the scope of the law, which only covers wild forms. Besides this, the protection status categories and assessment criteria determined by the International Union for Conservation of Nature (IUCN) and recognized by the law (Article 16) differ from the prioritization (vulnerability assessment) criteria of crop wild relatives. The importance and vulnerability of crop wild relatives are determined by aggregating scores for the following criteria: (i) vulnerability according to IUCN criteria; (ii) extent of occurrence on km^2; (iii) endemism; (iv) gene pool/taxonomic similarity to a landraces. In addition, as mentioned, the gene pool of wild relatives of Georgian cultivated plants has not been sufficiently studied, and that gap interferes with the inclusion of the species in the Red List.

Law on Fauna (1996) protects both wild and domesticated animals. The law (Article 4) regulates "the relationships in the field of protection, breeding and use of those agricultural, domestic and other animals, which have economic, scientific, cultural, educational, aesthetic and other purpose". With a view to protecting animals the law regulates the application of herbicides, growth-promoting hormones, mineral fertilizers, and other activities directed at the regulation of the number of individual breeds/species. However, the law's provisions are rather general and its actual impact in terms of protection of domesticated animals is far from being effective.

Law on the System of Protected Territories (1996) – one of the main objectives of the Law is to promote the protection, restoration and development of traditional economic and folk creative activities to preserve Georgia's unique historical and cultural environment. According to the law, for the purpose of conservation of nature and development of economic activities related to the traditional use of renewable natural resources, zones of traditional use are arranged within national parks, where mowing, grazing, firewood cutting, and other activities limited to needs of local population and natural productivity are allowed. Tillage, sowing, and location of farm buildings within the protected area zone are prohibited by the Law. In this respect, special mention should be made of Tusheti and Kazbegi protected areas, the most part of which are traditionally used as natural pastures. Currently, various projects aimed at developing sustainable agriculture are being implemented within protected areas and their buffer zones, which is one of the means of conserving agricultural biodiversity (http://dpa.gov.ge/). The Law also provides for the categories of protected areas "protected landscape" and "multiple-use area" which can be arranged on land in private ownership as well. Notwithstanding the above, there is no agricultural diversity conservation strategy within the protected areas.

On 24 January 2012, the Government of Georgia approved the **Second National Environmental Action Plan** (2012-2016). The document envisages the implementation of biodiversity activities

through renewal of the NBSAP, also the elaboration of biodiversity indicators. In terms of agricultural biodiversity, the programme also encompasses such important issues as soil degradation control and adaptation to climate change. In relation to GMOs the Action Plan also states that it is important to have updated information on the share of LMOs in imported seed and planting material and in agricultural products. One of the Action Plan's short-term (5-year) targets is related to water (target 4): "Reduction of pollution from diffusive waters in agriculture." To attain this target, the Ministries of Agriculture and of Environment Protection of Georgia are drafting a **National Action Plan of Sustainable Use of Pesticides, Herbicides and Fertilizers**; also being planned are measures to promote **Pilot Organic Farms** in 2012-2016, with the participation of local governments. In addition, plans of the Ministries of Agriculture and of Environment Protection of Georgia for 2012-2014 envisage the development of criteria for assessing the risk of soil degradation and identification of areas where the risk is high. The Action Plan also underlines the point that rural households are directly dependent on biodiversity resources, and that any conservation activity or other actions should be planned in close cooperation with them.

In 2009, an **Environmental Code** was drafted and passed its first hearing in the Parliament of Georgia. Section VII of the Draft Code – "Conservation of Biodiversity" –does not include matters related to agricultural biodiversity; however of interest is Article 206 of the Draft Code dealing with the conservation of natural ecosystems, also Article 34, which regulates animal protection issues "upon application of herbicides and other agents". In general, though, the Draft Code has serious shortcomings in respect of agricultural biodiversity regulation.

10.2.2. Agricultural Policy and Legislation Relating to Agricultural Biodiversity

It is interesting that matters related to agricultural biodiversity feature more in the laws operating in the sphere of agriculture than in environmental protection legislation:

The Strategic "10-Point Plan" of the Government of Georgia for Modernization and Employment (2011–2015). The Plan envisages the transfer of land into agricultural activities, which is important in respect of agricultural biodiversity; however, the Plan fails to indicate what measures will be taken to attain this target.

The newly finalized and published **Draft Agriculture Development Strategy of Georgia (2012-2020)** dedicates a separate chapter to agricultural biodiversity. The Strategy mentions that "conservation of and sustainable use of agricultural biodiversity have a special role in the development of agriculture." The Strategy also recognizes the significant role of local farmers and breeders in the conservation and improvement of genetic resources, though it does not specify the State's obligations in respect of the conservation of agricultural biodiversity.

The main focus in the Strategy is on activities aimed at developing soil protection and land-reclamation infrastructure. The Strategy provides for taking the following measures to combat soil degradation:

- Arrangement and maintenance of windbreaks;
- Monitoring the application of fertilizers and chemicals and wastes;
- Regulation of land-reclamation infrastructure;
- Conduct of shore protection operations and creation of a data base on riverside emergency objects;
- Perfection/modernization of a natural disaster early warning system.

Unfortunately, the Strategy fails to highlight the questions related to the development of organic agriculture, which is an important issue for the "green economy" development initiative mentioned above.

Law on Vine and Wine (1998) protects the diversity of local grapevine varieties. According to Article 4 of this Law: "1) The local genetic resources (landraces) and wild forms of the grapevine are a national wealth protected by the State. 2) The retrieval, research, study and conservation of genetic

resources of the grapevine shall be financed by the State." However, the Law does not define the government agency responsible for conserving genetic resources of the vine varieties. The Statute of the National Wine Agency SAMTRESTI does not assign such a function to the Agency. Accordingly, in reality this provision of the law is ineffective.

The **Laws on Veterinary**, (1995), **On the Protection of Plants from Harmful Organisms** (1994), and **On Agricultural Quarantine** (1997) relate to the matters of plant and animal health in Georgia and are thus important in terms of conservation of agricultural biodiversity. However, these laws have failed to create a properly operating phytosanitary and veterinary system.

In 2010, following revocation of the **Law on Bee-keeping**, the Law on Veterinary was supplemented with Article 33.1, which states that "In order to preserve the purity of the Georgian bee, importation/transit from a foreign country of a bee family, queen, bee sperm, bee larvae and pupae without an import/transit permit of a product subject to veterinary control shall be prohibited. Also prohibited shall be the return of the bees exported or taken out from the territory of Georgia".

It should be mentioned that in 2011 the Georgian Government drafted a **Code on Food Safety, Veterinary and Plant Protection**, which has passed two hearings in the Parliament of Georgia. Unfortunately, the first version of the Draft Code contained numerous shortcomings in respect of regulation of plant protection and veterinary issues. At the same time, the article relating to the honeybee export-import was not included in the Draft Code. The veterinary medicine issues are outlined in a very general way and do not provide for mechanisms ensuring good veterinary practices on small farms. It is also to be noted that the Draft Code says nothing of the necessity of monitoring the damage caused to the environment from mass application of pesticides and agrochemicals. According to the Code, the Food Agency is no longer responsible for informing farmers of such things as periods of appearance, propagation and development of harmful organisms, the ecologically justified methods and means of their control, and observance of the economic limits of the harmful action.

Also of importance in respect of encouraging sustainable agricultural production is the development of organic production and a favourable legislative environment. In 2010, the **Law on Biological Agroproduction** (2006) was revoked. At present, the Draft Code on Food/Feed Safety, Veterinary and Plant Protection establishes that the Government of Georgia has to ensure the adoption of a governmental resolution on "Organic production". Of importance in this respect is the prohibition of marking uncertified products with misleading labels or marks (e.g. "ecological", "organic", ecologically safe", etc.). The absence of such prohibition is one of the major factors interfering with the development of the organic farming sector in Georgia.

Issues concerning the effective use and safe application of pesticides and agrochemicals are regulated by the **Law on Pesticides and Agricultural Chemicals** (1998). According to the Law, a necessary precondition for safe application of pesticides and agrochemicals is the imposition by the respective services of the Ministry of Agriculture and competent agencies of the Government of Georgia of strict controls over content of the pesticide and agrochemical residue in crops, the soil and other objects of the environment. Regrettably, operation of the Law is ineffective due to limited funding and institutional capacity; the National Food Agency cannot effectively carry out control measures in this direction.

Issues related to soil conservation are regulated by the **Law on Soil Conservation and Efficiency Revival-improvement** (2003) and **Law on Protection of Soil** (1994). Pursuant to these laws, measures to restore and improve the fertility of soils that are associated with agricultural production processes shall be carried out on all categories of soils at the expense of physical and juridical legal persons, whereas chemical amelioration of soils and erosion- and desertification-preventive measures on state-owned lands shall be financed from the Central Budget of Georgia, through purposeful programmes.

10.2.3. Legislation in the Sphere of Intellectual Property Rights

The **Patent Law of Georgia** (1999) regulates the granting an industrial patent. According to Article 17, "A patent shall not be granted in respect of inventions relating to plant or animal varieties or essentially biological processes for the production of plants and animals". This means that cultivated plants and domesticated animal species are beyond the scope of the law. However, "this provision shall not apply to microbiological processes or the products thereof", which means that the methods of producing local product starters (a combination of microorganisms contained therein) can be patented. We know two patents for Matsoni starter: the first is granted by Sakpatenti, the second has been applied for obtaining an international (concurrently in several countries) patent in accordance with the **Patent Cooperation Treaty** (PCT, 1970). At the same time, to avoid the risk of "bio-piracy", special attention should be paid to patenting of traditional product starters, as there is a threat that the microbial composition of local starters can be patented by one organizations and that will have a monopolistic status on the local or international market. Traditional product starters should be accessible for local producers; especially if the products are **"protected geographical indications"**. The easiest way of achieving this is for the State to finance, even if only partially, the establishment and patenting of the method of traditional product starters and for a public organization to be the patent holder.

Together with other measures, strict control needs to be exercised over the export of non-studied and unprotected endemic microorganisms. Protection of appellations of origin and identification of starter compositions will make it possible to protect Georgian products from their adulterated analogues on international markets and allow original locally-made products to access these markets. For example, a Japanese producer of dairy starters and products is selling a product known as "Matsoni – Caspian Sea yoghurt", being advertised as originating in Georgia and as one of the factors of longevity of the Caucasian population. However, the composition of this product is completely different from that of Georgian matsoni, for it contains only mesophilic bacteria: *L. lactis subsp. Cremoris* and *Acetobacter orientalis*, whereas the dominant flora in matsoni is represented by *Lb. delbrueki* and *S. thermophilus*.

Law of Georgia on Appellation of Origin and Geographical Indications of Goods (1999) regulates the registration, protection and use of appellations of origin and geographical indications of goods. Based on this law the following geographical indications were registered in 2011: Chacha, Churchkhela, Chogi, Matsoni, Tenili (cheese), Kartuli Kveli (Georgian cheese), Acharuli Chlechili (Adjarian cheese), Meskhuri Chechili (Meskhetian cheese) Megruli Sulguni (Megrelian cheese), Sulguni (cheese), Svanuri Sulguni (Svanetian cheese), Kobi (cheese) Guda (cheese), and Tushuri Guda (Tushetian cheese) http://www.sakpatenti.org.ge/index.php?lang_id=GEO&sec_id=325#4). It should be mentioned that according to the Law for making genuine matsoni it is necessary that "lactic fermentation of the milk should be carried out by a starter composed of local lactic-bacterium cultures and isolated within the territorial space of Georgia."

The matters of the right of intellectual property on plant and animal varieties/breeds and permission for their distribution are regulated by the **Law of Georgia on New Breeds of Animals and Varieties of Plants** (2010)**.** It should be mentioned that the law primarily concerns the relationships with legal protection of new animal and plant varieties (the right of selection) and applies to all genera and species of agricultural animals and plants. Accordingly, the indigenous varieties/breeds (landraces) of popular selection are beyond the scope of the Law. It is interesting that following reversal in 2010 of the **Law of Georgia on Permission for Distribution of Varieties of Agricultural Crops, Quality Seeds and Planting Material** (1999), the issues of permission for distribution in Georgia of quality seed and planting material have been transferred to **Chapter 9 of the Law of Georgia on New Breeds of Animals and Varieties of Plants**, according to which "seeds and planting material are permitted for distribution in Georgia: a) by a certificate of quality; b) by a phytosanitary certificate. Additional conditions of distribution of seeds and planting materials in Georgia shall be defined by a resolution of the Government of Georgia." It is to be noted that the said resolution has not been passed up to

this day; therefore **it is unclear under what conditions seed and planting material of landraces shall be distributed** according to this Law.

It is of interest that Sakpatenti has drafted a set of amendments to the **Law of Georgia on New Breeds of Animals and Varieties of Plants** and presented them to the Parliament of Georgia for consideration. According to this draft law, the law is to be renamed as the **Law of Georgia on Breeds of Animals and Varieties of Plants.** The scope of the Law (Article 1) is supplemented with "**the relations associated with identification and reasonable use of traditional agricultural, domesticated animals and cultivated crop varieties of local origin."** According to the draft law, Sakpatenti shall ensure the entry of such varieties/breeds in a register and inform the public through publication of an official bulletin; a conclusion on the morphological and biological characteristics and botanical traits of these varieties/breeds shall be made by the Ministry of Agriculture. The adoption of such a law is important in that it implies inventory of these varieties/breeds (landraces), their formal registration and that it will protect their names from being misused and adulterated (e.g., currently, most sheep in East Georgia are named as "Tushuri", irrespective of the circumstance that sheep in local locks are very mixed with other breeds and, accordingly, some of them have very little in common with the aboriginal Tushetian breed). The draft law includes one very disputable provision, implying the granting by Sakpatenti of the right to use landraces for commercial purposes subject to payment of a fee. The imposition of such strict regulation on the use of landraces violates the rights of small-holders since the landraces have been selected by the efforts of those small-holders and their ancestors and are their legacy. The imposition of a levy on the use of local sheep breeds, when most of them cannot compete with industrial breeds/varieties due to low productivity, may result in extinction of the landraces.

10.2.4. Other State Strategy Documents

Chapter V of the **State Strategy for Regional Development of Georgia (2010-2017)** is dedicated to the development of agriculture, tourism and ensuring environmental protection. According to this document "The goal of the State in the process of sustainable regional development is to ensure a balance between environmental protection and the socio-economic development interests of society which will support the realization of the constitutional right of citizens to live in and benefit from a sound environment." Within the scope of this goal, **"**the State should ensure financial and technical support for the rehabilitation of the production of endemic and traditional agricultures (wine, wheat, tea, etc.)". In respect of agricultural biodiversity, issues related to improved management of land resources are also of importance: "Norms for the exploitation of agricultural lands should be elaborated (quantity of live-stock per grazing area, agricultural activities which can be conducted in areas that are prone to landslides, the provision of windbreaks to territories vulnerable to wind erosion, etc.) according to local climate conditions, observations on on-going natural changes, anthropogenic impact and soil condition. Land areas which are vulnerable (landslides, water erosions, river banks and coastal zone) should be regularly monitored and rehabilitation and adaptation activities planned and implemented."

10.3. Main Institutions Involved in the Conservation of Biological Diversity

Ministry of Environment Protection: the body directly responsible for issues of agricultural biodiversity is the **Service of Biodiversity Protection of the Ministry of Environment Protection of Georgia**, which is responsible for coordinating implementation of international agreements, legislation and governmental resolutions, their supervision, elaboration of legislative initiatives and programmes, making amendments and addenda to the Red List of Georgia, etc. Its powers include:

- drafting proposals on harmonization of national legislation with international agreements in the sphere of conservation of biological diversity;
- taking part in the elaboration and realization of programmes in the sphere of protection of components of biodiversity and sustainable use of biological resources.

Ministry of Agriculture of Georgia and LEPL National Food Agency are "consumer" institutions of agricultural biodiversity; at present, the Ministry of Agriculture (MoA) is not engaged in any way in the implementing activities to protect local plant and animal varieties/breeds protection. The Ministry's activities in the agricultural biodiversity sphere are limited to the realization of soil conservation measures and ensuring veterinary and phytosanitary reliability. The MoA has a significant role in deciding rules for protecting agricultural biodiversity and using pastures. The MoA is also responsible for supervision and controlling the use of pesticides and agrochemicals. The MoA's functions include the generation of a uniform data base on consolidation of lands, soil quality assessment, and their state, the organization of land conservation, fertility recovery and preservation, also the elaboration of the uniform policy in the sphere of agrochemistry.

National Intellectual Property Centre - Sakpatenti: the following activities of Sakpatenti are important in terms of agricultural biodiversity: Sakpatenti grants rights to new plant and animal varieties/breeds, grants patents for microbiological cultures, works on the problems of protection of local cultivated plants and domesticated animals.

Ministry of Regional Development and Infrastructure is responsible for implementing the National Regional Development Strategy.

Local municipalities are involved in the conservation of agricultural biodiversity in so far as pastures are regulated at the level of local government. Also in 2012-2016, the **promotion of pilot organic farms** with the participation of local governments is being planned (see above).

According to the **Law on Permission for Distribution of Agricultural Crops, Quality Seeds and Planting Materials,** ensuring conservation of biodiversity of genetic resources of Georgian agricultural crops was entrusted to research institutes. In 2010, this Law was revoked and accordingly **no law imposes the obligation of biodiversity conservation on scientific institutions**. However, the Second National Environmental Action Programme (2012-2016) approved on 24 January 2012 states that universities and research institutes are involved in the research in and monitoring of agricultural biodiversity, provide the Ministry of Environment Protection of Georgia with information and recommendations on request, and participate in the *ex situ* conservation of Georgian flora and agricultural biodiversity.

Legal Entity of Public Law - Georgian Academy of Agricultural Sciences (GAAS): According to the Law of Georgia on National Georgian Academy of Sciences of 2007, the Georgian Academy of Agricultural Sciences determines priority directions of agricultural sciences, coordinates scientific and research work, and acts as the scientific advisor of the Government of Georgia on agricultural issues.

Non-entrepreneurial (Non-Commercial) Legal Entity – Agricultural University of Georgia (AUG): as mentioned above, the most diverse *ex situ* collections of agricultural biodiversity are deposited with institutions with an agricultural profile, including the only gene bank in Georgia, which exists at the Lomauri Institute of Farming. As a result of agricultural education and science reform carried out in 2010-2011, these institutes were incorporated in LEPL Georgian State Agricultural University. Under the Resolution of the Government of Georgia of 19 March 2011 #136 "On the Measures of Development of Georgian Agricultural Education and Science", LEPL Georgian State Agricultural University was reorganized into the NELE Agricultural University of Georgia (AUG), the State and NELE Agricultural Education and Science Fund being determined as its founders. Under the same resolution, the movable and immovable property belonging to the University was returned to state ownership. After that, information concerning the legal status of the former property of the University, including of the collections of scientific institutes within its system has no longer been published on the web-site of the Government of Georgia and its ministries. Accordingly, whether the Agricultural University has assumed any liability to the State in connection with the genetic resources of cultivated plants, microorganisms and fungi preserved within its structures is not known.

11. Research, Science, International Cooperation, Projects and Programmes in the Sphere of Agricultural Biodiversity

During the last twenty years Georgia's agricultural biodiversity research and conservation activities have been generally carried out within the framework of international projects. Studies carried out as a basis for biodiversity status reports and policy implementation have been financed by the Food and Agriculture Organization of the United Nations (FAO). Several, mainly research, projects have been financed by Shota Rustaveli National Science Foundation; maintenance of *in situ* collections of the research institutes was financed from the budget of the concerned research institute/university.

The main problems of Georgian research institutes and universities involved in research and conservation of agricultural biodiversity are as follows:

1. **Unstable regulatory environment** – Recently, various reforms have been carried out in the education and research field. In 2010-2011, the reorganization of scientific and research institutes into structural units of higher education institutions was carried out (the reform has not applied to LEPL Giorgi Eliava Research Institute of Bacteriophage, Microbiology and Virusology). As a result, these institutes no longer have direct state financing and they are dependent on university budgets. In addition, in case the research institutes obtain grant financing from Shota Rustaveli Science Foundation or international organizations, they will have to share it with the university. This has further complicated the already difficult financial situation of these institutes. Because of the lack of consideration towards the development of research institutes on the part of government authorities and the lack of necessary funds the dependence of these institutes on internationally-financed projects is high.

   The fate of *ex situ* collections existing within the structure of the Agricultural University is also important.

   After the reforms of recent years society is no longer informed of some important issues, namely: what legal status do the collections of plant genetic resources of the research institutions of NELE Agricultural University of Georgia (Lomauri Farming Institute's gene bank, collections of the Institutes of Horticulture, Viticulture and Oenology, and Tea, Subtropical Crops and Tea Production, etc.) now have. Based on the legal status of the collections, what legal levers the State has in order to ensure:
   a) the preservation of existing collections;
   b) the possibility of unimpeded use of the genetic resources preserved in the collections as public wealth for Georgian farmers and researchers;
   c) the deepening of cooperation with international organizations and gene banks, in accordance with international agreements, so that on the one hand the principle of "access and fair and equitable benefit sharing" be complied with (which should economically benefit the State as the holder of genetic resources), , and on the other hand local collections are replenished with the genetic material scattered in foreign gene banks, which had been exported during the Soviet period and samples of which are not preserved in the currently available collections in Georgia.

2. **Lack of young skilled researchers** –the reasons of the above include: few relevant education courses at universities, outdated infrastructure and textbooks etc. Although the main factor is that under conditions of low funding and permanent reorganization of research institutes, young people avoid working in the scientific-research field and looking for a vacancy abroad. The equipping of university departments and laboratories is frequently poor and outdated, which discourages students from conducting quality research for a master's degree or doctorate.

3. **Weak cooperation with the business/enterprise sector** – most institutes fail to properly use the potential of cooperation with the private sector, which could promote the conservation of

agricultural biodiversity; e.g., in the spheres of breeding and testing of new plant and animal species, production and testing of plant protection and biological agents that raise soil fertility, production of traditional foodstuffs, traditional production of foodstuff starters, tourism, etc. The cause of this is both the inactivity of research institutes and the lack of business relations skills, as well as a small interest on the part of Georgian entrepreneurial companies. The small interest on the part of the private sector is conditioned by a low trust in competence of the research institutes' personnel and the maximum restriction of investments into innovation projects owing to a young age of most Georgian companies and market instability (especially in the case when a possibility of importing standard materials from other countries exists: e.g., seed and planting material, traditional product starters, etc.). It should be mentioned that such activities are not promoted by the State either (legislative and political environment).

Research and international cooperation on plant genetic resources important for food and agriculture: The Academy of Agricultural Sciences of Georgia cooperates intensively on the conservation of plant genetic recourses important for food and agriculture with international organizations and networks such as ICARDA, IPGRI, GCDT and CACAARI.

Study of the distribution of local landraces and their wild relatives and medical plants through expeditions and enrichment of *ex situ* collections in the frame of their core activities, and with international support, is carried out by the Institute of Botany of Ilia State University, Tbilisi Botanical Garden, National Museum, Lomauri Institute of Farming of the Agricultural University of Georgia and Institute of Horticulture, Viticulture and Oenology of the Agricultural University of Georgia. The cooperation of the above-mentioned research institutes with the gene bank of Gaterleben (Germany) and United States Department of Agriculture (USDA) should be especially underlined. Collection of the field crops was financed in recent years by International Centre of Agricultural Research for Dry land Areas (ICARDA), Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Australian Winter Crop Gene Bank (AWCC), Australian Centre for International Agricultural Research (ACIAR), Centre for Legumes in Mediterranean Agriculture (CLIMA) etc.

Research in the field of conservation of plant genetic recourses is mainly carried out in the following directions: field research and collection of samples, maintenance and renewal of collections, inventory of collections, molecular identification of local landraces of grape and pip fruits and identification of genetic markers for Georgian grape varieties (molecular and genetic studies are carried out by Institute of Biochemistry and Biotechnology of the Agricultural University of Georgia and Ilia State University), surveys on adaptability of local agricultural biodiversity to climate change.

Expeditions carried out in recent years were mainly focused on inventory of grain crops in Samtskhe-Javakheti (in the frame of the project financed by GEF/UNDP "Conservation and Sustainable Use of Georgia's Agrobiodiversity") and Lechkhumi and Upper Svaneti regions (joint project of the Gaterleben University and Institute of Botany); also the diversity of landraces and local varieties of grape, pip fruits and berries were investigated in Samtskhe-Javakheti (in the frame of the GEF/UNDP-financed project "Conservation and Sustainable Use of Georgia's Agrobiodiversity"). There were very few expeditions in mountainous regions of eastern Georgia, in Adjara, Guria and various other regions in recent years. The number of expeditions carried out for inventory and collection of samples of local landraces of vegetable crops, grapes and fruits for the purpose of their inclusion in existing *ex situ* collections are very few.

The Institute of Horticulture, Viticulture and Oenology became a participant/recipient of a reform component of a WB-funded project, which significantly strengthened its capacity through provision of scientific equipment (including molecular lab) and training. The Institute benefited from several projects, including "Conservation of Grapevine Genetic Resources in the Caucasus and the North of Black Sea Area" (Biodiversity International and Hortivar/FAO). The institute's cooperation with Milan University allowed for better characterization and evaluation of local grape genetic resources.

Characterization of PGR of seed and stone fruits of the temperate zone was also conducted but at a lesser scale.

In 2011, in the frame of the EU-financed project "Conservation of Agricultural Biodiversity in Arid and Semi Arid Ecosystems" and German International Cooperation (GIZ) and implemented by "REC – Caucasus" a survey on state of landraces and influence of the climate change on them was carried out in Gori, Gardabani, Sagarejo and Dedoplistskari districts.

The GEF/UNDP-financed project "Recovery, Conservation and Sustainable Use of Georgia's Agrobiodiversity" promoted awareness on the importance of CWRs through trainings on CWR research, management and policy issues at the Ministry of Environment Protection in 2008. The training was carried out by Dr. Nigel Maxted from the University of Birmingham.

The characterization, evaluation and regeneration of samples in collections of genetic resources has been carried out by the Institutes of Agricultural University of Georgia - Lomauri Institute of Farming, Institute of Horticulture, Viticulture and Oenology, Institute of Sericulture, Institute of Tea and Subtropical Crops and Tea Industry - in the frame of various international projects.

PGR documentation in Georgia is mostly computerized. Through the ICARDA's support, Lomauri Institute of Farming has established a database which includes all information and passport data on availably for its more than 2000 samples of field crops. The Institute of Horticulture, Viticulture and Oenology has made a database of local grapevine varieties, preserved in the collections of Georgia, in the frame of the IPGRI's project "Conservation and sustainable use of grapevine genetic resources in the Caucasus and Northern Black Sea area". However there have been no catalogues published for PGRFA collections in Georgia and information preserved in the above-mentioned data bases is not freely accessible.

The information about plant genetic accessories from Georgia preserved in the USDA collections can be found at the web-site of the USDA Germplasm Resources Information Network (http://www.ars-grin.gov); there is also a Georgian database of biodiversity (http://biodiversity-georgia.net) which includes information on the wild flora and fauna of Georgia; the database includes information about some CWRs. The database was prepared by Institute of Ecology of Ilia State University with the support of BP and the Caucasian Endemics Research Centre.

Research and international cooperation on domestic animal genetic resources important for food and agriculture: the vulnerability and conservation priority of local domestic animal breeds have not been defined by any recognized methodology. Also, no database on literature/research reports concerning local domesticated animal breeds is available, for which reason access to them is complicated.

In general, major research on local domesticated animal species conducted in Georgia encompasses the following issues:

- studying the economic and biological traits of almost all species (data on pig populations spread in Svaneti and Racha are scanty);
- studying blood, types of transferrin and haemoglobin of polymorphous blood, blood serum of local cow and sheep breeds;
- studying blood groups of local cow and Kakhetian pig breeds;
- within the Georgian mountain cow's Pshav-Khevsurian population, studying frequencies of quantitative and structural abnormalities of chromosomes, as well as the frequency of the organizing regions of the active nucleus;
- a study of genetic markers of Tushuri horse, Tushuri sheep, and the Georgian shepherd dog for breed specification is under way (Ilia University).

Genetic studies which would identify the origin of a specific breed are relatively few, for which reason there are mutually exclusive views on the origin of various breeds.

With the exception of preparation of reports on the state of genetic resources of domestic animals, no international or local projects concerning the conservation and sustainable use of local domesticated animal genetic resources have been implemented in Georgia. Small-scale projects in the direction of the conservation of the Georgian mountain cow (financed by Rustaveli Science Foundation) and of the Kakhetian pig (small-scale UN grants programme) have been implemented; however, owing to insufficient funding and spread of African swine fever, these projects have failed to be sustainable, and the breeding farms created within the framework of these projects have not survived.

Since autumn 2011, with the financial support of the MATRA - Social Transition Programme of the Embassy of the Kingdom of the Netherlands in Georgia and Armenia, the Biological Farming Association "Elkana" has been implementing a small-scale project "The Conservation and Sustainable Use of Domestic Animals at Risk of Extinction in Georgia" (09/2011 - 03/2013). The said project provides for on-farm conservation of local animal breeds; a demonstration farm has been set up in the village of Zemo Khodasheni (Kakheti region), where, for the purpose of reproduction and distribution among the interested farmers, the following local breeds have been introduced: 1) Georgian mountain cow (Tushur-Khevsuruli); 2) Tushuri sheep; 3) Megruli goat; 4) Kakhuri pig; 5) five local hen population.

Main research and international cooperation in the field of microorganisms and fungi important for food and agriculture: With regard to microorganisms and fungi important for food production the main research focus of recent studies was on the microbiological content of matsoni and wine yeasts. Some research was also done on the microbiology of local cheese varieties. At present four research institutes are working in the field of microbiology of food and agriculture products in Georgia: G. Eliava Institute of Bacteriophage, Microbiology and Virology; S. Durmishidze Institute of Biochemistry and Biotechnology; I. Kanchaveli Institute of Plant Immunity under the Agricultural University of Georgia; Institute of Phytopathology under the Shota Rustabeli Batumi State University. Some examples of the projects carried out in this field in recent years include:

- 1995 - Selection of endemic LAB cultures from matsoni for their potential use in flavoured butter production – the Finnish Funding Agency for Technology and Innovation and the company "Osuuskunta Maitokolmio";
- 1998-1999 - Microbiological study of the Caucasian traditional yogurt-like product matsoni - Georgian Academy of Sciences;
- 2006 - Elaboration of standardized dairy starters for traditional Caucasian dairy products (Stage I – Development of Business Plan) – Georgian-USA Research Development Foundation;
- 2007 - Commercialization of dairy starters of matsoni with improved health beneficial and biotechnological values – Georgian-USA Research Development Foundation;
- 2007-2009 - Development of standard matsoni starters with health beneficial properties - Georgian National Science Foundation;
- 2008 - Development of the starter for Imeruli cheese - Georgian-USA Research Development Foundation.

Research and international cooperation in the field of conservation of agricultural ecosystems: In terms of research and international cooperation in the field of the conservation of agricultural biodiversity the main emphasis was on research and conservation of plant genetic resources; less attention was paid to the conservation of local animal breeds and less still to the conservation of microorganism and beneficial insects. For example the last research on pollinators carried out in Georgia was carried out about twenty years ago. The last publication of beneficial insects in Georgian was published in 1980.

The Institute of Zoology of the Ilia State University (the laboratory of invertebrates) is working on a scientific study of earthworms. The Kanchaveli Institute of Plant Immunity at the Agricultural University of Georgia and the Institute of Phytopathology of the Shota Rustaveli Batumi State University work on the beneficial insects, natural entomophages and microorganisms causing plant diseases, by identifying disease resistant varieties of plants.

Issues related to the impact of global climate change on agricultural biodiversity of Georgia are addressed to some extent by the 1st (1999, http://unfccc.int/resource/docs/natc/geonc1.pdf) and the 2nd (2009, http://unfccc.int/resource/docs/natc/geonc2.pdf) National Communications to the United Nations Frame Convention on Climate Change (UNFCCC).

There is also a lack of relevant detailed information on the conditions of soils in Georgia and on the impacts of pesticides and agrochemicals.

During 2005-2009 the Ilia Vekua Sokhumi Institute of Physics and Technology in collaboration with the Department of Biophysics of the Institute of Plant Protection and Ivane Javakhishvili Tbilisi State University investigated the content of radionuclides on the whole territory of Georgia in the frame of the MNTZ project (Project G-1106). The project was financed by the EU and the collaborators were the Justus Libikh University (Giessen, Germany) and University of Barcelona (Spain).

In 2002-2006 the "Cadastre and Land Register Project" co-financed by the government of Germany was implemented in Georgia. In the frame of this project a large group of soil scientists was retrained according to modern standards. The international classification of soils (WRB) was studied and for the first time in post-Soviet space soils were classified in accordance with a modern international classification; as a result in 2009 the Soil Map of Georgia at a scale of 1:500 000 was published, with the participation of more than 50 scientists and practitioners.

The situation in the Mashavera river basin was investigated during last 7 years under the leadership of the famous soil scientist Prof. P. Felix-Hennigsen from the Institute of Soil Science and Soil Conservation of the Justus-Liebig-University (Giessen, Germany).

For the purpose of improving soil fertility, the Ministry of Agriculture of Georgia has been carrying out studies in some municipalities. Some of the studies are already completed and in the frame of on-going projects measures to mitigate soil erosion have been implemented in the Autonomous Republic of Adjara and Dedoplistskaro municipality).

A project to rehabilitatedegraded agricultural lands, windbreaks and forest edges in Dedoplistskaro municipality is being carried out by GIZ with funding from BMZ. In 2012-2015 28 hectares of windbreaks will be planted and 17,000 hectares of windbreaks will be rehabilitated.

In 2012-2016 it is planned to carry out a project on rehabilitation of irrigation systems in Dedoplistskaro municipality with the participation of local farmers, the Ministry of Agriculture and the Ministry of Environment Protection of Georgia.

12. Education and Public Awareness

The Georgian population is well aware of the fact that Georgia is a country with rich agricultural biodiversity and, at the same time, is the centre of domestication of some species (e.g. grape). The population especially values agricultural produce of local origin, for it believes that the farm products produced using local species and/or traditional cultivation methods are more tasty and wholesome than imported ones. Correspondingly, there is a general consensus among the public that the conservation and preservation of local cultivated plants and domesticated animals, as well as the microbiological composition of traditional products, is of much importance.

At the same time it should be mentioned that the public lacks more specific knowledge about traditional species and landraces, their distinctive traits, significance and other matters. The public is also unaware of the problems associated with the conservation and sustainable use of these

landraces. In addition, mythologizing of traditions, or, conversley, complete negation of their importance, frequently takes place in Georgian society. All this gives rise to diametrically opposed attitudes and interferes with proper decision-making at both the regional and national level. The public's knowledge of the importance of *ex situ* conservation is especially superficial.

Questions relating to agricultural biodiversity are not included in school curricula and textbooks, also they are not being taught within general courses of university syllabuses (e.g., the courses of lectures in the sphere of food production focuses on food processing and biochemistry rather than on microbiological aspects). In fact, issues concerning agricultural biodiversity are taught only as special university courses (e.g. only Ilia State University gives a course on plant genetic resources and only for PhD students).

The public is informed on issues of agricultural biodiversity generally through television broadcasts (Georgian Public Broadcaster and Georgian Patriarchate TV Company), newspaper articles and brochures. Although TV broadcasts and films generally deal with two crops - vine and wheat - programmes about the making of various traditional products are also being prepared. The Public Broadcaster's programme "Our Farm" also deals with such issues as the preservation of soil fertility and pastures, which are of importance in terms of conservation of agricultural ecosystems. The Biological Farming Association "Elkana" is actively engaged in enhancing the public awareness of agricultural biodiversity, promoting local species and traditional products through its thematic publications and various activities (e.g. tasting events, Bread Festival in Akhaltsikhe).

Technical assistance to government structures in the field of agricultural biodiversity is provided by FAO and ICARDA. Thanks to their efforts, several national reports and documents on the PGR conservation policy have been prepared. FAO works with the Ministry Agriculture on PGR issues, reminding it of the necessity of ratifying the International Treaty of Plant Genetic Resources for Food and Agriculture (ITPGRFA). In 2009, "Elkana" arranged and held a workshop in line with the Bonn Guidelines on Access to Genetic Resources and fair and Equitable Sharing of the Benefits Arising out of their Utilization.

Overall, it can be said that the level of awareness of the significance, state and conservation needs of agricultural biodiversity is low both in the general public and among the main stakeholders including decision makers.

13. Problems and their root causes

The principal problems associated with a decrease of Georgia's agricultural biodiversity and their causes are the following:

***In situ* conservation of plant genetic resources important for food and agriculture**	
Comment: In terms of conservation the priority should be given to the preservation of endemic species, oldest landraces and their wild relatives, such as: cereals (wheat, barley, rye, oat, millet, Italian millet; legumes (grass pea, chickpea, vetch, faba bean, lentil, cowpea); flax, onion, garlic, coriander, dill, savory, spinach; grape and fruit (apple, pear, quince, plum, cherry, cornel) and nuts (almond, hazelnut).	
Problem	**Cause**
Landraces and local varieties are less/rarely cultivated on farms	• Limited access to the seed and planting material of landraces and local varieties; • Lack of knowledge associated with the cultivation and utilization of landraces and local varieties; • Low recognisability of landraces, local varieties and their products on the market;

	• Relatively low-productivity of some landraces; • Low awareness among growers of the value of of landraces and local varieties.
Market is dominated by imported industrial seed and planting material	• Production and breeding of seed and planting material is poorly developed in Georgia; • Seed and planting material of varieties obtained through improvement of local genetic material is practically absent; • Because of the absence of an appropriate institution, certification of seed and planting material of landraces and local varieties is not carried out.
Entry and spread of new pests and diseases	• Plant protection and quarantine measures are not carried out properly.
On-farm conservation activities are fragmented and dependent on foreign funding	• Lack of special state programmes.
Erosion of crop wild relatives, medicinal plants, wild plants harvested and managed for food and pasture and rangeland species	• Loss of habitats, soil degradation and fragmentation; • Improper farming practices; • Spread of new pests and diseases; • Overgrazing and desertification, especially in arid and semiarid areas; • Climate change; • Possible genetic contamination by GM-crops;
Overgrazing and degradation of pastures	• Currently, animal grazing in Georgia is unsystematic and unorganized. Local traditions ensuring application of practices of rotational grazing on alpine pastures have been forgotten.
Lack of comprehensive official statistics on cultivation of local and newly introduced varieties including those developed by modern biotechnologies in the country	• No catalogue of agricultural plant varieties spread in Georgia has been published since 1996; • No monitoring of the impact of the introduced varieties on the local agricultural biodiversity is carried out.
The information about endemic species and local varieties conserved within protected areas are of Georgia is not available	• There are no detailed, mapped data on the diversity and distribution within protected areas of crop wild relatives, medicinal plants and wild plants harvested and managed for food.
Collection of wild plants harvested and managed for food and medicinal plants is carried out in an unsystematic way	• The legislative base concerning the collection of plant genetic resources for commercial purposes in the wild needs improvement.
***Ex situ* conservation of plant genetic resources important for food and agriculture**	
Comment: *Ex situ* conservation is of high importance, since measures of on-farm conservation and/or conservation in wild of landraces and crop wild relatives are in some cases ineffective or costly. *Ex situ* collections represent the major and most easily accessible source for conducting of	

systematic genetic research and breeding activities by scientists.	
Most collections held at universities and research institutions lack any formal status and stable funding; funding of collections is scanty and not prioritized (depends on goodwill of institute/university management, international projects).	• The State lacks the *ex situ* conservation strategy of plant genetic resources; • No specific government agency institution or legal entity of public law is held responsible for ex situ conservation by any statutory act; • Matters related to the maintenance of the *ex situ* collections of plant genetic resources and their status have not been taken into account in the process of reorganization of research institutes.
Ex situ collections are not well maintained; infrastructure is outdated; the number of staff of research institutes and their competence is limited; living collections of genetic material are not well protected from pests and diseases;	• Renewal of seed material of field crops maintained in the collections is restricted due to scarce resources; • Operation of major collections is poorly linked with the industry sector and breeding activities.
The number of samples of landraces of fruits and grape protected in collections and the number of the collections themselves is not satisfactory; only two living collections of fruits and grape are available in the country, which does not prevent the risks of destruction of the gene pool in the event of natural disasters, diseases, and other reasons; the condition of the living collection of tea and subtropical crops is rather grave.	• Lack of state strategy and lack of funding.
The number of samples of vegetable and feed crops as well as of maize in existing collections is poor; samples of such traditional crops for Georgia as sorghum, Italian millet. flax, etc. also need to be replenished	• Low level of financing; • Small number of target-oriented collection expeditions.
Replenishment of local collections with samples of landraces maintained in the collections/gene banks of the foreign countries is impeded	• Georgia is not a party to the ITPGRFA; • The post-reform status (in case collections are privatized) might interfere with free obtaining of samples from foreign public gene banks.
The collection of germplasm of crop wild relatives maintained in *ex situ* is rather small and the collections are running the risk of	• The state does not finances the collection maintained in Tbilisi and Batumi botanical gardens.

complete abolishment	
Databases of the collections of plant genetic resources are incomplete; Existing databases are incomplete; catalogues of the gene banks of the Institute of Farming and of databases of the Institute of Horticulture, Viticulture and Oenology of the Agricultural University of Georgia have not been updated and published; collections of some research institutes lack any database.	• Low level of financing.
Possibility of unimpeded use of genetic resources maintained in collections as a public good by Georgian farmers and scientists is hampered	• The on-going reform of research institutes and correspondingly the status of collections (in case collections are privatized) may interfere with access to the samples maintained in such collections.
***In situ* conservation of animal genetic resources for food and agriculture**	
Comment: Specially threatened are aboriginal breeds, such as: Caucasian mountain (Georgian) grey bee, Georgian mountain and Megruli red cow, Tushuri and Imeruli sheep, local pig populations (Kakhuri, Svanuri) and Tushuri and Megruli horses.	
No measures are being taken to preserve the pedigree animals of abolished animal breeding farms and their pedigree samples	• Low priority in state policy.
Uncontrolled crossing with imported breeds	• Unorganized breeding; • Inexistence of animal identification system.
Orientation to standard products	• Low market awareness/recognisability of local breeds and their products.
Spread of animal diseases	• Inefficiency of veterinary control, epidemic prevention and early warning systems.
Silkworm populations are endangered	• Collapse of silk production in the country; • Lack of interest in the silk production development from the part of the State.
Populations of Caucasian mountain (Georgian) grey bee are endangered	• Reversal of the law prohibiting import of other bee species in Georgia for preserving the local bee the purity of local bee populations; • Colony collapse disorder (CCD) represents a serious threat to bee health.
Lack of official statistics on distribution and number of	• No statistics for the distribution and number of domestic animal breeds in Georgia have been published since the 1980s;

domestic animals in Georgia	• Absence of an animal identification system.
***Ex situ* conservation of animal genetic resources important for food and agriculture**	
Comment: *Ex situ* conservation of local domesticated farm animals in Georgia is not actually carried out. Existing artificial insemination centers preserve only the sperm of local cow breeds.	
Absence of an animal gene bank in Georgia	• Conservation of local agricultural domestic animal breeds has not been announced as a state priority; • No funds have been allocated for conservation activities of local animal breeds.
***In situ* and *ex situ* conservation of microorganisms and fungi important for food and agriculture**	
Comment: Of special importance is the study and conservation of starter cultures (bacteria and fungi) of traditional products which have the status of protected geographical indications, or which are actually rarely produced and, correspondingly, face a real danger of losing their unique microflora (e.g., traditional bread, beer, etc.); also ensuring appropriate management of intellectual property rights on these starter cultures.	
Genetic erosion of the unique microflora of products produced by traditional fermentation methods	• Traditional methods of the production of particular traditional products are no more applied/forgotten; • Tendency for replacement of the endemic microbial flora with imported industrial starters.
Low number of researches in traditional food production	• Food microbiology is not considered as a priority of scientific research and education in the country; • Improper funding and outdated infrastructure; • Low awareness of producers and respective laboratory personnel in the sphere of food microbiology.
The number of cultures preserved in collections is very limited/collections does not include cultures isolated from numerous traditional products	• Limited funding (including in terms of preserving available collection); • A small number expeditions conducted for collection of samples and their limited coverage (matsoni samples are generally collected); • Collections lack the formal national or international status; • No database on cultures preserved in collections is available.
Issues related to protection of the intellectual property rights on starter cultures of traditional products need to be improved	• Research institutes lack intellectual property management systems; • Trans-border movement of genetic resources including samples of traditional products with endemic microflora is not properly controlled; • The protection of authenticity of local products (biopiracy) is still a problem on the world and domestic markets; • Microflora of traditional products has not been declared as state/national property; there is a risk that the microbiological composition of local starters will be patented by a monopolist organization and their accessibility for local producers will be limited.
Production of traditional	• Starters of traditional products are not available on the market.

products is hampered, including of those with the status of protected geographical indications	
Conservation of agroecosystems	
Comment: The ecological state of Georgia's soil cover is rather grave – 30% of agricultural lands is eroded, 18% - degraded (acidized soils – 11%, saline soils - 7%).	
Soil degradation	• Climate change; • Monoculture production, ecosystem imbalance, improper crop rotation; • Clearing out of windbreaks; • Improper irrigation; • Over-fertilization; • Absence of adequate programmes for restoring heavily eroded soils, soils contaminated with heavy metals and radioactive nuclides or reducing adverse affects.
Spread of new pests and diseases	• Improper phytosanitary and veterinary measures; • Climate change.
Reduction of populations of useful insects	• Loss of natural habitats of useful insects (reduction of buffer zones, monoculture production, soil degradation); • Misapplication of insecticides.
Institutional, political and legislative environment for conservation and sustainable use of agricultural biodiversity	
The state of agricultural biodiversity is not calculated according to established biodiversity indicators	• Limited access to necessary information for calculation of indicators.
A risk of uncontrolled spread of genetically modified crops	• Absence of relevant national biosafety regulations.
A risk of "biopiracy"	• Absence of national regulations on access to genetic recourses and fair and equitable sharing of the benefits arising out of their utilization.
Replenishment of local collections with samples of landraces maintained in the collections/gene banks of the foreign countries is hampered	• Georgia is not a party to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).
Importance of conservation and appropriate measures for traditional agricultural landscapes is not clearly defined in regulations and state programmes	• Provisions of the European Landscape Convention and of the Law of Georgia on the Basis of the Landscape Planning and Urban Development are not properly stipulated in the national policy and programmes.
Georgian laws fail to properly protect plant and animal landraces, traditional agricultural landscapes and traditional	• The Law on Environmental Protection (1996) regards protected areas as the principal instrument of biodiversity conservation; no mention of agricultural

knowledge related to genetic resources and agricultural traditions	biodiversity is made in the Law; • Law of Georgia on Cultural Heritage (2007) does not regard agricultural biodiversity as part of cultural heritage.
The Red List of Georgia does not include most species important in respect of agricultural biodiversity	• Law on the Red List and Red Book of Georgia (2003) only establishes a list of endangered species of wild plants and animals; • The vulnerability establishment (priority setting) criteria of wild relatives of cultivated plants differ from the protection status categories classification for wild flora
The management of Georgia's protected areas does not pay sufficient regard to the conservation of agricultural biodiversity.	• Lack of awareness among protected areas managers; • Resources allocated to protected areas are inadequate.
Provisions of the Law on Wildlife (1996) are practically ineffective	• Provisions of the Law are very general and instruments of their enforcement are not defined.
Agricultural policy of the country fails to promote the use of agro-ecological methods in agriculture	• The Draft Agriculture Development Strategy of Georgia (2012-2020) does not mention the issues related to the development of organic agriculture; • The Law on Biological Agro-production (2006) has been abolished.
The provision of the Law of Georgia on Viticulture and Wine concerning protection of the local genetic resources of the landraces and wild forms of grape, as well as the reveal, research and conservation of the grape genetic recourses, is not implemented in full	• Notwithstanding the Law's provision, State financing for research and conservation of grape genetic resources is insufficient; • The law does not define the government agency responsible for conserving the genetic resources of the grape
Irrespective of existence of relevant legislation, the veterinary and phytosanitary control, protection of plants, supervision of the application of agrochemicals and pesticides, soil conservation and restoration and improvement measures are not effectively carried out.	• Lack of proper financing; • Institutional possibilities need to be improved (especially at regional level); • Reform on-going in the sphere of food safety, veterinary and plant protection has not been completed yet; • The National Action Plan on Sustainable Use of Pesticides, Herbicides and Fertilizers has not been developed up to now.
Georgian legislation fails to provide the mechanisms that would ensure inventory, official registration, protection from biopiracy (and/or illegal use of the names) of the landraces as well as of the microorganisms used in the production of and traditional products and the traditional knowledge related thereto	• Absence of the respective legislative base.

There is no legal framework for propagation of seed and planting material for landraces and breeding of local domestic animals	• The Law of Georgia on New Animal and Plant Species (2010) does not include provisions concerning the propagation of the seed and planting material of landraces and local varieties as well as breeding of the local domestic animals.
Commitments of specific government agencies and research institutions in terms of *ex situ* and *in situ* conservation of agricultural biodiversity are not clearly defined	• Absence of the appropriate legislative provisions; • The resources of the Biodiversity Protection Department of the Ministry of Environment Protection of Georgia in terms of *ex situ* and *in situ* conservation are limited.
Research, science, international cooperation, projects and programmes in the sphere of agricultural biodiversity	
The implementation of the activities aimed at conservation and sustainable use of the agricultural biodiversity strongly depend on implementation of the internationally-funded projects	• Conservation of agricultural biodiversity has not been recognized by the State as a national priority.
Low number of implemented research and conservation projects	• Scanty and unsystematic financing.
Instable regulatory environment of research institutes	• Protracted reorganization process; • Scanty and unsystematic financing; • Weak feedback of research institutes with the general public, with one another, and the Ministries of Agriculture and Environment.
Lack of young skilled professionals in the science sphere	• Few educational courses in high education institutions, outdated infrastructure and textbooks; • Scanty financing of research institutions and the protracted reorganization process.
Non-use of cooperation potential with the private sector	• Inactivity of research institutes and lack of business relation skills; • Mutual distrust between the parties; • Maximum restriction of investments in innovation projects by Georgian companies; • Absence of State programmes to promote cooperation between research institutes and entrepreneurs.
Search and retrieval of literature on Georgia's agricultural biodiversity are difficult	• Absence of a database on research reports and scientific works in the sphere of agricultural diversity; no relevant catalogue or collected articles have been published.
Lack of information about distribution and vulnerability of species and varieties (landraces) important for food and agriculture	• No inventory of local landraces has been carried out; • With few exceptions, the vulnerability and conservation priority of landraces and CWRs has not been determined according to any recognized

	methodology.
Education and public awareness	
Lack of awareness among professionals of the importance of conserving agricultural biodiversity.	• Issues of agricultural biodiversity have not been included in school curricula and textbooks; • Issues of agricultural biodiversity are lectured only in two universities as special university courses • Outdated textbooks; • Poorly equipped laboratories.
Public awareness of agricultural biodiversity conservation and sustainable use is low	• Few television broadcasts, articles and information materials on agricultural biodiversity (especially on the *ex situ* conservation issues.

THEMATIC FIELD 4. ASSESSMENT AND SUSTAINABLE USE OF BIOLOGICAL RESOURCES

Lead organisation: NACRES

Lead author: Irakli Macharashvili

1. Issues related to the use of biological resources in the National Biodiversity Strategy and Action Plan of Georgia (2005)

The first National Biodiversity Strategy and Action Plan of Georgia (NBSAP-1) does not contain a strategic direction – "Assessment and Sustainable Use of Biological Resources". The strategic directions "Hunting and Fishing" and "Sustainable Forestry" cover these issues to some extent.

In respect of **hunting and fishing** NBSAP-1 focused on the following problems:

- Gaps in current legislation relating to hunting and fishing;
- Inadequate enforcement of the Law on Wild Fauna due to lack of regulations and enforcement mechanisms;
- Ineffective mechanisms to counter poaching;
- Limited experience in the creation and management of private hunting farms;
- Lack if differentiation in the licensing scheme beween tariffs on trophy and non-trophy hunting species, leading to extraction of individuals important for populations;
- Absence of regulation on the capture of birds of prey for falconry purposes;
- Absence of a training facility in Georgia for the appropriate governmental officials or private hunting farm personnel;
- Extremely low awareness of hunting regulations (quotas, season, permit documents, etc.) among Georgian hunters;
- Uncertainty about the maintenance of traditional hunting;
- The recovery of certain economically important fish species will require specific restoration efforts;
- Specific mechanisms for fish stock restoration and protection have not been put in place.

In order to settle these problems NBSAP 1 set out the following strategic goal: "*To promote sustainable hunting and fishing through adequate planning, restoration and protection of key biological resource*", three specific objectives, and ten activities for the first five years, i.e. 2005-2010 (the specific objectives and activities are listed in Appendix 1 at the end of this compilation).

There has not been any significant progress with implementing the action plan for **sustainable hunting and fishing**. The establishment of the Environmental Protection Inspectorate under the MoEP in 2005 was a step forward but the inspectorate was abolished in 2011. Changes to legislation since 2005 have increased the pressure on commercial fish species in Georgia's Black Sea coastal waters and threaten to increase pressure on a number of species which are listed in the Red List of Georgia. Only one activity - "Improve the licensing procedure for hunting of migratory birds" – was implemented. According to changes introduced by the *Law on Licenses and Permits (2005)* licenses and permits on hunting of migratory birds have not been issued since 2005. Interested persons are obliged to pay a tax on hunting of migratory birds to the relevant bank account. During hunting the hunters should have the relevant check, as well as the documents on firearms and ID card. These amendments helped avoid quite an inconvenient procedure of issuing a license on hunting of migratory birds that was triggering huge discontent among the hunters.

With regard to **sustainable forestry** NBSAP 1 focused on several problematic issues related to the use of forest resources at the time:

- There is no appropriate legislative, institutional and financial framework to ensure the sustainable management of forest resources;
- Current levels of illegal felling, and unsustainable forest exploitation are causing irreversible degradation of forest ecosystems;
- Inappropriate institutional arrangements, uncertain obligations and insufficient financing hamper not only effective control of illegal felling, but also effective management of forest resources;
- The stumpage fee which resources users pay to the state budget does not reflect international market prices; this causes unsustainable use of forest resources and significantly accounts for the outflow of cheap raw material from the country;
- State budget expenditure on protection and rational use of forest resources has significantly decreased and the pace of development of the forestry sector has slowed down as a result;
- Current forestry practice does not take into consideration principles of biodiversity conservation; it is mostly oriented on forest exploitation and leads to degradation of forest biodiversity;
- Old growth forest stands of high ecological value are considered as the most accessible source of timber; these stands are most important in terms of conservation of forest landscapes and forest ecosystem biodiversity;
- Current methods and rules of forest resource inventory, cadastre, planning and especially forest felling do not comply with the principles of sustainable development; actually there are no indicators of forest biodiversity and sustainable forestry;
- Current legislation in the forestry sphere does not require the implementation and introduction of complex forest management plans – the legislation only requires the existence of forest inventory projects.

To address these problems NBSAP 1 set out the strategic goal "*To protect and conserve forest biodiversity through the introduction of sustainable forest management*" and nine specific objectives (the specific objectives are listed in Appendix 1 at the end of this compilation).

NBSAP 1 did not specify activities to achieve the above-listed strategic goal and specific objectives related to the forest sector because in that period a national forest policy, strategy and action plan was being developed in the frame of the World Bank-financed Forests Development Project. However, the World Bank cancelled the project in 2008 citing that the Georgian side was not fulfilling its commitments under the agreement and no forest policy, strategy or action plan has been developed so far.

Some of the specific objectives and activities included in NBSAP 1's chapters "Hunting and Fishing" and "Sustainable Forestry") are no longer appropriate because of recent political developments in the country and institutional/legislative changes; others remain urgent owing to the seriousness of the problems which they are designed to address.

2. Review of legislation related to the use of biological resources (2004-2012)

The use of biodiversity in Georgia is regulated by a number laws and subordinate normative acts:

The **Law on Environmental Protection** (1996) deals with the following issues: protection of the environment against harmful impacts; improvement of environmental quality; sustainable development and sustainable use of natural resources; preservation of biological diversity and ecological balance; protection of unique landscapes and ecosystems; making efforts to settle global environmental problems; defining citizens' rights and obligations in the sphere of environmental protection; environmental education.

The **Law on the System of Protected Areas** (1996) defines the aspects of establishment, development and functioning of protected areas; establishes the system of agencies responsible for management at various levels and defines banned and permitted (regulated) activities within various categories of protected areas, as well as general rules related to the use of natural resources.

The **Law on Wild Fauna** (1996) regulates legal relations in terms of protection and use of wildlife. Besides protection of wild fauna species, the law also envisages the protection of their habitats, migratory routes, propagation sites; provides for sustainable use of wild fauna and creates the legal basis for its in-situ and ex-situ conservation. Before August 2005 this law regulated the issues of use/licensing of wildlife species (including fishing).

The **Forest Code of Georgia** (1999) regulates legal relations related to forest tending, protection, restoration, and use; the Forest Code of Georgia defines the concept of the state forest fund and the lands and resources included in the fund. The code also regulates the right to ownership of the forest fund. At the moment of adopting the code the forest fund was declared as the state property, while the process of its privatization should be regulated by relevant legislation, as envisaged by article 9.2 of the code. By this law, economic functions were removed from state forest management units and the right of logging (subject to a licence) was transferred to the private sector. Transfer of forests to self-governments was also permitted.

No practical measures have been implemented in the direction of privatization or decentralization. The Forest Code introduced short-term (up to one year) and long-term (up to 20 years) forest use and following types of forest use: timber extraction, plantation farms, hunting farms, use of non-timber resources, special use (for example while using the entrails). Preference was given to long-term use over short-term use, and to those types of forest use which are less related to forest felling.

In 2003 the Parliament of Georgia adopted the Law on the Red List and Red Book of Georgia. The law provided legal definitions of endangered animal and wild plant species included in the Red List and Red Book. The law also defined the structure of the Red List, the procedures of defining the species included in the list, and the procedures of developing, adopting and revising the draft of the list. The law also regulates issues related to planning and financing measures for the protection, extraction, recovery and conservation of endangered species included in the Red List.

The **Law on Imposing Taxes on the Use of Natural Resources** (2004) has as its purpose to provide, through establishing the principle of paying to use nature, the rational use of state-owned natural resources based on the potential environmental opportunities and sustainable development principles. According to the law the use of natural resources encompasses removal of minerals, timber resources of the forest fund, non-timber resources (including fir-tree cones), surface water resources and animal wildlife resources from the environment. A tax on the use of natural resources should be paid by a person whose activity is subject to licensing under Georgian legislation; a person who uses timber resources from the state forest fund; a person, who uses timber resources removed as a result of special felling; a person, who removes animal wildlife species from the environment.

The law defines the amount of tax on natural resources for aquatic animals per tonne; snowdrop bulbs and cyclamen balls, as well as fir-tree cones – per kilogram; timber – in cubic meters, by types and four qualitative categories; minerals – by weight or volume, based on the specific characeristics of the resource.

The law establishes certain privileges in respect of payment for natural resources.

The law also establishes rules for tax payments. Taxes on natural resources are transferred to the local budgets of the regions in which the natural resources are extracted.

Taxes on the use of natural resources, including those wild animals and wild plants which are included in the Red List of Georgia, can be used for calculating the damage caused by illegal extraction of resources. The amount of taxes is also used to determine the initial price of licenses on the use of natural resources.

The **Law on Licenses and Permits** (2005) lists activities that are subject to licences and permits and the types of licenses and permits necessary for such activities. The following licenses are issued for the use of natural resources:

- License on the extraction of minerals.
- General license on the use of oil and gas resources, including a) special license for oil and gas exploration; b) special license for oil and gas extraction. These two licenses can be issued independently.
- General license of forest use, which can include: a) special license on timber production; b) special license of hunting farm. These two licenses can be issued independently.
- License of fishery (commercial fishing is meant).
- License on the use of fir-tree cones and snowdrop tubers and/or cyclamen bulbs, entered into the annexes of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for export purposes.

These licenses are issued through the auction. Besides the above mentioned, no other licenses related to natural resources are issued presently.

Environmental impact permits, as well as the permit on export, import and re-export of species, their parts and derivatives entered into the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are also issued under the same law.

Other pre-existing normative acts should have been harmonised with the law on Licences and Permits within four months; however, even seven years after adopting the law, no harmonization of the mentioned laws has taken place.

The **Law on the Forestry Agency** (2010) established the Forestry Agency (in place of the Forestry Department) as a legal entity of public law under the Ministry of Environment Protection and laid down the general principles of the Agency's operation, administrative-legal arrangement, responsibilities and key directions of operations. The Agency's key objectives included tending and restoration of forests and sustainable use of biodiversity on the territory of the forest fund. The Agency's key tasks included: facilitating the determination-clarification of the boundaries of the forest fund; forest fund management; forest use regulation; implementation of forest tending and restoration measures; carrying out control over the forest fund's territory. The law was renamed the **Law on Forest Fund Management** as a result of amendments made on March 11, 2011.

The following subordinate normative acts have been enacted since the Forest Code came into force:

Presidential orders:

- No 6, June 10, 2000 "On approval of regulations on the rule of felling in Georgian forests and a number of measures on protection, restoration and recovery of forests";
- No 403, September 12, 2000 "On approval of regulations on determining the boundaries of the state forest fund of Georgia";
- No 404, September 12, 2000 "On approval of regulations on the rules and timeframes of transfer of the former forests of collective farms and Soviet economies to the state forestry agencies";
- No 342, July 19, 2002 "On approval of regulations on the system of registration of state forest fund";
- No 506, December 10, 2002 "On approval of regulations on the rule of allocation of forest area belonging to the state forest fund and suspension, prohibition and restriction of forest use on the territory of this area";
- No 508, December 10, 2002 "On approval of regulations on determining and changing the boundaries of state forests and lands of the state forest fund";

- No 687, August 8, 2005 “On approval of the list of basic (non-privatized) property to be transferred to local self-governing units”;

Governmental Decrees:

- No 132, August 11, 2005 “On approval of regulations on the rules and terms of issuing the licenses on forest use”;
- No 96, May 10, 2007 “On approval of the rule of inclusion and exclusion of land plots from the state forest fund”;
- No 105, May 23, 2007 “On the rule of defining the forests of local importance”;
- No 242, August 20, 2010 “On approval of the rule of forest use”.

Minister’s orders:

- Order No 380 of the Minister of Environment Protection and Natural Resources of Georgia dated September 22, 2005 “On approval of the procedure for issuance of legally harvested timber and timber origin certificates”;
- Order No 566 of the Minister of Environmental Protection and Natural Resources of Georgia dated December 20, 2005 “On the format and issuance procedure for legally harvested firewood certificate”;
- Order No 672 of the Minister of Environmental Protection and Natural Resources of Georgia dated September 26, 2008 “On the procedure for development and approval of forest use plans”;
- Order No 538 of the Minister of Environmental Protection and Natural Resources of Georgia dated July 5, 2006 “On approval of the methods of calculation of environmental damage”;
- Order No 96 of the Minister of Energy and Natural Resources of Georgia dated June 24, 2011 “On approval of the rules of timber movement on the territory of Georgia and technical regulations on the facility (saw mill) of primary processing of round wood (log)”;

Orders of the Chairman of the Forestry Department:

- Order No 10/161 dated December 7, 1999 “On approval of regulations on the rules of logging for the purpose of care”;
- Order No 10/37 dated June 1, 2000 “On approval of the rule for issuance of legally harvested timber certificates”;
- Order No 10/61 dated September 13, 2000 “On approval of regulations on special logging and the rule of its implementation;”
- Order No 10/03 dated January 10, 2001 “On approval of regulations on planning and implementation of measures on forest protection against fires;”
- Order No 10/39 dated March 15, 2001 “On approval of regulations on the rule of limitation, suspension, termination, and restoration of the right of forest use;”
- Order No 10/122 dated June 24, 2002 “On approval of regulations on the rule of management of forestry plantation”;
- Order No 10/161 dated December 4, 2002 “On approval of regulations on the restoration and planting of the state forest fund;”
- Order No 10/162 dated December 4, 2002 “On approval of regulations on the rule of production of timber forest products and secondary forest products;”
- Order No 10/93 dated March 28, 2002 “On approval of regulations on the rule of allocation of cutting area;”

- Order No 10/76 dated May 22, 2003 "On approval of regulations on the general rule of implementation of scientific-research and educational measures on the territory of the state forest fund."

Numerous amendments have been made to the above mentioned legal documents (for example, approximately 60 amendments have been made to decree 132 dated August 11, 2005 "On approval of the regulations on the rule and terms of issuing licenses on forest use". Many acts have been abolished partially or completely.

Currently the following normative acts related to forest use are of practical importance:

- Forest Code of Georgia, 1999;
- Law of Georgia on the Red List and Red Book of Georgia, 2003;
- Law of Georgia on Imposing Taxes on the Use of Natural Resources, 2004;
- Law of Georgia on Licenses and Permits, 2005;
- Law of Georgia on Management of Forest Fund, 2010;
- Governmental Decree No 132 dated August 11, 2005 "On approval of the regulations on the rule and terms of issuing licenses on forest use;
- Governmental Decree No 242 dated August 20, 2010 "On approval of the rule of forest use";
- Order No 96 of the Minister of Energy and Natural Resources of Georgia dated June 24, 2011 "On approval of the rules of timber movement on the territory of Georgia and technical regulations on the facility (saw mill) of primary processing of round wood (log)".

Hunting issues are mostly regulated by laws subordinate to the Law on Wild Fauna; however, most of the laws are either abolished or are not put in practice, because since the adoption of the law on Wild Fauna the institutional arrangement and legal framework of the sector has changed significantly. Presently, the following normative acts are of practical importance (they are all ministerial orders):

- On approval of the regulations on the rules and timeframes for the taking of wild animals, by species, and the list of weapons and devices permitted for their taking;
- On approval of the regulations on the rule of defining the list of hunting species;
- On approval of the dates of beginning and closing of hunting and fishing seasons;
- On approval of the list of huntable species.

The last order in the above list approves the list of species subject to hunting (approved by order No 18 of the Minister of Environment Protection and Natural Resources dated May 25, 2009; 03.06.2009; article 68, 750; registered at the Ministry of Justice of Georgia, registration code 410.030.000.22.023. 013.136). The list of huntable species is also approved by order 175 of the Minister of Energy and Natural Resources of Georgia dated September 1, 2011 "On approval of the list of animal species subject to hunting (except of migratory birds)", which was issued on the basis of subparagraph "l" of article 3 of the Law of Georgia on Management of the State Forest Fund. Thus, two different acts regulate one and the same legal issue. Moreover, on November 8, 2011 the Parliament of Georgia adopted the law "On making amendments to some legislative acts of Georgia"; according to one of the amendments the following subparagraph "z" was added to article 116 of the Forest Code: to issue the order of the Minister of Energy and Natural Resources before August 1, 2012 "On the list of animal species subject to hunting". Thus, animal species subject to hunting are defined by three normative acts with similar contents.

The rule and terms of issuing permits on export, import and re-export of species, their parts and derivatives entered into the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are defined by decree 18 of the Government of Georgia dated February 6, 2007 "On approval of the regulations on the rule and terms of issuing permits on export,

import and re-export of species, their parts and derivatives entered into the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)".

The rule and terms of issuing a license on the use of fir-tree cones and snowdrop tuber and/or cyclamen bulbs, entered into the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for export purposes are defined by decree No 21 of the Government of Georgia dated February 2007 "On approval of the regulations on the rule and terms of issuing a license on the use of fir-tree cones and snowdrop tuber and/or cyclamen bulbs, entered into the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for export purposes".

Thus, under the legislation, the following licenses and permits are issued in respect of natural resource consumption:

- General license of forest use, which can include:
- Special license on timber production;
- Special license of hunting farm.
- License of fishery (commercial fishing is meant).
- License on the use of fir-tree cones and snowdrop tuber and/or cyclamen bulbs, entered into the annexes of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for export purposes.
- Environmental impact permit.
- Permit on export, import, re-export and introduction from the sea of species, their parts and derivatives entered into the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The legislation defines the following types of forest use:

- Timber production;
- Hunting;
- Use for special purposes;
- Production of timber forest products and secondary forest products;
- Removal of a fertile layer of the soil in the forest fund;
- Use of non-timber forest resources;
- Forestry plantations;
- Forest use for agricultural purposes;
- Use for resort, recreational, sport and other cultural-sanitation purposes;
- Arrangement of fishery farms;
- Arrangement of animal shelters and farms;
- Complex forest use;
- Placement of communication facility.

Besides the above mentioned licenses and permits, the Agency of Natural Resources issues other permit documents on certain types of forest use, in line with the Law on Management of the Forest Fund, in particular:

- Document on extraction of animal species subject to hunting (except of migratory birds);
- Timber production ticket (for tree felling to meet the needs of rural communities);
- Agreement on forest use;

- Ticket for the use of forest resources (issued only for the removal of a fertile layer of the soil);
- Agreement on setting the designated areas of the State Forest Fund;
- Agreement on the use of the State Forest Fund for special purposes.

3. Review of Institutional Arrangements Related to the Use of Biological Resources (forest use, hunting, extraction of non-timber plant resources) (2004-2012)

In 2004, significant changes were made to the structure of the executive governement in the period following the Rose Revolution. The following changes were made in respect of structures with functions related to the management of biological resources: the Ministry of Environment Protection was renamed the Ministry of Environment Protection and Natural Resources. The State Forestry Department and the State Department of Protected Areas, Nature Reserves and Hunting Farms were incorporated into the ministry's structure as the Forestry Department and Protected Areas Department; the ministry became responsible for managing the state forest fund and protected areas through those departments.

State policy in the sphere of protection and use of biological diversity was carried out by the Ministry of Environment Protection and Natural Resources of Georgia; according to the law the ministry was a governmental agency of the Georgian executive authorities, providing state governance in the sphere of environmental protection and rational use of natural resources, and in the sphere of the population's ecological safety.

The central office of the Ministry of Environment Protection and Natural Resources incorporated a structural unit – the Service of Biodiversity Protection. The functions of the Service included: to participate in the development and implementation of state policy in the sphere of protection and conservation of biodiversity components and the management and regulation of biological resources on the entire territory of Georgia; to coordinate and monitor the fulfillment of the measures defined by the National Biodiversity Strategy and Action Plan; to organize and coordinate the fulfillment of commitments defined by the conventions ratified in the sphere of biodiversity (Convention on the Biological Diversity; Convention on International Trade in Endangered Species of Wild Fauna and Flora; Convention on Wetlands of International Importance especially as Waterfowl Habitat; Convention on the Conservation of Migratory Species of Wild Animals; the agreements and protocols to these Conventions ratified by Georgia; The Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea Against Pollution); to prepare national reports; to define and plan the priority directions of the measures on protection, conservation and recovery of the biodiversity components; to develop relevant programmes/projects and to coordinate their implementation.

The Inspection of Environment Protection of the Ministry of Environment Protection and Natural Resources implemented state control in the sphere of environmental protection, revealed and presented the facts of illegal use of natural resources, and controlled the fulfillment of the terms of licenses and permits issued by the Ministry.

The Investigation Department of the Ministry of Environment Protection and Natural Resources was tasked with combating environmental crimes and carrying preliminary investigation of criminal cases in this sphere. The key functions of the department were to implement powers envisaged by the criminal procedure legislation of Georgia with the purpose of revealing/preventing the crimes against the rule of environmental protection and use of natural resources.

The Division of Licenses and Permits of the Ministry of Environment Protection and Natural Resources was tasked with implementing state ecological expertise, issuing environmental impact permits, and issuing licenses for the use of natural resources.

The Law on Licenses and Permits 2005 established the types of licenses and defined that these licenses would be issued only by auction. Licenses provided for by the Law on Wild Fauna and the rule of their issuing, including the rule of creation of hunting farms, were abolished. The "forest ticket" was abolished as well.

No significant reforms were implemented in the sphere of forest management before 2007. In 2007 the Ministry of Environment Protection and Natural Resources launched one more "forest reform." The idea of the reform was to free the State from the obligation of forest management and related expenses and to retain only the functions of selling and controlling forest use licenses. For this purpose, the following steps should have been taken:

1. A great part of the forest fund should have been handed over under long-term licenses; maximum term of license should have increased from 20 to 50 years;
2. Part of the forest fund should have been transferred to local self-governments;
3. Part of the forest fund should have been transferred to the Georgian Patriarchate.

None of the above-mentioned steps were carried out, though a number of related institutional reforms were implemented: the internal structure of the Forestry Department was changed; staff reduction was carried out at the central office; territorial bodies of the Department were reorganized; forest districts were abolished and ten regional forest divisions were created instead. The number of staff was reduced from 1,694 to 682. As a result of this reduction average salaries increased 2.4-fold. A salary of a forest ranger rose to 400 GEL. The area of responsibility for each ranger rose to 4,500-5,000 hectares (rangers were instructed to prevent illegal cuttings on the area under their control; to issue-check permit documents; to prevent fires and forest diseases, etc.).

In March 2008 the function of issuing licenses for forest use were transferred from the Ministry of Environment Protection and Natural Resources and to the Ministry of Economic Development (later the Ministry of Economy and Sustainable Development). The quantitiy of natural resources extractable under a license was defined by the Ministry of Environment Protection and Natural Recourses and approved by the Ministry of Economy.

In 2010 the Forestry Department of the Ministry of Environment Protection and Natural Resources was replaced by the Forest Agency, a legal entity of public law under the subordination of the same ministry with the right to carry out certain economic activities.

In spring 2011 the Ministry of Environment Protection and Natural Resources and the Ministry of Energy were renamed into the Ministry of Environment Protection and the Ministry of Energy and Natural Resources, respectively. The following structural units of the Ministry of Environment Protection were transferred to the Ministry of Energy and Natural Resources: the Inspection of Environment Protection, the Investigation Department and the Forestry Agency. Later these units were liquidated. The Agency of Natural Resources, a legal entity of public law, was established at the Ministry of Energy and Natural Resources and forest management functions were transferred to the agency. The agency was put in charge of hunting and fishing issues and the management of minerals (setting license quotas, checking license terms, etc.). Furthermore, the function of selling the right to use natural resources was transferred from the Ministry of Economy and Sustainable Management to the Ministry of Energy and Natural Resources.

Thus, the following functions related to management of natural resources (minerals, water, wild fauna, wood and non-wood forest resources) have become concentrated in the Ministry of Energy and Natural Resources (more exactly, in the Agency of Natural Resources under the Ministry): to set the quotas and terms of using natural resources; to prepare license/lease objects; to sell licenses; to control licenses; to prevent illegal use.

The Ministry of Environment Protection has retained some control functions in the sphere of natural resource use, in particular concerning the issues of extraction of the species included in the Red List

and in the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The quotas for extracting snowdrop tuber and/or cyclamen bulbs entered into the annexes of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are set by the Agency of Natural Resources based on the conclusion issued by the Scientific Body under the Ministry of Environment Protection. The Scientific Body (the Minister's Advisory Council is created by order of the Minister of Environment Protection). The rule of activity of the Scientific Body is also defined by order of the Minister of Environment Protection.

Permits on export, import and re-export of species, their parts and derivatives entered into the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are issued by the Ministry of Environment Protection of Georgia or the Revenue Service, a legal entity of public law under the Ministry of Finance of Georgia. Since joining the Convention, this function was always performed by the Ministry of Environment Protection (or its predecessor); the Revenue Service undertook this function from December 1, 2011, however it has not exercised this right so far.

According to the amendments to the Law of Georgia on the Red List and the Red Book (08.11.2011, N5201), decisions on the permissible amount of extraction (removal from the environment) of endangered wild animals (except those propagated in captivity) are made by the Minister of Environment Protection by individual administrative-legal act.

4. Practice related to the extraction of biological resources (2004-2012)

4.1. Timber production for commercial purposes

According to the Forest Code (1999) short-term (up to one year) and long-term (up to 20 years) forest use is permitted.

Before 2007 forest use was mostly carried out under the documents issued for a term of up to one year.

In 2006 the Ministry of Environment Protection and Natural Resources issued 501 special one-year licenses on timber production. The special column "License Terms" was not filled in on only two licenses. Moreover, instead of extractable species (for example, beech, fir-tree, pine-tree, etc.) more than a half of the licenses indicated only "coniferous" or "broadleaf" trees, which made it impossible to control the exact amount of extracted timber.

Among the licenses issued by the Ministry some were issued on the territory of the Gori Experimental Forestry Farm, which at the time of issuing the licenses belonged not to the Ministry's Forestry Department but to the Gulisashvili Forestry Institute. The Ministry had no authority to issue licenses on that territory or to issue the documents confirming the origin and legality of the extracted timber.

In 2006, according to a governmental decree, the terms of one-year licenses were prolonged initially by two months and subsequently to November 1st, 2008. By decree N81 of the Government of Georgia dated April 3, 2008 the holders of licenses of up to one year for timber production issued by the Ministry of Environment Protection and Natural Resources who had failed to produce total amount of timber defined by the license were granted the right to produce the remaining part without receiving a new license, up to November 1st, 2008. In exchange, the decree obliged license holders to hand over 25% of the timber they extracted to the relevant local government bodies before August 15th, 2008 for the purpose of supplying socially vulnerable households with wood. This decision was not preceded either by relevant examination of cutting areas, or by relevant monitoring of the work done. As it appeared, license holders were opposed to the condition under which they

had to hand over 25% of produced timber to the state. The Ministry of Environment Protection and Natural Resources submitted a proposal to the government session envisaging the reduction of the license holders' share from 25% to 10%. Finally, the government members agreed on an intermediary option under which license holders should have transferred 15% of their products to the state.

Eventually, this part of the governmental decree was formulated as follows: the company Merkani Ltd and the holders of up to one-year licenses on timber production issued by the Ministry of Environment Protection and Natural Resources in 2005 and 2006, respectively, who failed to produce the total amount of timber within the term defined by the license, were granted the right to produce the remaining part without receiving a new license from the day of enactment of the present decree until November 1st, 2008." At the same time license holders were obliged to hand over 15% of produced timber to the state governors' administrations.

As it appeared, the delivery of even 15% of produced timber was quite unprofitable for the entrepreneurs and it had no sense for them to continue their work. Therefore, instead of 20,629 cubic metres of timber to have been delivered to the governors by license holders, only 935 cubic metres were delivered.

In late 2006 and early 2007, the Georgian Government announced that issuing of long-term licenses on forest use with the purpose of timber production was a priority. The first 20-year license on timber production was purchased by the company Georgian Forest Ltd in August 2006, thus being granted the right to cut timber in Samegrelo, Martvili district, Kurzu and Taleri forestry. The next auction was held at the Ministry of Environment Protection and Natural Resources on May 1, 2007. Special licenses on timber production were sold for a term of 20 years to the following companies: "Georgia Wood and Industrial Development Co", Ltd (Mukhuri, Taia, Napichkhovo, Magani, Khudoni, Jvari forest quarters of Tsalenjikha and Chkhorotsku regional forest districts of the Samegrelo-Zemo Svaneti Regional Forestry Division); Georgian-Italian company "Georgian Timber Industry Company" (Akhalsopeli, Kvareli, Shildi, Sabue, Gremi forest quarters of the Kvareli Forest District of the Kakheti Regional Forestry Division) and a physical person, Emil Raynirs (Oti, Zedaveli, Dzveli, Atskuri, Tiseli, Uraveli, Vale forest quarters of Akhaltsikhe forest district of the Samtskhe-Javakheti Regional Forestry Division).

Up to May 2012 timber production licenses were issued for a term of 5, 10 and 20 years. 16,1671 hectares of the forest fund were covered by those licenses.

Announcing and holding of all auctions on forest use are accompanied by the following problems:

- **Public participation in the decision-making process**

As a rule, the rights of Georgian citizens to participate in decision-making process related to the environment/forests are violated; particularly, they cannot participate in selecting the areas subject to licensing or in setting the quotas on timber resources subject to cutting (articles 35 and 36 of the Forest Code of Georgia). Interested parties, including the local population dependent on forest resources, learned about the government's decisions on selling forest resources through long-term licenses after the fact. In a number of cases conflicts emerged between the local population and licensees, as a result of which the government was obliged to change license areas for license holders (Akhmeta district, "Imedi" Ltd; Chokhatauri district, "Guria JP" Ltd).

As a result of decisions made without consultations with relevant experts and environmental organizations (including with the Service of Biodiversity Protection), licenses on timber production were granted without evaluation of the importance of forest conservation, as a result of which timber cutting licenses covered ecologically sensitive forest areas with especially high conservation value.

- **Obscure and controversial license terms**

According to Georgian legislation and international standards, forest use should be carried out on the basis of inventory data, which should be updated at least every 10 years. Forest inventory defines the area of the forest fund, its types, timber resources, types and amount of extractable resources, ecological requirements of forest use, and measures on planning forest protection, tending, restoration and economic activities. As a rule, license objects were auctioned with outdated forest inventory. As a result investors received incorrect data about license objects: the amount of auctioned extractable resource differed from the amount that was actually available in the forest; this posed a threat to forest ecosystems and at the same time infringed licensees' interests. Furthermore the obligations of license holders envisaged by license terms did not comply with their rights and it was impossible for license holders to fulfill many of the license conditions.

Such weaknesses in licence terms and conditions create problems in the contractual relationship between a license issuer and a license holder. The relationship between a license holder and the state in the issues of management of resources defined by the license lead to conflict of interests: after obtaining a license, a license holder, i.e. an interested party, carries out forest inventory and defines the amount of extractable resource. All the obligations related to forest management, which according to the Forest Code of Georgia should be fulfilled by the state – in particular, to carry out detailed inventory of forest fund, to define the sequence and terms of timber production areas, to plan the measures on forest biodiversity conservation based on the inventory data, to control illegal cuttings and carry out physical protection of forests – is a conflict of interests; so is the rule according to which the plan of forest use provided by a license holder is based on the factual data submitted by the latter, i.e. an interested party. Moreover, a license holder himself prepares a technical statement of the work to be done. In such case, the only protective mechanism is the honesty and frankness of those persons (foresters, and other specialists), who are carrying out the inventory and drawing up the plans of forest use under the instructions of a license holder.

The procedures for setting initial prices at forest use auctions have serious weaknesses. According to the legislation the starting price of the auction should be determined by order N1-1/480 of the Minister of Economic Development of Georgia dated April 4. 2008 "On holding an auction in order to grant the utilization license, determination of starting price and payment rules" (previously by similar order of the Minister of Environment Protection and Natural Resources). However, this mechanism has never been put in practice and it is unclear how the starting prices of auctions were calculated. Government officials have been unable to provide an explanation.

- **Neglecting environmental issues**

While selecting the objects for timber production under license the ecological expediency of allocating particular forest areas for timber production is not assessed. As a result, the forests with high conservation value are allocated for cutting; such forests also have a recreational and tourist potential as potential protected areas and resorts. The forests preserved in the Caucasus Mountains have a global ecological importance, because they are the last virgin forests preserved in the moderate belt. In Georgia intact forests constitute 17.2% of entire forests with only 2% having the status of protected.

- **Weak control over fulfillment of license terms**

Reasearch related to forest sector monitoring have clearly demonstrated that insufficient attention is paid to the fulfillment of license terms and to violations. For example, although the terms of the agreement concluded in 2005 on the extraction of chestnut timber – species included in the Red List of Endangered Species – were not fulfilled, in October 2008 the Government decided to prolong this agreement.

Several months after issuing the first long-term license, the license terms were simplified. On September 24, 2007 the Government issued decree No 203 "On making amendments and additions

to the regulations approved by decree N132 of the Government of Georgia dated August 11, 2005 "On approval of the regulation on the rules and terms of issuing licenses on forest use." As a result, the terms of long-term licenses on forest use were significantly changed: the requirement for the compliance of the forest use management plan with the principles of Forest Stewardship Council (FSC) was withdrawn.

The current legislation provides scarce opportunities for controlling licenses. According to paragraph 10 of article 21 of the Law of Georgia on Licenses and Permits, the fulfillment of license terms can be controlled only once during a calendar year; however, even this opportunity is not fully used.

4.2. Timber production by the local population

In 2005-2011 supplying the households with firewood and timber materials was regulated by decree N132 of the Government of Georgia dated August 11, 2005 "On approval of the regulation on the rules and terms of issuing licenses on forest use." This decree replaced the major regulatory act of the forest sector – Forest Code. State agencies were guided by this decree when supplying the population with forest resources. Because of imperfect legislation and poor structure of forestry services it was physically impossible for the most households to extract timber legally.

The decree notes in respect of legal extraction of firewood: "In order to prevent repeated reception of firewood by one and the same person, the Forestry Department of the Ministry of Environment Protection and Natural Resources shall be allowed to allocate firewood through the regional forest divisions after submitting an application by a local resident, a copy of ID card of an applicant, a certificate issued by an authorized person about the composition of a household as well as a tax statement or a bank cheque."

According to the decree, a person has to take the following steps to get firewood:

1. Submit an application to the head of forest district, who is usually located in a regional center,which may be a considerable distance from the applicant's home;
2. Go to a bank to pay the tax on natural resources (GEL 2-3 per cubic meter of timber);
3. Take a certificate from the local municipality about the composition of the applicant's household;
4. Submit the documents (receipt of payment of the tax on natural resources, certificate about the composition of the household and a copy of ID card) to the head of the forest district;
5. Go to the forest together with a forest ranger who will indicate the place for timber production (this stage is very difficult and a person may have to go to the regional centre several times to find an avaialble ranger);
6. Cut the trees indicated by the forest ranger in the previous step;
7. Visit the place of timber production with a forest ranger so that the ranger can issue a document certifying the legality of firewood transportation;
8. Transport the cut wood from the forest to home within 24 hours after the ranger issues the document in the previous step. (It is not easy for people to carry out this step within the time limit because there probably will be only one rough terrain capacity truck in the village. Moreover, to ease the struggle against illegal felling, firewood should be cut into less than one meter logs. Because of this rule, taking out the logs by bulls – a traditional method used by villagers in mountain regions of Georgia – is impossible. If permit holder fails to take the produced timber out of forest within 24 hours he has to find a ranger again and take him to the timber production area in order to receive a new document.

According to the above procedure, a forest ranger has to go to the forest at least three times: to allocate a cutting area; to take a local user to the cutting area (in order to indicate the place of

timber production); and to examine the legality of produced firewood. One example illustrates the problem: 16 forest rangers were working in the Oni district covering 70,687 hectares of forest area (on average 4,400 ha per ranger). There are about 3,500 households in the district, which means that one ranger would have to go to the forest about 400 times per year only to perform the procedures related to the process of firewood supplies (if he served each household separately); and in case of serving four households together - at least 100 times. In mountain regions a ranger will be able to get only to one cutting area during a day. It should be noted that besides the above mentioned duties a ranger has to perform other functions too (monitoring of legality, fire prevention, forest restoration, afforestation, etc.). Practically, it is an unrealizable task. So, owing to such legal and institutional framework, a ranger cannot perform his duties properly, while most villagers unintentionally violate the law.

Supplying the local population with timber for construction was yet another difficult issue. Before May 2008 the local population had no right to extract timber for household use along with firewood. The holders of timber production licenses were instructed to hand over a part of extracted timber to the President's regional governors for further supplying of the population. Moreover, allocation of standing timber to the local population was restricted to a maximum of 5 cubic meters of timber per household. The procedure of extraction was extremely difficult; it was much more difficult than in case of firewood extraction. In order to receive timber materials, a local resident should have taken the following steps:

1. An application addressed to the governor, which an applicant sends either to a governor directly, or hands it over to a rural envoy (this latter method was preferred in practice); it should be substantiated in the application that the applicant's family really needs timber materials;
2. Collection of all applications by the rural envoy and delivery to the local municipality;
3. Setting up a commission by the local municipality to study the applications;
4. Studying of the situation on the ground by the commission, whether an applicant really needs the required timber materials;
5. Preparing a conclusion after studying all applications by the commission and submitting it to the governor;
6. Discussing the conclusions prepared in each municipality of the region by the governor and making a motion to the regional forestry divisions over satisfying some of them. There were no criteria under which one applicant had a preference over the other. The governor could make two types of positive decisions: to allocate up to 5 cubic metres of trees for the applicant in order to receive timber materials or to give the ready product delivered by the holders of one-year licenses to the governor – not more than 5 cubic metres. In case of the second option, an applicant should pay the resource tax, obtain a transportation legality certificate from the forestry division and take home 5 cubic metres of ready products. In case of the first option, the following procedures should be carried out:
7. The forest division gives an instruction to the forest district to satisfy the governor's decision;
8. The forest district allocates a cutting area and presents it to the forest division;
9. The forest division agrees on the allocated cutting area;
10. The forest division notifies the applicant about meeting his requirement; afterwards, the above mentioned procedures related to firewood extraction are carried out;
11. The applicant pays a tax on natural resource;
12. The applicant goes to the forest district;

13. The applicant goes to the forest (cutting area) together with a ranger;
14. The applicant produces timber;
15. The applicant looks for a ranger, who should issue a document on transportation;
16. The applicant transports timber to saw-mill;
17. Timber is processed in the saw-mill;
18. The applicant goes to the ranger to obtain a transportation document (from the saw-mill to home);
19. The applicant takes ready materials from the saw-mill to home.

Such cumbersome procedures cannot be considered an acceptable method of supplying the local population with timber.

Supplying the local population with timber for other purposes (for example, to repair a house, cattle-shed, fence or other small household needs) remains without regulation. If a villager extracts a small amount of timber in the forest for his own needs, the relevant bodies may caegorise it as illegal timber extraction that is punishable under the law.

After transferring the forestry sector to the Ministry of Energy and Natural Resources, forest utilization by local population is regulated by the rule defined by amendments (13.-5.2011 199) to decree N242 of the Government of Georgia dated August 20, 2010 "On approval of the rule of forest use." Article 10 of this decree covers the issue "Social cutting."

According to the new regulations, the procedure seems comparatively simple. In frames of social cuttings, the population can extract relevant timber resources on the basis of the following documents:

a) A document certifying the payment of a relevant tax envisaged by the Law of Georgia on the Fee on Use of Natural Resources (except for the cases of exemption from payment of this fee);
b) A document certifying the payment of a service fee for issuing timber production ticket (except for the cases of exemption from payment of the service fee);
c) Timber production ticket.

Through an electronic database developed by the Agency of Natural Resources a citizen is provided with information about the cutting area at the bank after paying the fee for the use of natural resources. As far as timber materials are concerned, i.e. high grade timber resource, it is defined for each particular case through the agreement between the governor and the governing body (in case of the Autonomous Republics of Adjara and Abkhazia– through the mutual agreement between the self-governing unit and the governing body). The high grade timber resource is allocated according to the list submitted by the governor, and in case of the Autonomous Republics of Adjara and Abkhazia – by the self-governing units (along with indicating the first name, last name, personal ID number of each citizen and the amount of high grade timber to be allocated to a citizen).

In order to carry out social cuts, the relevant bodies authorized to manage the state forest fund allocate cutting areas annually in accordance with the procedures set by this rule; in case of necessity, they also ensure building of forest access roads and other measures in line with this rule.

It should also be noted that since 2011 the restrictions on the amount of extractable timber have been abolished (until recently, each family could extract only up to 7 cubic metres of firewood. This amount is 12 cubic metres in mountain regions, and 20 cubic metres in the areas with especially cold climate. The maximum permissible amount of timber materials was 5 cubic metres for local population (household)).

It is difficult to assess at this stage, whether this regulation proved successful. If we consider official data about officially extracted timber materials and firewood, and official data about illegal cuttings, we get the following picture: in 2011 the amount of legally produced firewood timber decreased compared to previous years; the amount of revealed illegal cuttings decreased sharply compared to previous years (Table 4.1).

Table 4.1: Amount of wood produced in 2005-2011

	Amount of legally produced wood m^3		Amount of revealed illegal cutting m^3	Total amount of wood harvested m^3
	Timber	Firewood		
2005	165,084	518,741	22,685	706,510
2006	102,946	481,495	57,178	641,619
2007	100,921	704,501	87,244	845,657
2008	78,915	761,158	40,235	880,308
2009	49,197	658,103	53,854	761,154
2010	73,473	725,419	32,925	831,817
2011	90,823	562,664	7,339	660,826

The decrease in revealed illegal cutting in 2011 is so dramatic that it raises the question as to whether it was the amount of illegal cuttings that decreased or the rate of revealing illegal cuttings . There are two reasons for thinking that the latter may be the case: 1. Abolition of the Inspection of Environment Protection; 2. Amnesty announced in 2011 for forest crimes committed in the past. The population decided that they would be forgiven not only their past but also future illegal cuttings. Significant illegal cuttings were observed in the Alazani grove, but the appeals submitted by the representatives of hunting farms to the Ministry of Energy and Natural Resources and the Interior Ministry were not answered.

4.3. Hunting

Until 2010 hunting was allowed only in hunting farms and certain areas of strict nature reserves. Hunting on migratory birds was an exception, as hunting on them was allowed everywhere, except in settlements and some categories of protected areas (reserves, national parks, natural monuments).

Today there are 18 hunting farms (4 more licenses have been issued to fishing farms). Unfortunately, these farms do not operate effectively and only some of them have approved extraction quotas.

As a result of amendments made to the legislation in 2010 (the Law on Forestry Agency) hunting was allowed on the entire territory of the state forest fund; however, hunting was not initiated under these provisions because of the absence of relevant subordinate legislation.

In September 2011 a draft law “on Making Amendments to Some Legislative Acts of Georgia” was prepared. The draft law introduced new regulations which posed a threat to Georgia’s biodiversity. There were several problematic issues:

- extraction of endangered species for commercial purposes;
- hunting in protected areas, including in national parks;
- legalization of the possibility of destruction of habitats of rare and endangered species;
- abolition of a natural resource fee on the extraction of Red List and other hunting species as well as of compensation for environmental damage caused by illegal extraction.

After non-governmental and international organizations expressed concerns several provisions were removed from the draft law, in particular, the provisions allowing hunting in national parks and introducing a zero fee on the extraction of endangered species.

As for allowing hunting on the species included in the Red List, quite an ambiguous wording was added to the legislation. The amendments to the Law on the Red List and Red Book of Georgia provided for the following:

1. The decision on the permissible amount of extraction (removal from the environment) of endangered wild animals (except those propagated in captivity) is made by the Minister of Environment Protection by individual administrative-legal act.
2. Except for the decision envisaged by paragraph 1 of the present article, it is allowed to extract (remove from the environment) endangered wild animals for the purpose of their saving, treating, restoration of populations and scientific purposes that can be carried out through a written consent of the Ministry of Environment Protection of Georgia (the mentioned consent may contain certain restrictions and/or terms for the extraction (removal from the environment) of endangered wild animals).

Although the above provisions do not directly state that hunting of endangered wild animals is permitted, according to the government's interpretation commercial hunting of species included in the Red List is allowed. Moreover, the government issued several normative acts in this respect.

On December 29, 2011 the Georgian Government issued decree No 513 on making amendments to decree 242 of the Government of Georgia dated August 20, 2010 "On approval of the rule of forest use." According to the decree, the species included in the Red List also belong to huntable objects; it was defined how much a hunter should pay to the Ministry of Energy and Natural Resources to obtain a hunting document: wild goat (*Capra aegagrus*) – GEL 500; red deer (*Cervus elaphus*), brown bear (*Ursus arctos*) – GEL 300; Caucasian grouse, Caspian snowcock – GEL 100).

Order No 275 of the Minister of Energy and Natural Resources of Georgia dated December 27, 2011 on making amendments to order No 07 of the Minister of Energy and Natural Resources of Georgia dated April 6, 2011 "On approval of the provision on the rules and timeframes of extraction of wild animals, by their species, and the list of weapons and equipment allowed for extraction", along with other species, has determined certain conditions and prohibitions on the extraction of endangered wild animals. Hunting of the following species is prohibited: a bear under one year, as well as a female bear that has an offspring under one year; female species of red deer, wild goat, grouse and snowcock; male species of wild goat with horn length less than 100 cm measured along the curve; male red deer, whose antlers are not branched and/or are branched, but the length of the main axis is less than 90 cm.

It should be emphasized that these restrictions are not enforced because there are no mechanisms to combat poaching (expceptin protected areas) or to control or monitor hunting.

By order No 276 of the Minister of Energy and Natural Resources of Georgia dated December 27, 2011 on making amendments to order No 30 of the Minister of Energy and Natural Resources of Georgia dated May 10, 2011 "On approval of opening and closing dates of the hunting and fishing season", along with other species, the timeframes for hunting of endangered wild animals were also set.

On January 30, 2012 the Ministry of Energy and Natural Resources of Georgia made amendments to the above mentioned orders (respectively, orders 35 and 36), as a result of which the timeframes of hunting for Capra and Chamois were increased to 6 months.

In January 2012 the Agency of Natural Resources approved the quotas on the extraction of the objects of the wild fauna during the 2012 hunting season: nutria- 194, rabbit -615, badger-168, forest marten- 157, stone martin- 157, wolf -120, jackal- 1453, fox- 162, forest cat- 77, wild pig- 189,

roebuck-417, raccoon-96, pheasant- 416, partridge- 713, black francolin- 50. When asked whether the distribution of these quotas were specified by hunting plots, the Ministry gave a negative answer (letter 4/665, 10.02.2012).

In recent years not a single state or scientific institution has ever registered a hunting species outside the protected areas (previously hunting was allowed only in hunting farms, now it is allowed anywhere, except nature reserves and national parks). Hunting quotas should be bound to a particular hunting plot. Legalization of the number of hunting species without specifying the areas where it is allowed to extract these animals (i.e. without distribution of extractable species by hunting plots) contradicts key ecological principles. Taking all these into consideration, we might suppose that the quotas approved by the Ministry are based on false information.

Besides the above mentioned law, the Georgian Parliament also made amendments to other laws in order to abolish as many legal restrictions on hunting as possible: The Law of Georgia on making amendments to the Law on Creation and Management of Tusheti, Batsara-Babaneuri, Lagodekhi and Vashlovani Protected Areas (November 24, 2011, No 5298-IIs), according to which fishing, hunting and creation of hunting farms was allowed in the Tusheti Protected Landscape as well as in the Ilto and Lagodekhi Managed Reserves.

The mentioned law contains a huge threat for Georgia's biodiversity. The issue is that the wild goat lives only in the Tusheti Protected Areas and one of the key goals is to allow hunting of this species. East Caucasian tur, Caucasian Grouse and Caspian snowcock also live in Tusheti. Since the territory is extremely large and the hunting rules unsettled, it will be very difficult to control whether hunting is carried out on the territory of protected landscape or within the limits of the national park.

The Lagodekhi Managed Reserve is very small with a total area of 2,155 ha. There is a visitor centre on the territory reserve, tourist paths, and places where the population legally extracts firewood. Accordingly, hunting and, especially, creation of hunting farms is physically impossible there. Even if it is simply noted in the law that hunting is allowed in the Lagodekhi Managed Reserve, it will have a negative impact on the number of ecotourists and this will ultimately a cause reduction of jobs and income from ecotourism in and around the protected area.

There are concerns that the amendments concerning hunting in Lagodekhi Managed Reserve is designed to prepare the situation for changing the category of Lagodekhi State Reserve to managed reserve in order to legalize hunting on the territory of the present state reserve. These doubts are well-grounded since red deer inhabit only the state reserve. Eastern Caucasian tur, Caucasian grouse and Caspian snowcock also inhabit the territory of the present state reserve.

The Law of Georgia on making amendments to the Law on Creation and Management of the Kolkheti Protected Areas (November 24, 2011, No 5299-IIs) allowed fishing, hunting and creation of hunting farms in Kobuleti Managed Reserve.

We can rank this law in the category of especially curious laws. Kobuleti Managed Reserve contains Ispani II marsh, which is a unique, almost uninviolated habitat of world importance in terms of biodiversity. Ispani peat is covered by a 25-45 cm thick layer of living sphagnum (white moss). It is never covered with water and forms a dome. It is possible to move on the Ispani territory only with the help of special wooden skis. Because of these ecological peculiarities, hunting and fishing are impossible there (there is no water surface).

Since 1996 Ispani II has been included in the Ramsar List of Wetlands of International Importance.

It is quite apparent that in order to allow hunting in some reserves and national parks, a part of them may be transformed into managed reserves or other categories of protected areas. Similar precedents have already taken place in the recent past: upon the initiative of the Ministry of Environment Protection, amendments were made to the Law of Georgia on Creation and Management of the Kolkheti Protected Areas (31.10.2011). As a result of these amendments, a section was removed from (the central part of) the Kolkheti National Park, where a multiple use area

was created. The Kolkheti Multiple Use Area is managed by the relevant local self-government body and not by the Agency of Protected Areas. The key goal of this amendment was to allow the construction of a motor road (Poti-Anaklia) on this territory.

Poaching remains one of the most serious and unsettled problems of biodiversity. Poaching is especially intensive in mountain regions, where both species of tur, chamois and brown bear are the objects of illegal hunting. Illegal hunting is the major reason of reducing the populations of deer, West Caucasian tur, Eastern Caucasian tur, chamois, wild goat, wild boar, bear and other species. Not so long ago deer could be found in all the forest areas of Georgia. Today only three small populations of deer are preserved in the protected areas. The populations of tur, chamois, wild goat and brown bear also decreased significantly. The goitered gazelle (*Gazella subgutturosa*) became extinct during the last century. Poaching also creates huge threat to waterfowl: many of them are popular hunting objects.

Illegal fishing, especially by prohibited means, is one of the reasons of the reduction of fish species. Illegal fishing on the migration routes of anadromous species (for example, sturgeon), along with the dams, creates huge barriers to their migration upstream.

The system of assessment of resources of hunting and fishing objects as well as of definition of the quotas needs significant improvement to provide for sustainable use. For example, the limits on hunting of migratory birds are not based on the results of monitoring of their populations. Most hunting farms do not have appropriate opportunities to register hunting species, while unequal distribution of hunting farms throughout the country, high taxes imposed on hunting and the fact that out of 18 hunting farms, hunting is allowed only in 5, is one of the reasons contributing to illegal hunting.

It is expected that new hunting regulations will further strengthen hunting pressure on biodiversity, because no mechanisms have been developed to control hunting.

4.4. Extraction of non-timber resources

At present extraction of non-timber resources (food, medical, decorative plants) is not regulated legally. Moreover, assessment of the statuses of these plants is not completed. Accordingly, rare, endemic and endangered species of non-timber resources are not legally protected. There are no data about the quantities being extracted and the influence of extraction on the state of their populations. The only exception is the extraction of fir-tree cones, snowdrop bulbs and cyclamen bulbs.

The number of persons willing to extract and export snowdrop and cyclamen resources has been for years. The amount of resource demanded by them significantly exceeded the annual quota of extraction of this resource defined by the scientific board. This situation has significantly complicated the process of issuing permits on the export of snowdrop bulbs and cyclamen bulbs, in respect of the distribution of quotas among the interested persons. The first normative acts regulating the issue were adopted in 2005 and in 2007 a regulation was approved by the governmental decree and is still in force. In 2008 ten-year licenses were issued to four entities for the extraction of snowdrop bulbs. Up to now no license/permit has been issued for the extraction of cyclamen bulbs.

The quota for harvesting cones of *Abies nordmanniana* is also defined annually.

Besides the above mentioned types of natural resource consumption other forms of land use also took place on the territory of the State Forest Fund. They are: forest use with the purpose of setting designated areas that is defined by the Forest Code of Georgia and the Law on Forest Fund Management and exclusion of areas from the Forest Fund for the purpose of implementation of various projects.

4.5. Fees and taxes related to biological resources

Based on the provisions of the Law of Georgia on Licenses and Permits, since 2005 one can purchase the right to using biological resources only through an auction. The bidder who offers the highest price is announced as the license owner. The auction is considered valid even if only one bidder participates. The amount paid as a result of bidding is transferred to the state budget. An interested person should also pay a license fee.

Before 2005 the cost for resources was defined by the Tax Code of Georgia. Starting from January 1, 2005 the taxes on natural resources were abolished and payments for the use of natural resources are made under the Law of Georgia on Fees on the Use of Natural Resources. As already mentioned above, both the holders of licenses on the use of natural resources (the owners of licenses issued for timber production, fishing, hunting farms, extraction of fir-tree cones, snowdrop bulbs and cyclamen balls), as well as private persons, who extract timber and/or hunting species for their own consumption, should pay the fees.

Unlike the amount paid in license bidding (which is a royalty by nature), which is transferred to the state budget, the fee on the use of natural resources, the amount of which depends on the amount of actually extracted resource, is transferred to the budget of that self-governing unit (administrative district), where the resource was extracted. In this way, the principle of fair distribution of the profit gained as a result of exploitation of biological resources is somehow observed.

Decree No 242 of the Government of Georgia dated August 20, 2010 "On approval of the rule of forest use" defines the cost of services, which a user of natural resources should pay to the Agency of Natural Resources for certain services, such as: issuing forest use ticket for removal of a fertile layer of the soil; preparation of information about land plot; cadastral measurement of land plots; preparation of license objects; issuing timber production ticket; issuing a document on the extraction of huntable wild fauna species (except migratory birds) per individual; issuing the document on timber origin and/or marking with special banners.

The legislation envisages certain tax privileges for promoting the sustainable use of natural resources. For example, according to the Law of Georgia on Fee on the Use of Natural Resources, tax is reduced by 70% for those users of natural resources who carry out scientific and cultural-educational activities related to the extraction of natural resources, and for those users of natural resources who implement recovery and reproduction of natural resources on their own (within the volume of restored resource). To facilitate the creation of hunting farms, the Tax Code of Georgia states that the lands occupied by hunting farms are exempted from property tax. However, the efficiency of these instruments is too weak to stimulate environmental protection and sustainable use of biodiversity[22].

In the decision-making process, economic assessment of biodiversity and its value are not envisaged. However, methodological research in this direction was implemented in the Soviet period and within the framework of some projects financed by various donors. When establishing the amount of tax for the use of natural resources or calculating the damage caused by the illegal harvesting of natural resources, the full economic value of biodiversity is not taken into consideration[23].

5. Problems related to the use of biological resources. Conclusions

The following problems were identified as a result of researching the legislation related to the use of natural resources, institutional arrangement and established practice:

[22] Third National Report of Georgia to the Convention on Biological Diversity

[23] Third National Report of Georgia to the Convention on Biological Diversity

- Conflict of interests: all functions related to natural resources (hunting, fishing, timber and non-timber resources and minerals) are concentrated in one agency – the Ministry of Energy and Natural Resources, particularly: development of a normative framework, policy development, protection of natural resources, commercial activities, issuing licenses and other documents, controlling the fulfillment of the terms of licenses and other permit documents[24];
- Insufficient personnel in the regions;
- Low skilled personnel in the issues of natural resource management and monitoring;
- Outside protected areas not a single agency is in charge of fighting against poaching (illegal hunting, fishing). Actually, there is no struggle underway against poaching outside protected areas;
- License terms, the practice of setting extraction quotas and other conditions, and issuing of licenses do not comply with the principles of sustainable use;
- Legislation and policy are oriented to maximum extraction of resources in a short period of time, instead of conservation and sustainability/long-term benefits;
- Access of local population to resources is limited, encouraging unsustainable use of resources;
- The normative framework for sport and amateur fishing, and falconry is insufficient;
- There are no hunting rules or means to enforce hunting rules;
- There is no community-oriented and/or trophy hunting concept;
- There is no provision for the reproduction of hunting and fishing species;
- Hunting farms failed to develop because of the impunity of poachers;
- New legislation poses a threat to the Red List species and protected areas;
- Weakness of environmental legislation, environmental monitoring and control accounts for the degradation/destruction of biological resources (extraction and processing of minerals, hydro power plants, industrial and municipal waste);
- Lack of professional knowledge both in the central office and the regions;
- Insufficient human resources (lack of staff).

[24] Since the situation analysis was prepared state functions related to hunting, fishing and forests have been transferred back to the Ministry of Environment Protection.

THEMATIC FIELD 5. BIOSAFETY

Lead organisation: REC-Caucasus

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1. Policy and legal framework

1.1. National policy and legal framework

At present biosafety issues are covered by only one strategic document in Georgia – the National. Biodiversity strategy and Action Plan adopted by decree of government No 25, 19.02.2005 (NBSAP-1). The document defined the following strategic goal:

> "*To protect both the human population and biodiversity from potential threats from genetically modified organisms (biotechnology), through the strengthening the law and through increasing public involvement in decision making*."

and the following specific objectives:

- To create a sufficient legal basis to address biosafety issues in the country.
- To develop effective official and public control mechanisms.
- To ensure the transparency of any initiatives involving genetically modified organisms (GMOs) or products.

The NBSAP-1 action plan 2005-2010 for biosafety is partially implemented (see Appendix 1 of this compilation for the full assessment). No normative regulations have been adopted on biosafety. After 2005, some progress was made towards creating scientific and technical capacity for detecting GMOs. Biosafety issues are included in general and higher education programmes. Public awareness-raising activities have been partially implemented by NGO sector.

The **National Environmental Action Programme of Georgia 2012-2016** (NEAP-2) notes that due to the absence of a biosafety system in Georgia risks related to Living Modified Organisms (LMOs) are not regulated. The document also notes that the scale of risks from LMOs on biodiversity is unknown, and that it is important to develop a risk management system. According to NEAP-2 an appropriate action plan has not been developed.

A draft **"Strategy of development Georgian Agriculture for 2011-2021"**, which was developed by the Ministry of Agriculture, considers developing a profitable, competitive and sustainable agro-food sector through the enlargement of small and medium farms and formation of complete production chain. The document does not address biosafety issues.

No relevant legislative and regulatory acts have been adopted in Georgia to provide for LMO- related risk management procedures.

Existing legislation and legislative initiatives are discussed below in three directions:

1) ***Biosafety*** – addresses the risks posed to the environment and human health when GMOs are released in to the environment either for research (e.g. small-scale or field-testing) or for commercial purposes. Biosafety instruments also address the contained use of GMOs.
2) ***Food safety*** **-** addresses the risks posed to humans by genetically modified foods. The general goal of these instruments is to minimize risks to humans presented by GMOs used in food. Ideally the entire human food chain is examined, moving from the farm to the kitchen table. A related area is animal feed safety.
3) ***Consumer protection*** **-** primarily addresses the labelling of end products resulting from genetic engineering, such as food or animal feed. In general, these instruments are designed

to protect the consumer's right to know and the right to make informed choices and to ensure fair trade practices.

1.1.1. Biosafety

In 2005 a draft National Biosafety Framework (NBF) for Georgia was elaborated under a GEF/UNDP project on the development of national biosafety frameworks. The draft NBF for Georgia consists of a basic draft law on GMOs and a package of corresponding amendments to existing national legal acts. The following new norms were established by the draft NBF:

- defines the authorities and competences of the Georgian Government with regard to the management and regulation of GMOs;
- states natural and legal persons' rights and obligations with regard to the use of GMOs;
- establishes a unified state/national system for managing and regulating GMOs and GMPs; the system also includes procedures for cross-border movement;
- provides that information in the field of GMOs is open and accessible to the general public; also it provides for active public participation and involvement in the early stages of the decision-making process and during monitoring and control;
- establishes and defines the status and categories of GMO free zones;
- determines state authorities responsible for control and supervision with regard to the use of GMOs;
- specifies compensation for damage and liability for violations.

Legislative and institutional amendments implemented shortly after the development of the draft legislative package made it necessary to bring administrative procedures, competences and other aspects determined by the documents into compliance with the new laws and regulations. For this purpose the Ministry of Economic Development prepared a draft Government resolution on biodiversity protection on the territory of georgia". A working group was set up by order #587 of the Minister of Environment Protection and Natural Resources of Georgia of November 27, 2009 to develop regulations for GMO management. Under the order the group was tasked with preparing a draft law on genetically modified organisms by May 1, 2010; however, work on the updated version of the draft law is still in progress. It is advisable for the government to adopt a provisional regulatory act in the biosafety sphere that would provide more flexibility and opportunities for addressing the identified shortcomings. However, to achieve this, the government needs to define corresponding commissions, or issue a corresponding legislative act or executive order.

In 2010, the Ministry of Environmental Protection prepared a *Draft Environment Code*. Part 7, Chapter XXIII of the draft code regulates issues related to genetic resources and biosafety including: availability of genetic resources; biosafety; consumer awareness about genetically modified products. However, this part of the draft code still requires considerable improvement.

The Law On New Animal and Plant Species (2010), which aims at regulating legal protection and use of new animal and plant species and concerns all new varieties and species of agricultural animals and plants, bans the application of genetic engineering methods to animal and plant genetic resources (Article 1). In compliance with the law, dissemination of seeds and seedlings is permitted only with quality and phytosanitary certificates (Article 46). Additional requirements for dissemination of seeds and seedlings in Georgia were to be determined by a resolution of the Government of Georgia that is yet to be adopted.

Current legislation fails to create any barriers for LMO import in Georgia. There are no restrictions in force concerning import and dissemination of new plant or animal species. Import of plant and animal materials is subject only to phytosanitary and veterinary control and requires only phytosanitary and veterinary permits and certificates (Law of Georgia **"On Licenses and Permits"**, 2005).

The legislation fails to reflect the legal requirements and commitments envisaged by the Cartagena Protocol on Biosafety concerning the Advance Informed Agreement Procedure (the Party of export shall notify or require the exporter to ensure notification to, in writing, the competent national authority of the Party of import prior to the intentional cross-border movement of a living modified organism). There are no appropriate regulations available for safe transportation, handling, use and introduction of LMOs.

The **Law on the System of Protected Areas (1996)** establishes indirect restrictions on LMO dissemination by banning the introduction and dissemination of alien species in protected areas (Article 20). The **Law on Wild Fauna** (1996) prohibits the introduction into nature of alien species and hybrid forms except for biological plant protection means (Articles 22 and 23).

1.1.2. Food Safety

From the standpoint of food safety existing legislation and strategic documents do not deal with GMOs, whether for human consumption or for fodder, nor with GMO-based products. The only restriction is set for biological production. According to **Governmental Standard 68:2007 on the Main Requirements and Production Conditions of Biological Production (2007)**, products produced through genetic engineering do not comply with biological production principles and should not be present in the primary produce of organic crop production or animal husbandry for human consumption, or in processed organic produce of crop production and animal husbandry. The standard was elaborated based on the *Guidelines for the Production, Processing, Labeling and Marketing of Organically Produced Foods* of the Codex Alimentarius Commission (guidelines 32-1999, review 2001-1), *EU Regulation 2092/91 on Organic Production of Agricultural Products and Indications referring thereto on Agricultural Products and Foodstuffs,* and on the basic standards of the International Federation of Organic Agriculture Movements (IFOAM) on biological agricultural production and processing. It should be noted, that EU Regulation EEC 834 published on June 28, 2007 also deals with rules of organic agricultural production, introducing amendments to previously enacted legislation. The **Law on Food Safety and Quality (2005)** regulates procedures of biological production certification and labelling (Article 12). By virtue of the said article a certificate of biological produce is to be issued if the production process complies with the provisions of Georgian legislation and appropriate standards.

The **Law on Food Safety and Quality (2005)** defines the legal framework for the elaboration, implementation and coordination of state policy in the field of food safety. By virtue of the law state policy in the field of the food safety is to be determined by the Ministry of Agriculture. The purpose of the law is to ensure protection of the life, health and economic interests of the consumers of foodstuffs, taking into consideration efficient operation of the domestic market and its diversity. The law establishes general principles and requirements of the food and fodder safety, quality and labelling, obligations imposed on food/fodder producers and distributors, instruments of state control over food/fodder safety and quality, and establishes competences of the state agency authorized to carry out control and supervision.

In 2010 the **Comprehensive Strategy and Legislative Approximation Programme in Food Safety** was adopted by Government of Georgia (Decree #1756, 28.12.2010). The aim of the government as demonstrated in this programme is to further develop the legal and institutional framework in the food safety area and establish a solid food safety system in Georgia in line with EU and international standards. The strategy aims at: a) analysing the existing legislative and institutional framework and identifying possible shortcomings and needs; b) describing the steps the government intends to take to introduce a solid food safety system in Georgia; c) outlining principles and priorities by which the establishment of such a system should be guided; d) identifying the needs, goals and challenges, associated with implementation of each component of the food safety system; e) introducing timelines and stages in which implementation should be ensured. For these purposes the strategy is accompanied by a legislative approximation programme. The strategy is based on the 'from farm to

fork' principle, which means that it will cover the whole chain from farm level to the final consumer. GMO-related risk management issues are not included in the document; however, the risk control and management systems mentioned in the document can be applied to LMO's too.

The Legislative Approximation Program for 2010-2014 was approved alongside the Food Safety Strategy. The programme does not mention the EU directives and regulations concerning biosafety and GMOs; thus it appears that the programme does not envisage the development of corresponding national legal documents.

The institutional framework of the food safety system in Georgia consists of a number of institutions. Efficient coordination of activities between the following institutions is essential for the establishment of a solid food safety system in Georgia and introduction of food safety official control:

- Ministry of Agriculture – responsible for policy-making in the field of food safety.
- Ministry of Labour, Health and Social Protection – responsible for participation in setting food safety parameters and norms and contribution to crisis management.
- The National Service of Food Safety, Veterinary and Plant Protection (NSFSVPP) under the Ministry of Agriculture – responsible for food safety supervision, monitoring and control.
- Revenue Service (RS) under the Ministry of Finance – responsible for Sanitary-Phyto-Sanitary (SPS) border control. Officials performing SPS control at the border are hired by the Revenue Service. A special division for veterinary, sanitary and phytosanitary control was created within the Revenue Service in April 2007. This division is in charge of SPS control at the border and has authority to control and supervise daily work of phytosanitary and veterinary specialists of territorial units of the RS.

In the case that non-compliance is identified during SPS control at the border, the RS makes a decision on destruction or return of the consignment and immediately notifies the NSFSVPP via electronic means of communication.

Particular attention is paid in the legislative approximation programme to:

- registration of food business operators and development of proper company databases;
- introduction of official control mechanisms, most notably checks and inspections by the NSFSVPP;
- introduction of official control at the border, in particular by the RS;
- ensuring efficient coordination between the NSFSVPP and the RS;
- further development of the system of laboratories to facilitate introduction of the official control system.

The NSFSVPP has the responsibility for elaboration of risk assessment and management and communication of risks. The NSFSVPP may outsource elaboration of risk assessment methodology to a third party. The third party may be a scientific or any other relevant institution, or qualified experts who can provide the necessary expertise and assistance for the elaboration of risk assessments.

The strategy also outlines channels of cooperation between the NSFSVPP and the RS in the carrying out of border and quarantine control**.**

The State Unified Laboratory System is supervised by a coordination board, the statute of which was adopted by Decree of the Government #252, November 15, 2007. The board consists of high-ranking representatives of the government and is chaired by the Minister of Labour, Health and Social Protection (Decree of the Government #159, July 30, 2008). The State Unified Laboratory System consists of laboratories with different bio-safety levels. The coordination board facilitates coordination and cooperation between the laboratories.

The above-mentioned laboratories under the Ministry of Agriculture and coordination board under the Ministry of Labour, Health and Social Protection deal with with especially dangerous pathogens

(EDPs) and function under the Biological Threat Reduction Programme (BTRP), which started in 2002 under the US Department of Defence. A Central Reference Laboratory (CRL) has been established under the programme.

The strategy discusses the possibility of establishing an independent inspection agency. At a later stages the government may elaborate a legal framework providing for independent inspection agencies within the state control system. If such legislation is indeed adopted it should comply with EU legislation, namely EC Regulation N882/2004, according to which the state controlling agency may delegate some of its functions to an independent third party. In accordance with international practice, an independent third party may be an independent inspection agency or private laboratory.

1.1.3. Consumer Rights Protection

On December 11 2009 **Decree of the Minister of Agriculture #2-231 on Adoption of Additional Requirements of Food Labelling** was adopted in accordance with provisions of the law on Food Safety and Quality (Article 19). Article 9 of the decree regulates labelling of GMO products in the following ways:

1) Food produced by means of modern biological technologies containing more than 0.9% of GMO components out of its total mass should bear an appropriate indication on its label.
2) If the food product contains only one genetically modified ingredient, then indication of 'genetically modified organism' (GMO) should be placed near the brand name of the food product.
3) If the food product contains two or more ingredients, one of which is genetically modified, then a GMO inscription should be placed in the list of ingredients alongside the ingredient which has been genetically modified.
4) A food product not containing DNA and which is produced on the basis of genetically modified organisms is subject to mandatory labelling based on the declaration of the country of the origin of the raw product.
5) Unpacked food containing GMO material intended for the retail trade should be accompanied by a written informational notice and/or booklets available for every consumer.
6) Food containing GMO material and which is packed into small portions with a surface less than 10 cm^2 should bear the inscription "genetically modified food product" or "containing GMO".

Based on the above rules, appropriate amendments have been made to the Code of Administrative Offences of Georgia (Article 1543):

1) Breach of rules of labelling will be fined by 1,000 GEL
2) Repeated violation within one year of the previous offense will be fined by 5,000 GEL

When amendments to the legislation requiring GMO-related labelling was adopted food control in the country was suspended because executive agencies were not authorized to carry out state control. Since January 3, 2011, the law has been fully enacted and inspections of food producers have begun, but as of today only a small number of samples for the purpose of GMO detection have been collected; the main focus has been on high risk products such as products of animal origin, infant food products and conserved products with pH lower than 4.7 (high risk products are defined by the Law on Food Safety).

1.2. Georgia's International Obligations on Biosafety

1.2.1. Convention on Biodiversity and Cartagena Protocol on Biosafety

The Convention on Biodiversity (CBD) was the first multilateral agreement that recognized risks related to living modified organisms; it defines countries' obligations with regards to the management of such risks. Georgia joined the CBD in 1994. Several provisions of the convention deal directly with LMOs; for instance, according to Article 8 (g) parties are obliged to establish or maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms. It should be noted that based on Convention Resolution II/15 only those organisms that have a new combination of genetic material produced by means of application of modern biological technologies are considered to be LMOs. According to Clause 4, Article 19, a country that is a party to the convention should provide a country into which an LMO is to be introduced with any available information about the use of the LMO, safety regulations, and potential adverse impact of the specific organisms.

The Cartagena Protocol on Biosafety sets out procedures for the safe transfer, handling and use of LMOs. Georgia joined the Cartagena Protocol on Biosafety in 2008. By virtue of the protocol a unified system of standards and procedures is being established, providing for justified decision on introducing LMOs into each of the participating countries. As already noted, Georgia has not yet enacted the legal and administrative framework in order to fulfil her obligations under the protocol

1.2.2. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) (1998)

The Aarhus Convention was ratified by Georgia in 2000. The convention provides for mandatory and voluntary measures with regards to GMOs; specifically, article 4 deals with information related to GMOs; by virtue of the same article public authorities are obliged to make such information available to the public without an interest having to be stated and in the form requested and as soon as possible. As for public involvement in decision making on the deliberate release of the GMOs into the environment, the convention leaves it up to the parties to regulate in an appropriate and feasible manner within the framework of national legislation (Article 6.11).

Amendments to the convention adopted in Almaty, Kazakhstan, in 2005 at the second meeting of the parties to the convention deal especially with public participation in decision making on the deliberate release of GMOs into the environment and market networks. The amendments have not yet been enacted, as they have not been ratified by a sufficient number of the parties. Amendments to the convention have been translated into Georgian but the process of ratifying the amendments has not been initiated in Georgia.

The purpose of adopting the mentioned amendments was to define the obligation of the parties in a clearer way than in the current edition of the convention; also it was necessary to bring certain provisions into compliance with the Cartagena Protocol to the CBD, which defines obligations of the parties with regards to informing the public and public participation in decision-making (Cartagena Protocol on Biosafety, Article 23). According to amendments to the convention (and as opposed to provisions currently in force), the parties will be obliged to incorporate provisions on informing the public and public participation in decision-making with regards to deliberate release of GMOs into the environment and their placement in the market network, specify legal defined procedures, deadlines, the type of information that cannot be kept confidential, also an obligation to inform the public about received notifications on the deliberate release of GMOs into the environment and provide information on risk assessment.

Georgian legislation does not reflect the Aarhus Convention's or the Cartagena Protocol's provisions on informing the public and public participation in decision-making with regards to GMOs. The current **Draft Law on Genetically Modified Organisms** provides for appropriate procedures, while

the **Draft Law on Protection of Biodiversity in Georgia** provides only for accessibility of information and does not provide any means to ensure public participation in decision-making.

1.2.3. International Plant Protection Convention (IPPC)

Georgia became a party to the IPPC in 2006. The aim of the convention is to protect cultivated and wild plants by preventing the introduction and spread of pests. The **International Standard for Phytosanitary Measures #11** (ISPM No11) provides details for the conduct of pest risk analysis (PRA) to determine if pests are quarantine pests; it describes the integrated processes to be used for risk assessment as well as the selection of risk management options; it includes guidance on evaluating potential phytosanitary risks to plants and plant products posed by living modified organisms (LMOs). According to the standard plant pest risks from LMOs may be presented by:

- the organism(s) with the inserted gene(s) (i.e. the LMO);
- the combination of genetic material (e.g. gene from plant pests such as viruses); or
- the consequences of the genetic material moving to another organism.

Part of the supplementary text provides guidance on how to determine if an LMO is a potential pest.

1.2.4. World Organization for Animal Health

Georgia has been a member of World Organization for Animal Health (WOAH) since 1993. Within the framework of the WOAH the International Office of Epizootics has elaborated guidelines on the use of products derived through genetic engineering and biotechnologies in animal husbandry (2005).

1.2.5. Codex Alimentarius Commission

Georgia became a member of Codex Alimentarius Commission in 1997; accordingly, standards adopted within the framework of the Commission have been registered in the Georgian National Agency for Standards, Technical Regulations and Metrology (GEOSTM). Codex Alimentarius defines general principles and guidelines with regards to food safety and includes a code of conduct on the release of exotic biological objects into the environment. Although the code of conduct does not have legal force it plays an important role with regards to GMOs because a number of standards have been adopted on safety of food produced by means of modern biotechnologies within its framework; for instance:

- CAC/GL 44-2003 – "*Principles for the Risk Analysis of Food Derived from Modern Biotechnology*" provide a framework for undertaking risk analysis on the safety and nutritional aspects of foods derived from modern biotechnology;
- CAC/GL 45-2003 – "*Guidelines for the conduct of Food Safety Assessment of Foods Derived from Recominant – DNA Plants*" include methodologies of foodstuff risk assessment comparing such food with 'doubles' derived by means of traditional technology and provide data and information identification to be used for such an assessment;
- CAC/GL 46-2003 – "*Guideline for the Conduct of Food Safety Assessment of Foods Produced Using Recombinant-DNA Microorganisms*" include methodologies for foodstuff risk assessment comparing such food with 'doubles' derived by means of traditional technology, providing data and information identification to be used for such an assessment.

1.2.6. World Trade Organization

Georgia became member of the World Trade Organization in 2000.

Before and after adoption of the Cartagena Protocol intensive debates took and are still taking place around the issue of whether provisions of the protocol comply with international order established within the framework of the World Trade Organization. According to protocol, parties:

- recognize that trade and environment agreements should be mutually supportive with a view to achieving sustainable development;
- emphasise that the protocol shall not be interpreted as implying a change in the rights and obligations of a party under any existing international agreements.
- understand that the above recital is not intended to subordinate the protocol to other international agreements.

Several provisions of the Cartagena Protocol may be seen as restrictive on trade:

- an importing country may prohibit the introduction of LMOs to the country;
- an importing country may impose market placement conditions (for instance, mandatory labeling) with regards to LMOs; such conditions will have an effect on the competitiveness of the product on the market.
- an obligation on exporters to observe the whole range of obligations related to notification and identification, for instance to provide accompanying documentation stating that the products in question contain LMOs.
- a procrastinated risk assessment process during procedures of preliminary notification and preliminary permit on import.

Based on the above, establishment of a biosafety regime should take into consideration the rules and dispute resolution instruments estbalished by the World Trade Organization, including:

Agreement on the Application of Sanitary and Phitosanitary Measures (SPS): According to article 2 of the agreement countries shall ensure that any sanitary or phytosanitary measure is applied only to the extent necessary to protect human, animal or plant life or health, is based on scientific principles, and that their sanitary and phytosanitary measures do not arbitrarily or unjustifiably discriminate between members where identical or similar conditions prevail, including between their own territory and that of other members. Sanitary and phytosanitary measures shall not be applied in a manner which would constitute a disguised restriction on international trade.

Technical Barriers to Trade (TBT) This document was enacted in 1995 and provides for the elaboration of such regulations, standards, examinations and certification procedures that would not hinder international trade. The TBT applies also to packing and labelling of biotechnologically-derived imported or domestically produced food products.

1.2.7. EU Legislation

EU legislation on LMOs has been in force since 1990. The EU ratified the Cartagena Protocol on Biosafety in 2003 and in order to ensure its implementation adopted **Regulation 1946/2003 of the European Parliament and of the Council on Transboundary Movements of Genetically Modified Organisms**.

Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the Deliberate Release into the Environment of Genetically Modified Organisms and repealing Council Directive 90/220/EEC defines the procedure for issuing a permit on deliberate release into the environment and market placement of LMOs. Permits are valid 10 years. Also, by virtue of the directive, LMO monitoring after its market placement becomes mandatory. Basic methodological principles of LMO-related risk assessment are also defined by the directive. According to the directive public consultations and LMO labelling are mandatory. Before making a decision, the European Commission is obliged to consult with appropriate scientific committees and the Committee on Ethics. Under the directive, establishment of a LMO register is required. Once every three years the European Commission is obliged to publish a report concerning measures taken by member countries with regards to implementation of the Directive and experience gained through market placement of LMOs. The report incorporates a social and economic analysis of the benefits and costs with regards to individual LMOs.

Other directives and regulations related to the GMO are the following:

- Commission Regulation (EC) No 65/2004 of 14 January 2004 establishing a system for the development and assignment of unique identifiers for genetically modified organisms;
- Commission Regulation (EC) No 1488/94 of 28 June 1994 laying down the principles for the assessment of risks to man and the environment of existing substances in accordance with Council Regulation (EEC) No 793/93;
- Council Directive 98/95/EC of 14 December 1998 amending, in respect of the consolidation of the internal market, genetically modified plant varieties and plant genetic resources;
- Directives 66/400/EEC, 66/401/EEC, 66/402/EEC, 66/403/EEC, 69/208/EEC, 70/457/EEC and 70/458/EEC on the marketing of beet seed, fodder plant seed, cereal seed, seed potatoes, seed of oil and fibre plants and vegetable seed and on the common catalogue of varieties of agricultural plant species;
- Commission Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed;
- Commission Regulation (EC) No 1830/2003 of the European Parliament and of the Council of 22 September 2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms and amending Directive 2001/18/EC;
- Commission Regulation (EC) No 50/2000 of 10 January 2000 on the labelling of foodstuffs and food ingredients containing additives and flavourings that have been genetically modified or have been produced from genetically modified organisms;
- Council Regulation (EEC) No 2309/93 of 22 July 1993 laying down Community procedures for the authorization and supervision of medicinal products for human and veterinary use and establishing a European Agency for the Evaluation of Medicinal Products;
- Council Directive 98/81/EC of 26 October 1998 amending Directive 90/219/EEC on the contained use of genetically modified micro-organisms.

The European Commission has already made several decisions on issuing permits for GMO market placement (including GM potatoes, carnation, rape and corn).

Apart from the above, by decrees of local governments, municipalities and individuals, GMO free zones have been established across Europe (for instance, in Austria 14 states have been declared GMO free zones, in Finland - 2 provinces, in France - 21 regions, in Norway - 1, in Poland - 16, in Spain - 4, in Sweden - 1 region and so forth, and Switzerland has declared a moratorium on GMO cultivation till November, 2013.

It would be feasible to carry out legal analysis in more detail to establish the legal basis of declaring a region as a GMO free zone in order to have similar instruments established in Georgian legislation.

2. Revealed Problems and Recommendations

1) As of today, in spite of its importance for the conservation of local biodiversity and healthcare, biosafety is not considered to be one of the priorities of national policy in Georgia. This may be caused by lack of basic information and appropriate research, providing decision-makers with an appropriate basis for policy-making; for instance, there is no assessment of imports of genetically modified seeding and planting stock; there is no assessment of the potential impacts from using of LMOs from environmental, social and economic standpoints.
2) International instruments of biosafety are not yet fully applied. Up to now no notifications under the preliminarily justified consent procedure provided for under the Cartagena Protocol have been received by Georgia. Georgia does import agricultural products from

countries that are party to the protocol and from LMO producers; however, it is not known whether GM products have been imported from these countries or not, and if they have, why Cartagena Protocol procedures were not initiated.

3) Georgia does not make use of the financial resources available within the framework of the CBD for the purposes of establishing a biosafety system, creating appropriate human resources and technical means, and participating in biosafety mediatory instruments.

4) Given the lack of appropriate legal requirements, LMOs imported into Georgia are not registered; no monitoring of release into the environment or market placement is taking place. The law does not require declaration of GM seeding or planting stocks, their labelling, advance notification and consent on import. In the absence of labelling requirements, farmers do not know whether they are cultivating LMOs; consequently it is impossible to establish changes in areas under LMO crops (which would have been a good indicator for assessment of impact on biodiversity). As part of the national system of biodiversity monitoring currently being established one of the selected indicators is change of total volume of imported GM seeding stock. In order to apply the indicator, it is necessary to define data collection and accounting measures.

5) There is no LMO control of imported seeding and planting stock, or over food and fodder.

6) A system of LMO based food labelling is not in operation. Despite requirements set by the Decree of the Minister of Agriculture with regards to GMO labelling, also provisions of the Law on Food Safety and Quality requiring the National Food Agency to carry out state control activities (the law was fully enacted on January 3, 2001, and inspections of food producers have begun), up to the time of writing this report not a single sample has been taken for the purpose of GMO detection.

7) Due to lack of an appropriate accounting and monitoring system there is no official data available on LMO spread and use. Informal data originates from various non-governmental organizations and the press; this information is not being studied or checked by governmental agencies and the distribution and distribution channels of LMOs remain unknown.

8) Because of high risk of genetic contamination of local varieties and their wild relatives the use of GM seeding and planting stock may present a serious threat to Georgia's agricultural and biological diversity. Consequently it is of high importance to ensure safe transboundary transportation and handling of LMOs in order to achieve an appropriate level of protection for biodiversity conservation. One of the solutions may be to support the development of local seeding and planting stock production by adopting appropriate policies, human resources development and technology development levels.

9) It would be feasible to start step-by-step adoption of appropriate amendments to primary and secondary legislation based on best international practices taking into account already existing legislation on food safety, in time achieving regulation of deliberate release and market placement of LMOs and safe transportation, transboundary movement and use in closed systems. The effort may be put not into elaborating a new law on genetically modified organisms but rather to integrate biosafety issues into existing legislation governing food safety; for instance, the obligation of the National Food Agency to carry out risk assessment, management and communication could be extended to include risk assessment methodology for LMOs in food or fodder.

Along with the above, legislative amendments should be prepared from the standpoint of providing territorial restrictions on the release of LMOs; for instance, imposing prohibition on the cultivation of LMOs in all categories of protected territories (including protected landscapes and *multiple use territories*). It is also necessary to settle issues arising from the

coexistence of bio-farmers and farmers who cultivate LMOs. Based on detailed legal analysis, local governing bodies and individual farmers should be entitled to declare territories LMO free zones. It is also necessary to examine possible restrictions on the release into the environment of GMOs whose wild relatives and local varieties are to be found in Georgia.

10) Regulation mechanisms provided for under Cartagena Protocol should be reflected in national legislation in such a way as not to hinder observation of other international obligations of the country. The protocol calls upon the parties to take into account global expert knowledge and competence in the fields of environment protection and human healthcare; this provision of the protocol implies incorporation of the recommendations, standards and guidelines of the Codex Alimentarius, FAO and WHO with regards to organisms derived through bio-technologies into national systems of biological safety.

11) Appropriate assessments should be carried out in order to inform decision makers in order to shape out the national policy on biosafety.

12) It would be advisable to extend the obligation of the National Food Safety, Veterinary and Plan Protection Service to carry out risk assessment, management and communication to LMOs in food and fodder that are to be directly consumed or processed, implementing an appropriate methodology of risk assessment; such a methodology may be based on the Manual on Risk Assessment of Living Modified Organisms (UNEP/CBD/BS/COP-MOP/5/INF/22). Personnel of the service are fully competent in traceability methodology for food and fodder. Establishment of such a system is required under EC Directives 1829/2003 “on genetically modified food and feed” and 1830/2003 “concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms".

13) A number of laboratories within the unified laboratory system and/or one a number of independent inspecting authorities could be appointed for the purpose of carrying out, in case of need, GMO examination and control of imported seeding plants and other LMOs, also food and fodder for direct consumption or for processing. It would be feasible for the coordination board in charge of the system to plan regular inspections in order to prevent illegal movement of living modified organisms.

14) It would be feasible, based on the requirements of the Cartagena Protocol, to establish a national agency (or delegate rights and obligations to already existing agencies) to carry out state registration of transgenic food and raw materials, also reproductive materials according to identification data.

3. Programmes and Projects in Biosafety

In 2002-2005 Georgia participated in the UNEP/GEF-supported global project “National Biosafety Framework Development” which aimed at establishing foundations for ratification of the Cartagena Protocol and observation of assumed obligations. The project was carried out in 23 countries of the world. In the course of the project documents were elaborated to form a national biosafety framework and a draft law on genetically modified organisms. Project activities were carried out to inform the public and raise public awareness.

In 2004 in the course of the project a public survey was conducted in order to determine public attitudes and level of awareness with regards to LMO cultures and foodstuffs, interviewing 1,005 respondents throughout Georgia (Imereti, Guria, Kakheti, Samtskhe-Javakheti). The survey found a negative and wary attitude of the population towards LMO products: 95% of the people interviewed considered it mandatory to have LMO products labelled accordingly, whilst 90% would refuse to buy such products even if they were considerably cheaper. The survey also revealed a low level of awareness among farmers with regards to the positive and negative sides of using LMO cultures. A small proportion of the interviewed farmers (16%) were sure it was necessary to import LMO seeding

and planting stock and fodder. 88% of the people interviewed considered it the government's duty to regulate LMO import and use.

In 2007-2011 Georgia, along with Armenia and Moldova, participated in the UN FAO regional project "Capacity building in agricultural biotechnologies and biosafety for Armenia, Georgia and Republic of Moldova" (TCP/RER/3207 D)

In the course of the project the following trainings were conducted:

1) Yerevan, 2010 - issues related to LMO legislative regulation, general provisions on risk assessment, basics of risk regulation, general principles and methodologies of assessment of genetically modified food products, methodology of describing genetic changes in donor and recipient organisms, methodology of assessment of potential toxicity and allergenicity of GM products, metabolic changes in GM food products, impact on different technological cycles of processing on GM raw materials and finished products, impact of GM seeding stock on biodiversity. Five specialists from Georgia participated in this training.
2) Kishinev, 2011 - biotechnology teaching curricula and syllabi in higher education institutions, teaching, scientific and practical (legislative) aspects have been evaluated. The meeting decided to establish a professional development teaching course on GMO detection and risk management. Four specialists from Georgia participated in this training.
3) Tbilisi, 2011 - GMO risk communication. Topics discussed - public participation and awareness with regards to GMO. Five specialists from Georgia participated.

The level of development and needs of agricultural biotechnologies were assessed during the course of the project. Working meetings with decision makers, farmers' associations and business-operators were conducted. Also the condition of Georgian laboratories was assessed from the standpoint of finding means to further develop their capacity.

Public Campaigns:
The non-governmental sector in Georgia holds a strict position with regards to the need for state regulation of LMO s (especially from the standpoint of release into environment). **The Greens Movement of Georgia** regularly carries out public awareness campaigns with regards to LMO threats to environment and human health. These campaigns played significant role in forming public opinion. **Biological Farming Association Elkana** supports the development of organic agriculture in Georgia. Their main activity is providing advisory services to organic famers, extension of rural development services, increase of farmers' income, conservation of agricultural biodiversity. The association lobbies for the development of organic farming and, consequently, is negatively inclined towards the introduction of LMOs into Georgia.

4. Existing Scientific and Technical Capacities and Needs in GMO Biosafety and Risk Management

Georgia has a long standing tradition of agricultural biotechnological research, especially in tea and wine production; however, current research activities are on a much lower scale; the reasons for this include emigration of qualified scientists (especially younger ones), obsolete equipment in research centres and lack of funds to pay for its replacement.

On-going projects include those devoted to research into and production of a range of biologically active compounds for the agricultural, food/feed and pharmaceutical industries. Research is also being carried out on tissue culture techniques to produce virus-free planting material of potato and grapevine. A considerable amount of work has been done on biotechnology of microorganisms, geared towards production of useful metabolites. Most on-going projects are funded nationally, but there are several international collaborative efforts.

In the field of biosafety in 2005-2012 four scientific projects have been implemented by Ivane Beritashvili Biomedicine Experimental Centre, funded by the National Scientific Fund. The goal of the research was testing, implementation and elaboration of GMO detection methodology.

GMO study and analysis is of crucial importance in Georgia for the following purposes: to assess seed and food quality and safety; to meet consumer demand; to protect local biodiversity; to implement legislation according to international obligations especially after ratification of Cartagena Protocol. The implementation of GMO legislation requires reinforcement of a suitable scientific basis for monitoring of GMOs.

At present there is only one officially accredited laboratory in the field of GMO detection – at the **Institute for Horticulture, Viticulture and Wine Making,** which has been certified by the Unified National Body of Accreditation - Accreditation Centre. The laboratory is inspected annually and is subject to recertification every three years. From the standpoint of the study of GMOs and products the laboratory is equipped with all necessary apparatus and reagents, including so called "Real-Time PCR", capable of both quantitative and qualitative analysis of GMOs, though the laboratory has not been asked to carry out quantitative analysis yet. The laboratory mainly carries out qualitative analysis of GMOs. Also, requests are mainly for export goods, such as alcohol-free beverages, bay leaf, tea and so on. One qualitative testing costs 200 GEL. Detection is based on identification of the 35S promoter, which is used for marking the majority of genetically modified organisms. Up to today the laboratory has not identified any GMO content.

In 2004 study of GMOs was started by the biotechnology group of the **Institute of Molecular Biology and Biological Physics** (Tbilisi, Georgia). A laboratory for GMO analysis was established on the basis of this group in March 2008. This was the first laboratory engaged with GMO analysis in the southern Caucasus (Georgia, Armenia and Azerbaijan). At present the GMO group belongs to the **Laboratory of Genome Structure and Function of the Ivane Beritashvili Biomedicine Experimental Centre**. The members of the laboratory are highly qualified experts of molecular biology, biotechnology and biochemistry. Several members of this group have worked in advanced research centres in Europe and USA including accredited European GMO laboratories. The GMO laboratory collaborates with the Institute of Chemical Biology of Ilia State University (Tbilisi, Georgia). The students of the University participate in research projects. The head of the laboratory has been trained in biosafety and GMO detection. The laboratory is equipped with equipment for DNA-based qualitative detection and analysis for GMOs including a thermal cycler for PCR, apparatus for agarose gel electrophoresis, transilluminator, and microcentrifuges. The laboratory does not have quantitative analysis equipment (Real-Time PGR).

A laboratory at the **Faculty of Exact and Natural Sciences of Javakhishvili State University** is equipped with some devices for performing DNA-based qualitative detection and analysis for GMOs through the PCR method. Further capacity is planned within the framework of the TEMPUS programme. The laboratory has been selected in the course of an FAO project for regional training in GMO detection, to be conducted in the first half of the current year. For the purposes of the training, the laboratory will be provided with all appropriate reagents and other materials under the FAO project.

As for other laboratories, the **Central Reference Laboratory,** operating within the framework of Cooperative Threat Reduction program (CTRO), has been built with funding from the Biological Threat Reduction Programme of the US Government (BTRP) and has been fully equipped with modern equipment. The **Levan Samkharauli National Forensics Bureau Biological Laboratory** is also appropriately equipped.

4.1. Identified Problems and recommendations

1) Existing scientific capacity for risk assessment and management is very scarce; almost none of the universities or research centres under them are purposefully studying GMO related risks and risk assessment and management issues.
2) The number of scientists trained in biosafety is very small, experience being especially scarce from the standpoint of risk assessment, management and appropriate mitigating measures.
3) At present there is only one laboratory accredited for GMO detection which, once national legislation on biosafety is adopted, will not be able to cope with demand. Other laboratories may have potential but their profile is different, being more focused on education, scientific research, medical and other purposes.
4) Another problem is the limited scope of GMO identification methodology practiced in the accredited laboratory. As has been mentioned above, nowadays identification is carried only via the 35S promoter. If a genetically modified organism has been derived through some other promoter, the existing methodology would be useless for its detection. Another problem is imposed by the high cost of the analysis.
5) Establishment of appropriate scientific capacity should be supported; expert registration and creation of a database of experts with specialized experience in the field of biosafety risk assessment and management would be desirable.

5. Educational Programmes in Biosafety

5.1. General Education

According to the National Curriculum, adopted under Decree #36/N of the Minister of Education and Science of Georgia on March 11, 2011, which will remain in force till 2016, modern biotechnology and genetic engineering have been included into the biology curriculum of the intermediary level (10th to 12th grades). According to the Biology Standard, upon completion of the biology curriculum, the student should be able to demonstrate appropriate knowledge and be able to discuss positive and negative sides of genetic engineering. The curriculum includes: general description of genetic engineering methods (*plasmids, restrictase, vectors),* biotechnologies related to genetic engineering, GMOs and biological safety.

In accordance with National Curriculum, the aforementioned subjects have been included in biology textbooks; for instance, N.Zaalishvili and N.Iosebashvili Biology Textbook, 10th Grade, contains quite appropriately measured and sufficiently sophisticated material for the students of the target age group on basic principles of genetic engineering and biosafety, also examples of the application of modern genetic technologies.

5.2. Higher Education

Bachelor's level curricula incorporate modern biotechnologies and biosafety in various disciplines, including molecular biology, genetics, biotechnology and others.

In several higher education institutions in Georgia there are bachelor, master and PhD level programmes in molecular biology and biotechnologies that incorporate GMO detection and biosafety issues.

The new bachelor programme in Applied Biosciences and Biotechnology has been developed within the framework of an EC Tempus funded project: “Developing new applied biosciences and biotechnology curricula”’ at the **Faculty of Exact and Natural Sciences of Javakhishvili State University.** The bachelor’s programne was introduced for the 2009-2010 academic year. The project is being implemented by an international consortium which along with Iv.Javakhishvili Tbilisi State University (the grant coordinator) includes three leading European universities – the University of the

West of England, UK (grant holder), Dublin Institute of Technology, Ireland, University of Alicante, Spain, Paulo & Beatriz – Consultores Associados, Portugal and Aristotle University of Thessaloniki, Greece.

The bachelor level curriculum includes the following sub-curricula: healthcare biotechnology, food biotechnology and agricultural biotechnology. Practical training in GMO detection is provided in the course of the bachelor level curriculum. Bachelor level students are also offered an opportunity to undergo industrial professional practice in biotechnological centres, providing them with the chance to get first-hand experience of biological technology.

It should be noted that university entrants' interest towards the subject is increasing: in 2009-2010 and 2010-2012 school years the programme was selected by 25 and 22 students, in 2011-2012 - by 48.

Ivane Javakhishvili Tbilisi State University also runs a TEMPUS-supported Master's level programme - Applied Bioscience - launched in January 2010. The project has duration of 3 years and is being implemented by an international consortium. In the course of the project five leading universities of Georgia and Armenia are to establish new Master's programme in applied biological sciences. The programme aims at preparing the students for prospective careers in science and for their employment in biology-related industries, research institutes or other organizations. The new Master's programme in applied biological sciences includes food biotechnologies, agricultural biotechnologies, healthcare biotechnologies and environmental biotechnologies.

The master's degree programme includes a module on genetically modified organisms and environmental safety. For the 2011-2012 academic year five students have been enlisted for the programme. It should be noted that this is a joint programme with the Agricultural University of Georgia (sub-programme Agricultural Biotechnology) and Akaki Tsereteli University (sub-programmes Healthcare Biotechnology, Food Biotechnology and Environment Protection Biotechnology).

All sub-programmes of Applied Bioscience and Biotechnologies will be served by a university laboratory fully equipped with modern scientific research equipment. This laboratory will be used for teaching modern methods of molecular biology and biotechnologies, students master biochemical, molecular-genetic, sytodiagnosis, histiodiagnosis, microbiological, physiological, immunological and other diagnostic technologies; will master polymerase chain reaction (PCR) method, and will learn how to derive and use human, animal and plant cell tissue cultures for *in vitro* experiments, methods of identifying and finding genetically modified products.

Teaching of modern biotechnologies of different complexities is also going on at **Ilia State University**, incorporating the Molecular Biotechnology and Biochemistry PhD programme. The purpose of the programme is to study, by means of molecular biology and modern biotechnology methods, genetically modified plant organisms and food products derived from them, and fundamental problems of biochemistry; research topics are: traceability of genetically modified organisms in food; development of new methods and nano-biotechnologies of genetically modified organisms detection; study of cell regulation principles; separation of biologically active substances and study of their effects in normal physiological conditions and in pathological conditions. At the time of writing this report a doctorate thesis was being worked on in the faculty of Master's and PhD programmes with the title “Impact of Food Processing on Genetically Modified Organisms Detection”.

In biophysics, laboratory practice is being conducted for the benefit of the students of Master's degree program in Ivane Beritashvili Experimental Biomedicine Centre, enabling them to master GMO detection methodology.

5.3. Identified Problems and recommendations

1) Regardless of Bachelor, Master and PhD level programmes, teaching of modern biotechnologies in Georgia is lagging behind other countries. Higher education programmes do not offer enough knowledge from the standpoint of GMO-related risk assessment and management. Teaching laboratories aren't adequately equipped. There is a need for professional development of scientific personnel.

2) Strengthening of existing Bachelor, Master and PhD level programmes from the standpoint of GMO- related risk assessment and management should be supported. Creating links with leading universities in order for training and professional development of personnel is recommended.

6. Extension

Unfortunately, there is no extension system operating in Georgia at the state level. The Ministry of Agriculture has developed a strategy of agriculture development that covers and considers implementation of an extension system at the state level in Georgia. The next step would be development of the according action plan to achieve the results set by the mentioned strategy. Several NGOs acting in Georgia are providing extension services to beneficiaries on their own (Elkana, Mercy Corps, CARE).

Additionally, it should be mentioned that the level of knowledge and awareness regarding international standards and regulations generally is relatively low. According to a survey conducted by International Financial Corporation (IFC) only 1/5-th of the firms have a basic or detailed knowledge of international food-safety standards (EU food safety and quality regulations, Codex Alimentarius, HACCP, Global GAP, ISO22000:2005, ISO9001:2008, GMP and GHP).

6.1. Identified Problems and Recommendations

1) The level of farmer awareness with regards to the advantages and drawbacks of GMO production and related risks is low. There are no specific educational modules for farmers. In the absence of a requirement to label GMO seeding and planting stock labelling, farmers do not know whether they are using such stock. On the other hand importers of seeding and planting stock state that they do not import GMO derived stock as local farmers would refuse to buy it.

2) It would be feasible, whilst establishing an extension system in accordance with the agriculture development strategy, to incorporate modules on farmer awareness-raising and education on GMO related risks, as well as GMO safe handling, storage and transportation issues.

THEMATIC FIELD 6. PUBLIC PARTICIPATION AND EDUCATION

Lead organisation: EcoVision

Lead authors: Nino Sulkhanishvili and Ana Rukhadze

1. Introduction

Article 13 of the Convention on Biodiversity (CBD) deals with education and awareness-raising and requires parties to the convention to promote understanding of the importance of biodiversity conservation, provide information through the mass media, an to include biodiversity conservation in educational programmes, and cooperate with other countries and international organizations in those regards.

The parties to the convention discussed implementation of Article 13 for the first time at COP4 in 1998 and decided that education and awareness-raising should be integrated into a cross-sectoral programme of work. COP6 (2002) adopted decision VI/19 on communication, education and public awareness (CEPA); the decision specified elements of the CEPA programme of work: formation of global networks for communication, education and public awareness; sharing of knowledge and experience; further development of the CEPA; strengthening the capacities of parties integration biodiversity issues into other sectors). COP8 adopted decision VIII/6, which includes a short list of the priority actions for implementing the CEPA programme of work:

1) Establish an implementation structure or process for CEPA activities;
2) Assess the state of knowledge and awareness on biodiversity and determine capacity for communication;
3) Develop key main messages;
4) Implement media relations strategy ;
5) Elaborate toolkits for development and implementation of CEPA strategies;
6) Organize workshops for the articulation of CEPA strategies;
7) Develop infrastructure and support for a global network;
8) The International Day for Biological Diversity;
9) Raise profile of meetings of the Conference of the Parties and the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA).
10) Strengthen formal and informal education on Biodiversity.

A number of other decisions taken by the parties to the convention are related to the development of CEPA programmes:

- Decision IV/10 which requires from the parties to pay special attention to Article 13 of the convention during developing national biodiversity strategies and action plans, to encourage education in the field of biodiversity protection, allocate appropriate resources, to include the problems of biodiversity into educational strategies, strategically use education and communication tools during formulation, and implement and evaluate of biodiversity.
- Decision X/18 proposes to the Parties to strengthen CEPA activities to achieve the goals of the Strategic Plan for Biodiversity 2011-2020, including by establishing coordination centres, assessing the level of public awareness, and paying special attention to access to genetic resources and public awareness about the Nagoya Protocol of benefit sharing.

Georgia implements CEPA activities in the framework of the CBD and of other conventions in the field of biodiversity to which it is a party. Resolutions VII.9, VIII.31 and X8 of the Ramsar Convention on Wetlands requires the parties to the convention to consider CEPA as a key instrument for

implementing the convention, to develop specific strategies and to include relevant measures into wetland protection and preservation plans. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) requires administrative bodies to ensure broad public awareness about the requirements of the convention. Decisions and conservation plans made for species listed in CITES and the Convention on the Conservation of Migratory Species of Wild Animals (CMS) also include guidance on raising public awareness. The Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea against Pollution obliges parties to inform the public about the biodiversity of the Black Sea, its conservation and protected areas, to include interested parties and public into the activities of the protected areas, species and landscape protection and assessment of the environment impact, and to include Black Sea biodiversity issues in educational programmes.

Georgia's first National Biodiversity Strategy and Action Plan recognised public awareness-raising and involving the public in decision making as a strategic issue.

The low level of awareness of the Georgian public and decision-makers of the value of biodiversity and the importance of conserving biodiversity is one of the main underlying causes of biodiversity loss.

2. Access to information related to the Biodiversity issues

2.1. The legislative framework

The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) entered into force for Georgia in 2001. The 4th and 5th articles of the convention establish the obligation of state authorities to provide access to environmental information. According to the convention, environmental information includes information on landscapes and natural sites, biological diversity and the condition of its components, and information about genetically modified organisms. Under the convention public authorities are obliged to maintain and update environmental information related to their functions and to take steps to increase gradually the volume of environmental information in electronic databases. Information available in electronic form shall include a report, legislation, strategic and operational plans and programmes on the state of environment.

Georgian legislation does not define environmental information; however, the General Administrative Code of Georgia (1999) provides for public access to information and openness. Only an "official" document is considered as public information (i.e. documents kept in a public institution, and information received, processed, created or sent related to the public servant or the institution's activities). According to the General Administrative Code everyone has the right to request public information without having to give a reason. The code defines a public agency's rules for issuing public information, response times and information that may not be withheld on grounds of secrecy.

According to Article 49 of the General Administrative Code of Georgia on 10th of December of each year a public agency shall submit to the President and Parliament of Georgia a report on issuance of public information. In compliance with the requirements of the code the above-mentioned environmental report shall be prepared by the Ministry of the Public Relations. According to the 2011 report, the Ministry of Environment Protection received 151 applications during the year, of which a large proportion were related to biodiversity issues. The requested information was provided in 101 cases, and in 4 cases the decision was made in connection with the granting of partial information, under the Paragraph 2 of the Article 2 of the Clause 41 of Georgian Constitution and Chapter 2 of the General Administrative Code the applicant's request was refused. No disciplinary cases of violation of the requirements of the Administrative Code by public servants were recorded in the Ministry of Environment Protection in 2011.

"The principle of access to information" is established as a basic principle of environmental protection under the Georgian law "on Environmental Protection" (1996), i.e. information about the state of the environment shall be open and available to the public. The public is entitled to receive full, accurate and timely information on their working and living conditions (Article 6); the duty of the Ministry of Environment is to maintain and update environmental information and provide access to environmental information (Article 13).

In accordance with the President's Decree #389 of 25 June 1999 on "*The rule of creation of the national report on the state of the environment*" the Ministry for Environment Protection certifies a national report on the state of the environment every 3 years and causes it to be published in order to inform the public about the state of the environment. In accordance with this decree the ministry within its competence coordinates state accounting, reporting and evaluation of indicators of the qualitative and quantitative condition of the environment; this includes cadastre planning, statistics, inventory, mapping of natural resources and environmental condition (Article 26). The ministry carries out coordination of the national environmental monitoring system and makes the results available to the public (Article 27).

According to the Georgian law "on Management of the Forest Fund" forest monitoring and the creation of a database of the results of monitoring is the responsibility of the Agency of Natural Resources of the Ministry of Energy and Natural Resources.

Under the Georgian law "on Fauna" (1996), natural and legal entities are entitled to obtain timely, objective and comprehensive information from state authorities about animals and their living conditions. In addition, in order to ensure the protection of wild fauna and to monitor quantitative and qualitative changes in populations of wild fauna (including endangered species) the State should carry out accounting of fauna and maintain a State Cadastre of Fauna, which should be financed from the State budget (Article 59).

In accordance with the Forest Code of Georgia (1999) members of the public and public organizations have the right to obtain complete, objective and timely information about the condition of the State Forestry Fund (Article 35). Furthermore, the authorities responsible for managing the forestry fund should provide access to information (Article 36) and put information about forest areas selected for auction for long term use and wood resources designated for felling on an official website. The code includes provisions on the monitoring of the state forestry fund, which is defined as the system of state forestry fund assessment, the state of the dynamics of continuous observation, analysis and forecasting. The results of State forest monitoring should be submitted to the Georgian National Statistics Office (Article 25.)

According to the Georgian law "on "the Red List and Red Book of Georgia" (2003) physical and legal persons have the right to receive timely information concerning the Red List and Red Book, apply to the relevant authorities, promote endangered species protection, restoration and preservation of state and regional programmes, participate in discussions on the Red List and Red Book, and in accordance with the set rule request that decisions about the location, design, construction, reconstruction or maintenance of objects which may have a harmful influence on endangered, species be changed (Article 8). Any citizen may submit a proposal to add species to the Red List to the Ministry of Environment Protection or to the Endangered Species Committee (Article 17).

2.2. Tools for Collecting and Spreading of Information

2.2.1. National Biodiversity Monitoring System

The lack of information about the various components of biodiversity, the intensity of the threats and the effectiveness of actions prevents informed public participation in decision-making. Conversely, supplying timely and constantly updated information will help get the public to support biodiversity conservation activities.

The Biodiversity Protection Service of the Ministry of Environment Protection is coordinating the establishment of a national system of biodiversity monitoring. In 2009 the Minister of Environment Protection the 25 indicators state, pressure and response indicators (Order #293, May 22, 2009). The methodology of data collection and analysis for 16 out of the 25 indicators was approved by the Minister of Environment Protection in 2011 (Order #65 , December 20, 2011). According to that order collection and analysis of data should start gradually from January 2012. One response indicator is public awareness about biodiversity, measured by the change in public attitude to biodiversity; the indicator is to be assessed once every two years by means of community focus groups and survey/interviews. So far such surveys have not been conducted in Georgia (except in relation to public attitudes towards protected areas), so at the present we do not have a real picture of the importance of biodiversity and biodiversity conservation in the public's perception.

Detailed information about the formation of the national biodiversity monitoring system is placed on the website www.biomonitoring.moe.gov.ge. Information on the following indicators has already been uploaded to the website: agricultural land use intensity, genetically modified organisms, intensity of pasture use, impact of infrastructure on protected areas, total area of the protected areas network, protected areas managed by the qualified personnel on the basis of management plans, nature conversation zones.

2.2.2. Monitoring Biodiversity in Protected Areas

The official functions of the Agency for Protected Areas include organizing monitoring and scientific research, and processing, storing and distributing data about protected areas (Order of the Minister of Environment Protection #26 of July 1, 2011). Scientific research and monitoring is conducted by the agency and its territorial bodies, other public research institutions and non-governmental organizations, including in the framework of individual projects.

According to the Order of the Minister of Environment #27 of July 1, 2011 "on the typical territorial administrations arrangements of the Agency of Protected Areas", the agency's territorial administrations should conduct accounting and monitoring of the ecosystems and species, and activities permitted on the protected areas and should organise research activities. Based on the monitoring which they carry out, the territorial administrations are required to prepare the annual "chronicle of nature" and submission it to the agency along with other periodic reports. Important information obtained by the administrations is periodically placed on the agency's website. The agency also produces annual reports, which include each area of the agency's activities; the reports are sent to various government bodies. The "chronicles of nature" and the annual reports of the agency are public; interested parties may obtain them by applying to the agency.

2.2.3. National Report on State of Environment

According to the law "on Environmental Protection" as amended in 2011, the MoEP prepares a national report on the state of environment once every three years (before 2011 the ministry the law required the ministry to prepare the report annually). The report covers the following issues: species, ecosystems and habitats, and the NBSAP. The national reports of the 2001, 2002, 2003, 2004 and 2005 are on the Aarhus Centre website. The 2006 report has not been approved yet and therefore has not been published. These earlier national reports have a more descriptive character and internationally agreed indicators were not used during their preparation.

The national report on the state of environment for the period 2007-2009 years was adopted in 2010[25]. During the making of this last national report the state of the environment was assessed based on indicators recommended in the UNECE manual which was recommended for Central Europe, Caucasus and Central Asia by the "Environment for Europe" Ministerial Conference in

[25] National Report on the State of the Environment of Georgia 2007-2009, adopted by the Order of the President of Georgia December 2010 "On approval of the 2007-2009 National Report on the State of the Environment of Georgia".

Belgrade (2007). It was difficult to apply the recommended indicators due to the absence of a national monitoring system and quantitative data on the condition of the individual species and ecosystems.

2.2.4. Statistical Data

The National Statistics Office of Georgia places on their website[26] annually the publication "Georgian Natural Resources and Environmental Protection". This publication includes information on forest resources, forest fires, forest restoration, afforestation, promoting natural regeneration of forest, the volume of wood felled, illegal logging, protected areas, protected animals in protected areas, expenditure on managing protecting areas. The data for the annual report are provided to the National Statistics Office by the Natural Resources Agency of the Ministry of Energy and Natural Resources and Agency for Protected Areas.

Statistical data prepared by the Agency for Protected Areas is compiled from information submitted by the agency's territorial administrations and central office. It is the responsibility of the scientific experts of the agency's territorial administrations to assist research and monitoring activities carried out by experts from other institutions. However, reliability of the data submitted by the territorial administrations is low because they lack the capacity to carry out full and regular accounting: there is a lack of qualified personnel, appropriate infrastructure and a lack of funding for monitoring and research.

In 2011, as a result of reorganization, responsibility for monitoring forest resources was transferred from the Ministry of Environment Protection to the Natural Resources Agency of the Ministry of Energy and Natural Resources. According to the Order #1 of the 18th of March, 2011 of the Minister of Energy and Natural Resources the functions of the Natural Resources Agency include monitoring the forest fund, processing the obtained information, accounting and analysis. However, despite the reforms, it has not been possible to carry out a complete inventory of the country's forest resources: current policy is that inventory should be carried out by the long-term license holders, but the areas issued under license include only part of the forest fund.

2.2.5. Biodiversity Resource Centre of Georgia

Article 18.3 of the CBD establishes a Clearing-House Mechanism (CHM), the aim of which is to promote effective performance of the convention by means of an information service, technical co-operation and sharing knowledge. The CHM consists of the website of the Convention and the network of national resource-centres. The Biodiversity Resource Centre in Georgia (www.chm.moe.gov.ge) was established with the help of the GEF, UNDP and German Government. The resource-centre is not included in the international network yet. The website providesinformation about Georgian biodiversity (species and habitats), threats, legislation, international obligations, red list species, use of natural resources, organizations and other issues related to the biodiversity. The information on the website needs continuous updating and needs to be connected to the international portal of the CBD.

2.2.6. Aarhus Centre

By the mutual initiative of the Organization for Security and Cooperation in Europe (OSCE) and the Ministry of Environment and Natural Resources of Georgia, the Aarhus Centre was created in Georgia in 2005. The centre makes environmental information available to the public by means of a regularly updated website (http://aarhus.ge/index.php?lang=geo&page=17) and environmental library and by organizing various informational events. On the website are placed environmental and biodiversity protection legislation, strategic documents, and documents for public consultations; also reports prepared in the framework of various projects.

[26] http://www.geostat.ge

2.2.7. Websites, Publications, Information and Awareness Raising Campaigns

Information on the website of the Agency of Protected Areas (http://www.apa.gov.ge) includes details about on-going activities of the agency and its territorial administrations. There is an interactive map of Georgia's protected areas on the site.

The website www.biodiversity-georgia.net made by the initiative of the Ilia State University includes a list of the species recorded on the territory of Georgia, information about their conditions, photographs, and maps. The aim of the website is to introduce Georgia's biodiversity to the international scientific community. Information is being put onto the site gradually.

Information about Georgian Red List species is placed on the official website of the MoEP and National Red ListCommission[27]. Information about some, but not all, Red List Species is on the website.

Besides the above-mentioned websites government and non-government organizations use the electronic distribution networks of the Regional Environment Centre for the Caucasus (RECC) and the Caucasus Environmental NGO Network (CENN) to disseminate information related to biodiversity conservation. The community "Georgian Biodiversity" has its own page on the social network Facebook.

Awareness-raising campaigns aimed at schoolchildren and their teachers have been initiated by the Biodiversity Protection Service of the MoEP. "Garden Birds' Hour" has been taking place since 2009 to celebrate International Biodiversity Day (May 22); the activity includes 7,000 pupils from 358 schools in Georgia. A campaign about Georgian Red List Species was launched in 2010 and included 250 public schools. These campaigns are conducted with the support of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Centre for International Migration and Development (CIM) within the framework of the Sustainable Management of Biodiversity South Caucasus – Georgia project funded by BMZ. The same project regularly publishes "Bio-topics" – information and news about biodiversity and biodiversity conservation in Georgia. It is important to sustain and extend these communication activities.

NGOs play an important role in raising public awareness in Georgia. Key actors in this regard are WWF CauPO, CENN, REC-Caucasus, NACRES, the Georgia Greens, ECOVISION; these and other NGOs carry out public awareness campaigns and other activities in the field of biodiversity protection and conservation at local and national levels.

One of the strategic directions the CEPF's programme in the Caucasus biodiversity hotspot in 2005-2010 was raising the awareness of decision-makers, and getting public and private sector support for biodiversity conservation. The programme supported the publication of "Beautiful Georgia" magazine, there was short documentary film "Mountain Goat's Return", he book "Caucasus - Treasure of Nature" was published. Newspaper articles, digests, radio broadcasts, advertising spots, exhibitions and calendars were made in the framework of the programme. The CEPF also supported an interesting initiative in Georgia that was aimed at developing cooperation between local government bodies and journalists: within the project networks of journalist were set up in two regions of Georgia; trainings were conducted for journalists and local authorities; consultations for journalists in interested environment topics were conducted by REC-Caucasus. Altogether 11 trainings were conducted in which 120 journalists, 40 representatives of local government and 45 NGO representatives from Georgia and Azerbaijan participated; two transnational media tours were organized.

Important measures are implemented for the popularization of protected areas. The Agency for Protected Areas organises meetings with people who live and work in or around protected areas in order to raise awareness in the local community; the agency also conducts workshops for various

[27] http://red-list.ge

target groups, trainings, conferences, eco-tours, eco-camps and media tours. Special environmental days are also celebrated and the agency organises contests for high school students; in 2011 a contest relating to the International Day of Biodiversity was held and the winner was awarded with an eco-tour to one of the protected areas. "Information corners" about protected areas have been opened in several educational institutions. Printed materials about protected areas are published from time to time, and they are distributed free of charge by the agency; the agency also produces souvenirs such as hats and tee-shirts. In 2011 about 70,000 people participated in eco-educational activities organised the agency and its territorial administrations, 1.5 times higher than in 2010.

The Agency for Protected Areas carries out an annual survey of the perceptions of people living in villages adjacent to protected areas. According to the results of the survey, public perception of the importance of protected areas and the proportion of respondents with a positive attitude towatds protected areas has increased steadily since 2009. Respondents said that the development of guest houses and traditional activities have helped to improve their living standards. The agency is also developing special programmes for local schools in order to involve the people who live in and around protected areas in environmental activities. In 2010 IUCN prepared a "young rangers programme" in which environmental awareness-raising activities were conducted for students; tours were also conducted. A documentary about Georgia's protected areas was broadcast on a national television channel.

Information about Georgia's protected areas, the biodiversity of protected areas, eco-tourism services provided in protected areas, on-going projects and other activities is provided on the Agency for Protected Areas' web site (www.apa.gov.ge). The site includes an interactive map. The agency has its own page on Facebook - "Agency of Protected Areas (Georgia)".

2.3. Revealed Problems

1) Environmental information is not legally defined in Georgia; nor are the types of information in the field of biodiversity conservation and of natural resourceswhich should be available to the public and relevant government agencies, including in electronic form, are not defined. It is recommended to define information in the field of biodiversity protection and use of the biological resources which should be available to the public; also to determine the objectives of data collection, processing and storage. Since responsibility for biodiversity protection and use of biological resources rests with two different ministries (the MoEP and the MoENR), the actions of the those minsitries in the field of information gathering and dissemination needs to be coordinated.

2) Knowledge and experience in the MoEP and the MoENR of creating and using GIS-based data storage and retrieval systems is very limited.

3) The Biodiversity Protection Service of the MoEP does not have sufficient human resources and qualified personnel to be able to plan and implement targeted information/awareness-raising campaigns and to assess their effectiveness. Currently the service is supported by the project "Sustainable Management of Biodiversity – South Caucasus", which is being implemented by GIZ. However, it is important that the service will be able to plan and implement public awareness-raising activities. The service should develop an appropriate concept of public awareness and a strategy and action plan to raise awareness, and to implement the action plan in cooperation with the public relations department of the MoEP.

4) Social surveys and special studies to determine public awareness for the purposes of more effective communication planning have not been conducted. Social networks could be used for this purpose.

5) The level of awareness of representatives of the business sector (even those whose activities are directly related to the use of biological resources, which have licenses for fishing,

timber harvesting, and owners of hunting farms) towards biodiversity protection and conservation issues is low. It would be good to implement trainings and information/awareness-raising campaigns for the above-mentioned target groups.

6) Awareness of the urgency and importance of biodiversity conservation among decision-makers is low (one example which illustrates this point is that recent legislative changes in Georgia made it legal to hunt "Red List" species. Special educational and awareness-raising campaigns need to be conducted for this target group.

7) In spite of the positive results from the awareness-raising activities that have been carried out during the last several years, some experts evaluate the existing tendency very negatively; i.e. it appears that biodiversity conservation has much less priority in Georgia now than in the past and public awareness of the importance of biodiversity remains for low (illustrated by the continuing high level of poaching. For this reason better focused and long term communication programmes need to be implemented. General education programmes may be more effective taking into account their repeated and wide-ranging nature (for example, school teachers' trainings, development of materials for long-term use).

8) The protection and conservation of biodiversity and socio-economic consequences of losing biodiversity is not an important issue for the media, in spite of the activities of recent projects to increase environmental journalism. Georgian TV channels rarely show popularised scientific films in the Georgian language. Documentary films about Georgia's biodiversity and its importance are shown very rarely (they are broadcast mainly on the "Ertsulovneba" channel). Protection and conservation of biodiversity has never been a popular theme in talk shows.

9) Environmental protection issues are of low importance for local authorities; in fact there is no information at local government level about the importance of maintaining biodiversity and there are no incentives for local authorities to make information available.

3. Public participation in decision-making processes related to biodiversity issues

3.1. The legislative framework and mechanisms to implement the laws

The Aarhus Convention provides that the public have the right to participate in decision-making in matters related to the environment and that parties to the convention shall establish mechanisms to enable the public to exercise that right.

The law of Georgia "on Environmental Protection" establishes public participation in decision-making as a basic principle: according to article 6 the public have the right to participate in the discussion of important decisions related to environment protection and in the decision-making process.

Georgian legislation does not provide for public participation procedures in preliminary discussions of draft legislation, programmes or strategies that could affect biodiversity. Ministries put draft version of documents related to the use of natural resources on their websites. Bills submitted to the Parliament for consideration are put on the Aarhus Centre website.

At the end of 2011, the Government issued some normative acts allowing the hunting of animals that are in Red List. NGOs believe that hunting of Red List species should not be allowed in the absence of proper control mechanisms, monitoring, measures to combat poaching, animal protection and propagation in the territories where hunting is allowed. Hunting of some species should not be allowed at all, due to their current status. Pressure from local communities helped to maintain a ban on in state reserves and national parks and in a 500 metre zone around them.

During interviews with representatives of various non-governmental organizations a number of people stressed that the one positive result of the transfer of responsibility for managing forest resources from the MoEP to the MoENR was the readiness of the MoENR to hold individual consultations and public discussions and often to initiate such meetings. However there are still weakness with consultation procedures; one example concerns the process of drafting a new Forest Code and standardlease agreement for forests. These documents were originally published in English, which was a major impediment for interested parties. Following a request from the public the draft Forest Code was translated into Georgian, but the lease agreement was not. The public's demands for the Forest Code to reflect environmental permitting procedures within the forest management process was reflected in the draft interim working version; however, in the final version presented to the NGO sector representatives the issue was not reflected in a form acceptable to the NGOs. Despite the government's plans to make the process go faster, consideration of the draft Forest Code by the parliament and long term leasing of forests are on hold pending a review.

Some problems remain in terms of providing public information to stakeholders. NGOs have discovered instances where the MoENR answered requests for information with only a verbal response and failed to provide full information in written form.

Experts consulted for the purpose of this situation analysis believe it is necessary to identify all possible stakeholders, to conduct a stakeholder analysis, and to involve each stakeholder in the decision-making process in order to be able to take into account the opinions of all parties and in accordance with proper planning and better decision-making processes.

The above information presents only a few examples of the government's response to the public's opinions; however, the picture overall shows that it is necessary to strengthen the cooperation between the government and non-governmental organisations in order to increase the importance given to biodiversity conversation and sustainable development principles in decision-making.

Public involvement in the issuance of individual normative acts by the executive authorities is regulated by the "General Administrative Code", according to which an administrative body must put the draft version of a legal act on its web site and allow 20 days for the submission of comments by the public.

Public participation in process of deciding approvals of management plans related to the using of biological resources is provided for in various normative acts:

According to the Order#163 of August 19, 2011 of the Minister of Energy and Natural Resources "on the development of management plans for internal reservoirs and fishery activities and rules on for their approval", management plans for internal reservoir and fish farms (prepared by the fishing license owner) must be placed on the official website of the Natural Resources Agency, after which interested persons shall be entitled to submit comments and suggestions to the agency related to the plans within a period of 15 calendar days. After consultation period has expired the agency conducts a review of the plan with interested people and the developers of the plan. In accordance with any recommendations arising from the review (if there are any) the agency certifies the management plan within 30 calendar days after its submission or, within the same term, returns the recommendations to the license holder, who must then resubmit the management plan within 3 months taking into account the recommendations made by the agency.

Order#16 of April 22, 2010 of the Minister of Environment Protection and Natural Resources "on the development of hunting-farm management plans and rule of their approval" regulates the approval of hunting farm licences. However, procedures defined by this normative act are implemented by the Agency of Natural Resources[28]. A draft of the management plan for a hunting farm (which is prepared by the holder of the hunting license) is placed on official website of the Agency of Natural

[28] The draft of the resolution of the Minister of Energy and Natural Resources is prepared, it will soon replace the Order #16 of April 22, 2010 of the Ministry of Environment And Natural Resources about the "Hunting management plan development and its approval".

Resources. Interested persons can submit recommendations and suggestions related to the management plan within 20 days, after which the agency holds a public discussion on the plan. In the next step the agency approves the plan or returns it to the license holder for revision together with recommendations.

According to information provided by the Biodiversity Protection Service of the MoEP and the Agency of Natural Resources there have been cases in which members of the public participated in discussions on management plans. The reasons for this are as follows:

- Information to the effect a management plan has been uploaded to the website is not made available;
- Deadlines for submission of comments from interested parties are a short;
- Information posted on the website is not available in the municipalities in which the hunting-farm or the internal reservoir is located (people in such areas generally do not have access to the internet).
- Public discussions on management plans are held in Tbilisi and local people cannot participate because it is expensive and time-consuming for them to travel.

Approval of forest management plans is regulated by Order # 672 of September 26, 2008 of the Minister of Environment Protection and Natural Resources "on the development forestry management plans and rules of their approval". Procedures defined by this normative act are now implemented by the Ministry for Energy and Natural Resources. Forest management plans submitted by licence holders are placed on the MoENR's web site. Interested persons can submit recommendations and suggestions related to the management plans within 30 days. The ministry then conducts a publicl discussion of the plan with interested people and the plan's developers. The ministry may then approve the plan or return if the developer for revision and resubmission.

From 2009 up to the present 39 public hearings of forest management plans have been conducted. Eight of the hearings were attended by representatives of the ministry, license holders and authors of the management plans, also representatives of NGOs and scientific institutions (Green Alternatives, the Greens Movement of Georgia, the Foundation "Caucasus Environment", Association "ELKANA", WWF Caucasus Programme Office, University of Agriculture, Kanchaveli Institute of Plant Protection, and others). On the basis of the results of the abovementioned public hearings seven management plans were returned to their authors for revision and one was rejected[29].

In accordance with Article 14 of the CBD, the parties to the convention should provide for public participation in the environmental assessment of projects which may cause adverse impacts on biodiversity. The obligation is transposed into Georgian legislation in the law "on the Environmental Impact Permit" (2007). According to the law public participation in the decision-making process is a necessary part of the procedure on Environmental Impact Assessment. According to the regulation "on Environmental Impact Assessment" (approved by the Minister of Environment Protection and Natural Resources, March 9, 2009, Order #8) in order to obtain a permit for certain types of development the developer should submit an environmental impact assessment (EIA) and other documents together with the results of public participation, indicating major points of disagreement. In accordance with Article 6 of the Law, the developer is obliged to arrange a public hearing before submitting the EIA to the responsible administrative authority. Information about the planned activities is required to be published in the national gazette and in the gazette of the regional/local administration where the activities are planned. Information about the planned activities includes:

- The objectives of the planned activities, their name and location;

[29] The letter to "EcoVision" issued on March 14, 2012 of the Agency of Natural Resources of the Ministry of Energy and Natural Resources of Georgia.

- Address where members of the public will be able to see documents related to the planned activities (including EIA reports);
- Deadline for submitting comments;
- Time and place for the arrangement of the public hearing.

Within 45 days after publication of the information about the planned activities the developer must review comments and proposals which the public submits in written form. Not earlier than 50 and not later than 60 days after publication of the information about the planned activities, the developer arranges the public hearing of the EIA reports. The information in the EIA report is public, except for any part for which a statement of confidentiality has been recorded.The public hearing is held in the centre of the administrative unit where activities are planned. Any member of the public the has right to attend the EIA's report public hearing. The final version of the EIA report is prepared taken into account all comments submitted in written form. If the developer disregards any comments he must provide a written explanation to the author of the comment.

EIA reports and relevant information about EIA public hearings are required to be posted on the web sites of the MoEP and the Aarhus Centre.

Under Georgian legislation EIA is required only for activities specified in the law "on Environmental Impact Permit". The list of activities does not include a range of activities which are indicated in the Aarhus Convention. In addition, under the Georgian law "on Environmental Impact Permit" it is possible to release an activity from requirement for an EIA if the common national interest requires that the activity is implemented without undue delay (Article 11); in this case the public is no longer part of the decision-making process.

Environmental NGOs (CENN, "Green Alternative") have carried out studies in order to improve the efficiency of the EIA system; they are actively participating in the process of reviewing EIA reports and are monitoring the implementation of established procedures. "Alternative analysis - Implementation of Aarhus Convention in Georgia" (2011) - developed by "Green Alternative" is noteable in this regard.

The Aarhus Centre monitors public participation in EIA and the decision-making process Since 2007 onwards observer reports about public participation in the EIA and the decision-making process have been posted on the Aarhus Centre web site. The last (the 2011) report is related to the barriers to public participation; the report found the main barriers to be:

- Legislative gaps;
- Lack of political will;
- Lack of financial resources;
- Mutual distrust;
- Low public awareness;
- Low environmental awareness of the developer.

Under the Georgian law "on the Protected Areas System" (1996) the public has the right to participate: in the processes of establishing protected areas, increasing and reducing their size, and cancelling them; in the elaboration of protected area management plans; in the elaboration of regulations governing the management and use of protected areas; in protected area management activities (Article 22). Under the requirements of Article 21 of the same law and by the order issued on July 1, 2011 by the Minister of Environment Protection approving the typical structure and functions of the territorial administrations of the Agency for Protected Areas, scientific-advisory councils are created as a mechanism for cooperation between territorial administrations and local authorities.

In order to involve the population and to improve the management of protected areas, "friends associations" have been established for Tusheti, Vashlovani and Lagodekhi protected areas. The functions of the friends associations is to promote the protected areas which the serve, raise funds, and carry out communication, education and public awareness activities. Membership of the friends associations include representatives of the local community, government, NGOs and the business sector.

Tusheti and Vashlovani friends associations are implementing "community communication strategies and action plans" designed by FFI/NACRES in the framework of the EU-funded Georgian Carnivore Conservation Project. In 2011 Tusheti Friends Association implemented a sustainable pasture use project in cooperation with the village of Chigho and received a grant from the Open Society Foundation to perform eco-educational activities, including eco-camps where students were trained to conduct special trainings for school students about the protected areas. Also in 2011 Vashlovani Friends Association received a grant from the Eurasia Partnership Foundation for the rehabilitation of the Colchian pheasant.

The protected areas' administrations conduct an annual survey of the attitudes and perceptions of the local population in the following directions:

- Awareness of protected areas;
- Public fear and expectations towards the protected areas;
- Social profit and loss due to protected areas;
- Participation in planning and implementing management activities.

3.2. Revealed Problems

1) Georgian legislation does not establish an obligation to provide for public participation in the development of legislative, political and strategic planning documents. Although in some cases these documents are published in draft version for public hearings, this is largely due to pressure from NGOs and donors. Consultations generally have the character of a formal procedure and have rarely been a real influence on the decision maker.

2) Existing legislation does not provide for participation of the public in forestry, hunting farms and fisheries management planning hearings. The time periods are very short and the legislation does not require that the public hearing be conducted at the local level with the participation of local authorities, local communities and NGOs.

3) Public interest in public hearings is still very low; in fact, the public generally does not influence the decision-making process due, on the one hand to the public's low awareness, lack of knowledge and relevant experience, and, on the other hand, to the fact that public participation is not understood by decision makers as a possible tool for optimal decision making. In some cases the developer is not able to explain matters properly to the public or to organize public hearings. Social and economic conditions also play an important role: generally the public give them higher priority than environmental protection and biodiversity conservation; because of that, in most cases the public are interested in the project only for employment.

4. Biodiversity education and public awareness

4.1. Legislative and Strategic Framework

Georgia has a long tradition of supporting environmental education, exemplified by the country's hosting of the world's first intergovernmental conference on environmental education organized by UNESCO/UNEP was held in Tbilisi in 2007. However, the policies determining the practical instruments to be implemented to this end varied through years in accordance with the political and

socio-economic changes taking place in the country and relative priority the governments in office gave to the environmental issues.

According to Georgian law environmental and ecological education, and awareness-raising in this direction as a civil right. The law "on Environmental Protection" defines the role of environmental education and calls for the creation of a unified environmental education system including a network of academic institutions and life-long training opportunities, thus ensuring continuing environmental education at pre-school, general, vocational and higher education levels (section III, articles 8 and 9). The "Forest Code" identifies "ecological education" among the functions of local self-governance bodies. Moreover, in accordance with the law "on the Red List" the Ministry of Education and Science of Georgia has the power to "develop, publish and distribute an adapted version of the "Red List of Georgia" for preschool and primary school children in agreement with the Georgian Academy of Sciences and the Ministry of Environment Protection of Georgia" (Chapter VI, Clause 21.7)

Despite the fact, that none of the country's overall strategic documents – "Basic Data and Directions" (in which the policy orientations of the Government of Georgia for the relevant time-span are set out) - mentions environmental education and public awareness raising as a priorities or as activities under any of the priorities, environmental education is still allocated its due focus within sector specific documents (NEAP-2 2011-2016, NBSAP-1, Preschool Standards, National Curriculum 2011-2016) and a considerable number of specific actions have been implemented by the government and NGOs to enhance the profile of environmental education in formal settings and to build the capacities of various target groups through training programmes, seminars and media coverage among other things.

More importantly, the MoEP in partnership with the Ministry of Education and Science of Georgia is developing a "Strategy and Action Plan of Education for Sustainable Development of Georgia". The document is comprehensive covering formal as well as non-formal/informal education channels and different target groups and will provide a framework for environmental education in Georgia.

4.2. Existing Biodiversity Education and Awareness Raising Instruments

4.2.1. Formal Biodiversity Education

Institutionally **education at preschool level** is administered by local governance bodies in Georgia. However, the Ministry of Education and Science of Georgia in 2010 established "Learning and Development Standards" that can be followed by kindergartens. The standards were developed by the National Curriculum and Assessment Centre with the support of UNICEF and represents a set of learning and development outcomes in five areas (namely, health and physical development, cognitive development and general knowledge, attitudes towards learning, speech development and social-emotional development) for age-groups of 0-1, 1-3, 3-5, 5-6. The standards have a strong focus on environmental issues and include outcomes conducive to developing environmental awareness and a positive attitude towards environment in children.[30] Most of the topics aimed at environmental awareness in children fall under the "cognitive development and general knowledge" section of the standards, one of the subtopics of which (namely "Nature and technology,") is oriented at children's abilities "to learn about the physical environment and observe, investigate and test processes that have visible outcomes." [31]

Environmental education (ore exactly "knowledge of potential harms to and ways to protect and preserve natural habitats" is one of the national goals for **general education** in Georgia

[30] "by learning about the environment children get information about e.g. earth and living nature" and through development of analytical and critical thinking the children are helped to use this knowledge in practice." (Preschool learning and development standards, 2010 Georgia).

[31] ISBN 978-9941-0-1521-2 © National curriculum and assessment center. 2011

(Governmental Decree No.84 of October 18, 2004 "on Approving **National Goals** of General Education"). As the document states "adolescents should know what natural habitat/environment they live in, what potential harm people may inflict on environment by their actions and how to preserve and protect natural habitats / the environment".

Environmental education (and, in particular, biodiversity education), as might be expected, is not identified as a separate subject block in the national curriculum (the current "National Curriculum 2011-2016" was adopted in 2011). The curriculum specifies learning outcomes related to environmental/biodiversity education in transparent priority competencies and integrated in an inter-disciplinary manner and embedded in specific subjects at all three levels: primary, basic and general education.

The national curriculum identifies nine priority competencies that are integrated in different subjects taught at the general education level and is aligned with "National Goals of General Education and Demand from the Society" and possession of which is decisive for "self-realization and finding one's place in the modern world." "Ecological literacy" is one of the above-mentioned transparent priorities. Ecological literacy means developing a healthy attitude in people towards the environment, and that pupils should understand their personal responsibilities in relation to current phenomena and be able to participate in their protection and restoration."[32]

Apart from transparent competencies, environmental teaching and learning is mainly consolidated in two blocks of subjects: natural and social sciences. Within the natural sciences block (nature studies, basics of biological sciences, biology, chemistry, physics) nature studies has seven major directions: living world (basics of biology), earth and cosmos (geography and astronomy), man and environment (basics of civic education), objects and phenomena (physics and chemistry), scientific research (research skills), physical phenomena (basics of physics), chemical phenomena (basics of chemistry). The first three directions include topics related to biodiversity, potential risks to biodiversity and biodiversity protection. Out of 11 major directions in the social sciences block (our Georgia, geography, civic education, emergency safety, etc) three cover learning outcomes related to biodiversity. Among some expected changes in the national curriculum is the addition of three new elective subjects: "environment and sustainable development," "conservation biology" and "monitoring of natural monuments".

The process of developing the national curriculum was highly participatory process and involved experts from the field, academia and pedagogical backgrounds, and thus should reflect well the subject specific expertise and up-to-date scientific knowledge and advances. However, in relation to the biodiversity conservation content of the curriculum there are problems associated with textbooks and internet accessibility: a) the existing textbooks are not sufficient to provide the students with broad subject knowledge and there is still lack of additional teaching materials in many subjects (this is especially true of elective subjects); bsides, despite the existing quality management mechanisms, the information within the books is sparse and sometimes there are even factual discrepancies; b) despite the facts that most schools throughout Georgia are connected to the internet and the Ministry of Education and Science provides intensive IT training to secondary school teachers, not all teachers have enough internet access and IT skills to take full advantage of internet resources and digital professional development opportunities.

The key role in the transferring adequate knowledge and developing skills lies with **teachers**, who can creating a conducive teaching and learning environment in the classroom and be mediators in the transfer of knowledge and the development of relevant skills, values and attitudes. The proper professional development of teachers is therefore of high importance. Teacher turn over in Georgian educational system is not high (which can be taken as a positive sign); attention should be paid to in-

[32] National Curriculum 2011-2016, Chapter VIII. Article 48.

service retraining of employed teachers (and of course proper pre-service training of future teachers).

In line with the educational reforms that have been taking place in Georgia since 2003 the professional development of teachers was high on the agenda. Under the aegis of the reforms teacher professional standards were developed (detailed guidelines are also being prepared) and trainings, both subject specific and teaching methodology related, have been offered to teachers[33].

The reforms of the education system also envisage teacher certification as an additional means of quality management in general education. Teachers have to take at least two certification exams: professional abilities and subject exams. The process started in 2010 and is voluntary up to the 2014[34]. However, teachers of social and natural sciences, as well as primary school teachers were offered the subject specific exams only in 2011. In 2012 teachers of natural sciences will be able to sit exams in the experimental part of the subject. As at January 2012 only a small number of natural and social science teachers had passed the exams and consequently been certified (see Table 6.1).

Table 6.1: Teacher certification statistics

Exam	Total number of teachers teaching the subject	Number registered for the exams	Papers Assessed	Number who passed the minimum Barrier	Number certified	Percentage certified
Civic Education	2,704	199	157	67	46	1.7%
Physics	2,784	518	413	36	28	1%
Chemistry	2,352	627	521	226	146	6%
Geography	2,882	712	609	233	116	4%
Biology	3,511	793	647	347	228	6.5%
Primary School (I-IV)	9,148[35]	3,654	3,014	855	606	6.6%
Professional abilities	69,165	20,738	18,263	5,655	3,229	4.7%

Source: NAEC, 2012

Apart from the Ministry of Education and Science of Georgia (with its agencies) probably the second most important actor in teacher awareness-raising with regards to biodiversity conservation and protected areas is the Ministry of Environment Protection (and its Agency for Protected Areas Biodiversity Protection Service). Primary targets within the ministry's campaigns have been biology and geography teachers. So far the coverage is not very comprehensive (approx. 120 and 500 teachers respectively) but the ministry plans to carry out further work in this regard in the coming

[33] Since 2011, in service training provision is centralized and are offered free of charge (1st round of each exam) to all acting teachers as well as inductees, as compared to decentralized provision of the previous two years, where teachers were granted stated funded vouchers to take trainings from any accredited provider operating on the market.

[34] The process of certification started in 2010 with the exams for Georgian Language and Literature, foreign languages and Maths teachers as well as exams in professional abilities. So far up to 20000 teachers (almost a third) have undertaken trainings and passed certification exams in one or 2 subjects and take the increased salaries. Exra-incentives are offered to those passing exams in foreign languages and computer skills besides passing the abovementioned two obligatory exams, as well as for additional exams (e.g. experimental part of science teaching). Those within top 25% of the certified teachers are offered additional salary bonuses.

[35] There are 23147 primary school teachers altogether in Georgia, the figure in the table represents the number of teachers in biological sciences at primary level.

years. The aim of the activities is to raise the awareness of school teachers and pupils about Georgia's protected areas, biodiversity and species that are on the verge of extinction.

In spite of a number of important institutional achievements in teacher professional development resulting from the educational reforms of recent years, experts speak of certain systemic inadequacies. Pproblems persist with the low intake of qualified people in the profession, low salary perspectives, still unmet need for extra in-service training for teachers (especially those with no relevant academic background)[36] and uncovered additional costs of the trainings for teachers (trainings are offered free, but the costs are still high for teachers who have to invest time and money in their trip to training facilities). With the certification process still under way school management is unable to make administrative decisions to replace unqualified teachers with more qualified counterparts (i.e. new university graduates that have passed through the induction phase and passed the certification exams). The cost of entering the profession is high compared to the prospective benefits (the induction service for new university graduates is not paid).

The inadequacies with teaching and especially teaching of natural sciences can be also related to a lack of **modern teaching aids and equipment** in school classrooms. The Ministry of Education and Science is tackling this problem by investing in school electronic infrastructure (computer labs, smart boards, etc). The "Einstein" project, apart from provision of equipment, envisages complimentary training of school staff in using and maintaining equipment. However, the scope of the activities again is smaller than the existing needs.

There are up to 11 institutions all over Georgia offering different levels of **vocational and higher education** (professional IV and V levels, bachelor's degree, master's degree, PhD) in subject areas related to biodiversity and environmental protection. The number of such institutions has fallen since 2005, which is expected and normal considering the consolidation process during the higher education reforms that decreased the number of uncompetitive institutions[37].

Curriculum development at Georgian higher educational institutions is fully under the responsibility of the institutions themselves, in accordance with the principle of academic freedom. However, programmes offered by the institutions have to comply with the minimum standards defined by the National Qualifications Framework (NQF)[38].

Table 6.2 below shows the profile of biodiversity teaching at post-secondary level at Georgian universities and colleges for the academic years 2010-2011 and 2011-2012 (the spectrum and number of programmes may vary year by year). The table contains the programmes that have at least one module related to biodiversity as a core module. Since higher education programmes at any level contain elective modules, students have relative freedom to choose any of the biodiversity modules at their will.

36 The ministry of Education and Science of Georgia plans for more Teacher Houses throughout Georgia to increase the capacity of teacher training provision and of longer (60 credits) training courses to meet the skills demand of the teachers.

[37] Within the framework of higher education reforms external quality assurance mechanisms – licensing (later replaced by authorization) and accreditation – were introduced. The mechanisms forced institutions that were not competitive enough and that did not have adequate resources for teaching (and research) in terms of infrastructure and faculty to either merge with other universities or close. As a result the number of HEIs decreased from 240 in 1990s to 47 by 2011.

[38] The documents were developed under the aegis of the National Centre for Education Quality Enhancement and adopted recently by the Ministry of Education and Science. These are minimum requirements with which programmes have to comply with. Apart from this, the structure of curricula and proportion of compulsory and elective subjects are defined by programme leaders within the HEIs. Most programmes have a modular and major/minor-based structure, except those for the regulated professions (medicine, law and education).

Table 6.2: Tertiary Environmental Education in Georgia

University	Programme Level			
	Vocational	Bachelor's	Master's	Doctoral
Tbilisi State University		• Biology • Applied BioSciences and BioTechnologies • Ecology • Natural Sciences	• Biology • Applied BioSciences	• Biology • Applied Ecology
Ilia University		• Biology • Ecology	• Teacher of Natural Sciences • Ecology • Bio Resources Management and Protection • Entomology	• Ecology • Animal Structures and Diagnosis • Entomology
Akaki Tsereteli State university	• Decorative Gardening • Horticulture • Wine growing	• Biology, Geography, Ecology • Applied BioSciences (Bio Technology) • Agroecology, forestry and agronomy • Agrotechnology, horticulture	• Agrotechnology of Subtropical Culture; • Agroecology; • Selection of Subtropical Species; • Landscape Design	• Doctoral program on biology
Shota Rustaveli State university	• PlantProtection Technician	• Biology • Ecology	• Biology	• Doctoral program on biology
Agricultural university of Georgia		• Forestry • Zootechnical • Agronomy • Applied Biosciences (biotechnology)	• Forestry • Agronomy • Applied Biosciences (biotechnology)	• Forestry • Agronomy

Telavi Iakob Gogebashvili State University	• Forestry (Forest Cutting, Taxator)	• Biology, Ecology, Georgraphy	• Environmental Studies • MicroBiology • Ecology • Biodiversity	• Protection of Life Nature • Biodiversity • Ecology
Technical University of Georgia	• Plant Protection Technician			
Sokhumi State University		• Ecology	• Applied Biology	• Ecology
Akhaltsikhe University	• Plant Protection Technician	• Ecology • Zootechnology		
Gori University		• Biology (1st year of teaching)		
Community College of decorative Gardening of Patriarchate of Georgia	• Decorative Gardening • Florist			
Vocational College "Horizon"	• Forestry			
Community College of Agrobusiness and Agroecology	• Decorative Gardening • Medical Herb Processing • Plant Protection Technician • Farmer • Environmental Technician			
Vocational College "Spektri"	• Environmental Technician • Decorative Gardening			
Community College "Aisi"	• Wine Growing			

Source: LELP EQE and respective websites of the universities

Experts think that the interest of students in sciences has increased after being given priority by the government. Table 6.3 below provides the 2005-2011 statistics of students studying at tertiary educational level. As the table shows, the number of students studying environmental programmes had been relatively steady during the years (not taking into consideration the year 2005, when enrolment in natural sciences was comparatively low). However, as the National Examinations and Assessment Centre explained, statistics in this case are a bit misleading since the figure for 2011 is not comparable to the previous years' figures. The reason for this is that the 2011 enrolment figures are shown by programmes whereas the figures for previous years are by faculty. Though not reflected by the statistics below, sector specialists (Ilia State university, TSU) speak about the increase of the number of students to natural sciences during 2011, which can be related to a new funding formula introduced by the government for the 2010-2011 and subsequent academic years.

Table 6.3: Student enrolment to natural sciences programmes by years

Year	Total enrolled	In Natural Sciences	% of total enrolled
2005	16,507	490	2.97%
2006	19,479	1,026	5.27%
2007	15,445	771	4.99%
2008	15,559	796	5.12%
2009	21,182	1,173	5.54%
2010	22,576	865	3.83%
2011	23,209	1,010	4.35%

Source: NAEC 2012

Positive changes under the higher education reforms include the integration of teaching and scientific research. Unlike the former Soviet-style universities, the new mandate stipulates that universities are places for both teaching and research. Under the reforms research institutions that operated under the Ministry of Education and Science were transferred to universities, a change that will enable students to be practically involved in research and improve the practical component of educational programmes. All the universities interviewed indicated that their students had opportunities to participate in research that is undertaken by the universities. For example, master's and doctoral students of Ilia State University have opportunities to be involved in research carried out by the Ecology and Zoology Institutes and the Entomology and Bio-control Research Centre[39].

[39] The research of the aforementioned institutes cover a number of biodiversity topics, namely:

1. Register and Inventory of Fauna in Adjara, 2009-2011, scientific manager: Alexandre Bukhnikashvili;
2. For the Rehabilitation of Highland Pastures: Mesofauna and Biodiversity, scientific manager: Mzia Kokhia;
3. Current State of Vertebrate Biodiversity in Highlands of Eastern Georgia (Greater Caucasus), 2010-2012, scientific manager: Alexandre Bukhnikashvili;
4. Hazardous Nematode Potato Diseases in Javakheti Highlands (Biodiversity of Nematode Population, Distribution of Pathogenetic Species), 2010-2011, scientific manager: Irakli Eliava
5. Current State of Vertebrate Fauna of the River Khrami and Upper Mtkvari Reservoirs (on the Territory of Georgia), Ways of its Degradation and Preservation Problems, 2008-2010, project manager: Alexandre Bukhnikashvili;
6. Study of Parasitology and Ecology of Fauna of Tbilisi Reservoirs and Waterside, 2008-2010, project manager: Lali Murvanidze;
7. Potato and Soil Nematodes in the Potato Production Regions of Eastern Georgia, 2008-2010, project manager: Irakli Eliava;
8. Study of Distribution of Specific Citrus Nematode, 2008-2010, project manager: Irakli Eliava;
9. Entomopathogenic Nematodes for Biocontrol, 2008-2010, project manager: Irakli Eliava;
10. Integrated Study of Hydrobiology of the Tbilisi Sea, 2008-2010, project manager: Bela Japoshvili;
11. Cariologic Study of Georgian Plant Lice (Hemiptera, Aphididae), 2010-2012, project manager: Nana Bakhtadze;

Cooperation between higher education institutions and business and this may result in a difficult transition from education to work for students and a comparatively loose connection between the skills and knowledge demanded by industry and those offered in educational programmes. The dialogue between enterprises in Georgia and the academic world is fairly weak, although 80% of HEIs report that they have cooperation agreements with private business. The main cooperation area is the employability of graduates and traineeships for students … Only 10% of universities cooperate with employers on curriculum design, and only six universities (all private) cooperate in the field of university management, inviting business representatives onto governing bodies (board trustees, boards of consultants).

However, the Agency for Protected Areas reported that it has signed MoUs with seven universities that work in the field of biodiversity and ecology. The MoUs envisage mutual scientific and educational cooperation within the framework of which the students and faculties of the universities are given opportunities to offer public lectures, use scientific libraries and arrange eco-camps on the territories protected areas or undertake scientific research there.

In addition, on 27 of May, 2011 the Ministry of Environment Protection signed an MoU with Tbilisi State University, Ilia University and NGOs working in the field of biodiversity (among them the Green Movement of Georgia, Green Alternative, Nacres, WWF, IUCN, Elkana, GCCW etc) stipulating cooperation in the sphere of bio-monitoring, exchange of information, and development and implementation of joint programmes and projects. The Ministry of Agriculture also indicated close cooperation with HEIs; in most cases cooperation was initiated by the HEIs themselves, but still this is a good sign of interchange of expertise between industry, research and academia.

Last but not least one more positive tendency in higher education is its openness to international partnership and mobility. Development of joint academic degree programmes is seen by the HEIs and the state as one of the most effective tools for programme quality enhancement and internationalization of Georgian higher education. There is no explicit policy to promote mobility of students from or to Georgia, although number of incoming and outgoing students is steadily increasing. The vast majority of Georgian students in higher education outside Georgia study in the USA, Germany and the UK, followed by other EU countries.

Recently the number of joint programmes between Georgian and foreign universities has increased considerably. Programmes developed in the framework of the EU's TEMPUS programme are the major part of the tendency (e.g.: Ilia State University programmes SALiS – "Student Active Learning in Science"; CIBELES – "Curriculum Invoking Bologna-aligned Education Leading to Reform in Environmental Studies" - partner Georgian universities are Ilia State University, I. Gogebashvili Telavi State University; Master's programme in Environmental and Climate Change Law - partner

12. Biochemical Adaptation to Environment of Some Invertebrates, 2010-2011, project manager: Nana Bakhtadze.
13. Ecology and conservation of big mammals
14. Quantitative ecology programme
14. Research of mountainous ecosystems
15. 2009-2011 - The invertebrate animals of Colchis National Park (coastal part), their biodiversity and population of the main habitats and ecosystems. GNSF-367
16. 2008-2010 - The biodiversity of Odonata, Hemiptera, Hymenoptera and Coleoptera in Borjom-Kharagauli National Park (GNSF Grant № GNSF/ST 07/6-236)
17. 2010-2011- Vitis pest Tetranychoid (Tetranychoidea) mites of Kakheti Region. GNSF-565
18. 2008 grant for a 3-year project from TUBITAK about: "Measurement of insect biodiversity and development of the protected strategies in Golcuk Natural Park in Isparta". Project Leader – Ref: B.02.1.TBT.0.06.03.11/AA-055, Project N107O743
19. 2007- present, Investigator in the DPT project (4 year): Ref: 2007K121320. Research and Rearing Center of Biological Control Agents (coordinator Prof. Dr. Ismail Karaca).
20. 2010–2013. Monitoring of the settlement of invertebrate animals on dumps and recultivated territories of manganese quarries. STCU-4875 (manager – M. Murvanidze).
21. 2010-2013. An ecological assessment of different forest types of Borjomi gorge protected territories by indicator insects and education of local population on conservation of biodiversity. RSG-7838-1 (manager- M. Murvanidze).

universities Pace University, Ilia State University, Technical University of Georgia; Master's programme in Applied Biosciences - partner universities Iv. Javakhishvili Tbilisi State University, Agrarian University of Georgia, Akaki Tsereteli State University).

However, problems persist. As the policy brief "Higher Education System in Georgia" states: "In fact the research component in HEIs is still underdeveloped. The neglect of research at universities and its main concentration in the institutes of the Academy of Sciences, inherited from Soviet times, is obvious. Thus, only 8.8% of HEIs participate in scientific grant competitions announced by the Georgian National Science Foundation (GNSF) (presently, Rustaveli Georgian National Foundation T.S.).".

Table 6.4 below gives the breakdown of grants for the years 2007, 2008 and 2009 according to field (those related to biodiversity are highlighted, and the number of research on specifically biodiversity issues by years are given in a separate row). In 2011 the GNSF allocated 35 scientific grants, out of which three were on biodiversity. Universities and research institutions are also eligible for international grants and funding from sources other than state budget.

Table 6.4: Projects financed from the state grant fund by scientific field

		2009		2008		2007	
#	Scientific directions	No. of projects	Budget	No. of projects	Budget	No. of projects	Budget
1	Information technologies, telecommunications	3	29,330	8	8,08,539	10	1,069,147
2	Mathematics, mechanics	11	136,342	17	2,034,298		
3	Life sciences	6	72,963	14	1,537,879	26	2,932,384
4	Medicine sciences	10	112,381	18	1,902,608		
5	Nature sciences	14	167,169	27	2,999,230	20	2,434,878
6	Earth studying sciences and environment	18	227,487	27	3,371,647	17	1,987,771
7	Engineering sciences, high technology materials	22	245,9855	24	2,379,578	21	2,125,623
8	Agrarian sciences	19	224,798	26	3,007,034	14	1,240,428
	Among these on biodiversity issues	7		11		9	
	Total	103	12,164,584		18,041,613	108	11,790,232

Source: The National Scientific Fund (http://gnsf.ge)

Specialists often point out the importance of environmental knowledge and awareness among law and journalism programme graduates. Unfortunately none of the journalism programmes offer courses related to environmental issues, though with the reformed HE modular curriculum there is always a possibility for an interested student to take a relevant subject as an elective.

Law has been another field of study with no related training possibilities as noted by the NBSAP 2005: "no formal curricula exist, and there is lack of information relating to environmental law." Ecological law as a unique case was taught at TSU. At present international ecological law is taught at bachelor's and master's level at several universities (e.g. Sokhumi State University offers Ecological Law at master's level, Ilia State university – at bachelor's level, Tbilisi State University offers International Ecological Law, etc.).

4.2.2. Non-formal Environmental Education

Apart from formal settings environmental awareness and knowledge is created through non-formal educational opportunities that are aimed at different target groups and are offered by educational institutions, NGOs, international organizations working in Georgia and different governmental

structures. Apart from teachers already mentioned above, other major groups that have been recently targeted by different environmental capacity or awareness building instruments include children aged 12-18, authorities responsible for dealing with environmental issues, business representatives and journalists.

One need not be a teacher at a school to promote love and awareness of biodiversity in children that will help shape children's values, perspectives and understanding of the environment, and help them develop into responsible adults. Children need to learn from a very early age that the environment has an impact on their lifestyle and quality of life and vice versa. Early environmental education is critical since today's children will be responsible for making decisions that will shape the health of the environment in the future.

Despite quite a number of **extra-curricular projects** for children initiated by different institutions, both educational and environmental, aimed at increasing awareness of the children on importance and conservation of biodiversity, the scope is still quite narrow and the impact of the programmes is not on a large scale; there is still much space for future interventions.

Since 2007 on the initiative from the Ministry of Education and Science and in partnership with universities a series of **public lectures** on a number of popular scientific topics, among them biology and geography, have been delivered at general schools all around Georgia. The project is aimed at updating knowledge of natural sciences and making the subject more attractive and appealing to students. As part of the project lectures and practical demonstrations have been delivered in Tbilisi, Telavi, Mtskheta, Gori, Kutaisi, Senaki, Rustavi, Akhalkalaki, Ozurgeti, Poti, Khelvachauri, Borjomi, Oni, and Mestia. The lecture series are mostly designed and targeted at senior students but are open to interested pupils of other age groups as well. Thousands of pupils have attended these lectures.

Another initiative by the Ministry of Education and Sciences of Georgia is a national awards initiative for school students called **"Olympiads".** The Olympiads cover a number of subject groups and form a country wide initiative allowing all basic and secondary school students to participate. Under the topic *education for sustainable development* the following areas were included: Conservation of the Black Sea coastal zone (Sarphi- Batumi or Supsa-Natanebi); Conservation and rational use of forests; Inclusion of local natural and historic relics into tourism development; Quality of environment and health, etc.

Ecotours and ecocamps have gained increasing popularity in Georgia during the last years. The goal for the camps and tours is to promote volunteerism and environmental awareness as well as knowledge of biodiversity and popularization of healthy lifestyle. The target groups of the various ecocamps have been Georgian and international students (e.g. the Embassy of the Czech Republic finances the participation of Czech students in eco-camps arranged by Agency for Protected Areas. The camps are financed from different sources by national and international organizations and initiated by APA itself, or other organizations working on environmental issues including CENN, CARE and Scouts of Georgia.

In general, the number of students participating in environmental educational activities has increased considerably in recent years indicating the increase in interest on the part of the students as well as efforts and successful work in this regard by the Agency for Protected Areas and other institutions active in this field. However, overall numbers are still low, representing approximately 10% of the secondary school student population of Georgia. So there is more to be done in terms of quantity and especially quality to make the camps and tours more educational and informative and varied, and to turn the entertainment side of the projects into behavioural change and functional knowledge and development of proper values and attitudes towards nature.

By the initiative of the Ministry of Environment Protection a Green Youth Club was created joined by hundreds of young people from different universities and initiating and participating in volunteer activities to protect nature. However, the Green Club is not the only eco club in Georgia. **Eco clubs** are being initiated within secondary educational institutions by different Georgian NGOs (Green

Movement, CENN to name just two) and are aimed at raising children's awareness of various environmental issues including climate change, waste management and watershed management. What's more the clubs help children become active citizens and implement various projects to protect environment around them.

The Ministry of Sports and Youth also has a mandate to promote awareness and participation of youth in environmental issues. Environment was one of the ministry's "Children and Youth Development Fund of Georgia " priorities for 2011 and three small grants were awarded to youth initiative groups to undertake community projects on environmental issues.

Museums and national parks, one of the major functions of which is educational portfolio, can play an importan role in environmental education and awareness-raising. The activities of the Agency for Protected Areas have been noted above. Tbilisi Zoo has an educational centre for children "Metazoa", aiming at environmental awareness-raising and ecological education of children (age groups 5-16), informing and involving different target groups in biodiversity conservation and supporting the harmonious coexistence of humans and living nature (Metazoa Education Policy Document). Since 2005 the Department for Educational Programmes has been working within the National Museum of Georgia. The department develops programmes based on the museum collections and targets school children. The museum has close partnerships with teachers and education experts. The museum initiated interactive dialogues on environmental topics that are held regularly at Chitaia Ethnographic Museum aimed at 10-15 year olds. The museum plans cooperation with the Ministry of Environment Protection on environmental education.

TSU Junior University and within the University a School of Young Biologists aims at popularizing natural sciences among children by holding public lectures and practical experiments with the participation of secondary school teachers and students to improve knowledge and skills of the teachers and to lay foundations for research in young children. The Junior University is planning student competitions and conferences and open seminars in different regions of Georgia.

TSU natural sciences department arranges summer schools for senior secondary school students. This programme provides students with a unique opportunity to obtain extra-curricular information about new scientific and technological advancements, interact with top Georgian and non-Georgian scholars and teachers, and participate in real time experiments and projects. In 2011 the summer school covered four topics: environment, energy, materials and health and included a day for meeting with CERN scholars and representatives of various projects and organisations.

Target groups for adult education programmes implemented in the framework of a number of international and national organizations have included public and non-public authorities, communities, journalists, etc.

Adult education is an area targeted by the Environmental Education Centre under Ilia State University. It plans to start offering various certificate courses for the following target groups: general and higher education teachers, public servants working in the field of environment protection and natural resource management, managers and specialists employed in the private sector, and bachelor's and master's students.

4.2.3. Informal Education

Some of the challenges identified by the NBSAP were related to informal environmental education and assessed the latter as "unsystematic and fragmented;" problems were associated with a mass media that "shows little interest in the environment and lacks specialist knowledge in this field;" The same conclusions were made by a printed and online media monitoring report that was undertaken by IUCN Programme Office for Southern Caucasus in 2010, which indicates that problems in this regards have persisted over the years.

On the other hand, as many sources indicate (NEAP 2012, SoE 2011, Alternative Aarhus Report) the Ministry of Environment Protection of Georgia gives high priority to public awareness of environmental issues and several TV and radio channels regularly report on environmental initiatives, high-level meetings and conferences and media briefings by the Ministry.

The official websites of the ministry and its agencies (especially the websites of the Agency for Protected Areas and the Biodiversity Protection Service) and their counterparts on social media (Facebook, Youtube, Myvideo, etc) serve as important sources of information about the ministry's activities and consequently cover diverse biodiversity issues as well. The websites of international and national environmental NGOs (e.g. NACRES , WWF Caucasus Office, CENN, Green Alternative, Green Movement, REC-Caucasus, Elkana, etc.) also provide a wide range of information on the biodiversity of Georgia and its conservation.

Information tours that are arranged by the Ministry and its partners target in many cases journalists to increase the profile and the quality of media coverage of environmental (among them biodiversity) issues.

The public relations activities of the Ministry of Environment Protection and its partners and sometimes other governmental bodies (e.g. Mayor's Office of Tbilisi) serve to raise public awareness and to make public behaviour more environmentally friendly; they include, but are not restricted to, varius outdoor campaigns ("Hour of Garden Birds", tree-planting, clean-up campaigns, etc.), advertisements on outdoor billboards, TV and Radio, adventure tours, art exhibitions etc. The target groups can be very wide ranging from children to adults, from policy makers to NGOs, journalists and the international community. The Ministry of Environment Protection and most environmental NGOs support the publication of informational and educational leaflets and brochures on various issues related to biodiversity.

The overall profile of biodiversity issues on TV and Radio is still not very high, which as media experts explained is the result of low interest from the public. At present, biodiversity is only covered by one TV programme – GEO guide, a weekly adventure show on Rustavi 2 (the primary goal of which is to attract eco-tourists; biodiversity coverage is a bi-product, a side effect). A similar programme - "A Traveller's Diary" - was broadcast on the public service channel. Radio "IMEDI" and, later on, TV "Mze" had a weekly programme "Green Broadcast" presented by the then Minister for Environment Protection . Environmental issues are regularly covered by a one-hour long programme on Radio 1 "Ecometer." The children's television channel "Enki-Benki" offers "Zoo-TV" which covers issues related to domestic and wild animals, Red List species, friendship with animals etc.

Considering the fact that the majority of population of Georgia and especially those in the regions use TV (and radio) as their primary source of information, these media channels should be better exploited. Internet media, being the second most popular and fast growing in media communications, can be also a powerful ally in educating the public on biodiversity issues.

4.3. Summary of problems

1) Although there is no quantitative formal evaluation of knowledge on biodiversity issues experts still assess public awareness in this regard as low.

2) Formal education on biodiversity issues has a strong structural background (in terms of curricula). However, more needs to be done to have the topic institutionalized in the classroom. Particular attention in this regard should be paid to teacher training and preparation of teaching and informational materials.

3) The internet is by far the broadest and cheapest informational resource, so internet access and proper skills of the teachers and students to use those resources should be ensured.

4) More attention should be paid to teaching sustainable development principles related to biodiversity in higher and vocational educational programmes that have indirect or direct contact with natural resources (specifically agriculture, tourism, production etc.).

5) Non-formal platforms for biodiversity teaching and awareness-raising should be exploited more. The scope as well as quality (how well the biodiversity issues are covered, how the knowledge can be turned into behavioural change) still needs to be improved.

6) The sustainability of non-formal platforms of environmental education should be carefully considered. At present, most of the providers of environmental education are NGOs who will stop provision as soon as the specific project funds are finished. It is important to channel efforts and funds towards capacity building of more sustainable educational platforms such as museums, protected areas, schools and other institutions having educational components.

7) Informal environmental education is still unsystematic and fragmented, however the Ministry of Environment Protection and Ministry of Education and Science are working on a strategy that will make environmental education more planned and focused on specific goals.

8) The media shows little interest on biodiversity issues and still lacks skills to successfully handle issues in this field; more should be done to use broadcast and internet media resources.

THEMATIC FIELD 7. BIODIVERSITY AND CLIMATE CHANGE

Lead organisation: Centre for Biodiversity Conservation and Research NACRES

Lead author: Kaha Artsivadze

1. Introduction

Today it is widely recognized that biodiversity and climate change are interconnected. The latest research has confirmed that climate change can be viewed as one of five key factors contributing to biodiversity loss, the other four being habitat degradation, unsustainable use, environmental pollution and invasive species[40]. It is also universally recognized that biodiversity provides the sustainability of ecosystems and respectively, represents the major component of services provided by ecosystems.

According to data gathered by the Ad Hoc Technical Expert Group (AHTEG)[41], the post-industrial period has seen an increase in temperatures that is already having a negative impact, including in regions characterized by high biodiversity. AHTEG suggests that approximately 10% of species assessed so far will be at an increasingly high risk of extinction for every 1°C rise in global mean temperature; this is particularly worrying when we consider that the global mean surface temperature is projected to increase by between 2.4ºC and 6.4ºC by 2100. Along with an increase in temperature, the frequency of extreme climatic phenomena, often accompanied by changing precipitation, are also expected to increase. Changes in vegetation, flowering times and migration schemes are currently being widely observed throughout the world. For example, the vegetation period in Europe arrives about 10 days earlier than 40 years ago. Such changes may trigger concurrent changes in associated food chains, possibly leading to broader ecological disruptions within the ecosystem.

At a global level, both water and carbon cycles, themselves dependent on global biodiversity, play a major role in the preservation of climate stability, providing crucial ecosystem services at a global level. According to the Millennium Ecosystem Assessment[42], human activity has led to the extinction of about one third of the planets' species, while 60% of the world's ecosystem services have been degraded over the past 50 years. These processes support each other so that the joint negative impacts of human endeavors and climate change create a tendency for biodiversity loss.

Unfortunately, the process has a cyclic, self-perpetuating nature; climate change causes biodiversity reduction that, in turn, reduces the sustainability of ecosystems and accelerates the process of climate change. Equally, it should be noted that each step of the cycle increases the complexity of the relationship, further accelerating the processes.

Respectively, biodiversity conservation also plays an important role in the mitigation of, and adaptation to climate change. Moreover, the role of biodiversity is also important in regulating certain processes, such as the hydrological regimes of the rivers. Climate change will have predominantly adverse impacts on many ecosystems and their services essential for human wellbeing. Climate change will also exacerbate other pressures acting on natural systems, including land use change, invasive species and disturbance by fire. Obviously, today the management of ecosystems is discussed as an important tool in the mitigation of climate change.

[40] Source: Secretariat of the Convention on Biological Diversity (2010) Global Biodiversity Outlook 3. Montréal.

[41] Connecting Biodiversity and Climate Change Mitigation and Adaptation. Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. CBD Technical Series No. 41.

[42] Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC.

Certain positive effects are not ruled out. Although, the number of such precedents is not high. For example, according to existing scientific data, the number so around one-third of 122 bird species in Europe may increase with rising global temperatures as a result of expanding ranges.

2. Recorded and predicted future climate change

According to the Intergovernmental Panel on Climate Change the significant increase in annual mean temperature that has been observed since the mid-20th century is connected with high levels of greenhouse gasses released as a result of human activity[43]. In Georgia the process of climate change has increased sharply since the end of last century. During the past 10 years annual mean temperatures have increased in parts of western Georgia, by 0.7 °C and in parts of eastern Georgia by 0.6 °C.

Since the 1960s, slight declines in precipitation have been observed in many of Georgia's western regions; however, precipitation has increased in separate localized territories with a maximum increase of 6% observed in eastern Georgia. As a result of these changes, the intensity and frequency of extreme phenomena caused by global warming has increased during past years; droughts and spring winds have become more frequent in semi-arid regions; the process of coastal erosion and washing away has strengthened in the Black Sea coastal zone. Moreover, satellite observations show that the average speed of retreat in several glaciers of the Greater Caucasus is 8 metres a year, while the surface area of glaciers has decreased by 6-9%.

These changes in temperature and precipitation manifest themselves in different ways depending on the region. Figure 7.1 below shows the change of annual mean temperature in Georgia from 1935 up to 2005 (the research was conducted on the basis of PRECIS outputs and the MAGICC-SCENGEN modeling tool).

Figure 7.1 – Changes in air temperature in the southern Caucaus[44]
(1935-2008 for Armenia, 1936-2005 for Georgia, 1960-2005 for Azerbaijan)

As the research confirms, in the case of Georgia the semi-arid zone and the southern slopes of the Caucasus Mountains, especially Svaneti, are the most sensitive regions.

The country has developed a number of models outlining possible changes during the next 50-100 years. The authors of the Second Communication to UNFCCC have used several options of the PRECIS package and the statistical program package, MAGICC/SCENGEN, as well as several global circulation models (for example HadAM3P and ECHAM4). According to the results of modelling annual mean

[43] Source: The World Bank. 2009. Convenient Solutions to an Inconvenient Truth: Ecosystem-based Approaches to Climate Change.

[44] Source: Zoi Environment Network. 2010. Climate Change in the South Caucasus.

temperature in Georgia may increase by between 1.8°C and 3.9°C. It is noteworthy that, according to forecasts, maximum temperature increases in eastern Georgia are expected in winter, while in western Georgia, they are forecast for summer.

Precipitation is expected to reduce over the entire territory of Georgia. In western Georgia maximum declines in precipitation are expected during spring and autumn while in eastern Georgia they are expected in summer and autumn[45].

3. Impacts of climate change on biodiversity

Negative consequences of climate change may be different for various regions. Globally, the most serious impact is anticipated in the Arctic Circles. Moreover, alpine, arid and semi-arid ecosystems, as well as forests and wetland ecosystems will also be quite sensitive. In addition, increase in sea acidification is already being observed and is caused by the uptake of anthropogenic carbon dioxide (CO_2) from the atmosphere. It may lead to damage of marine ecosystems and a reduction of the phytoplankton that are responsible for a significant part of photosynthesis. Although taken in the global perspective, all of these risks are also relevant to Georgia.

3.1.1. High Mountains

Mountain ecosystems tend to support a high number of endemic species, many of which are adapted to extreme conditions, including low temperatures. The increases in annual mean temperatures predicted by current forecasts may be especially dangerous for high-mountain species as vertical migration of species adapted to the warming conditions occurs. The process will be followed by fierce competition between species: plants adapted to low temperatures with a slow growth rate are likely to lose out to thermophilic species whose spread is currently limited by low temperature existing in the upper parts of mountainous regions. The upward vertical movement of climate zones will stimulate the vertical migration of heat-loving plants (characterized by a high rate of propagation). Invasion of new species in high mountains will lead to a change in the plant community. In alpine zones we are likely to see a reduction in typical alpine species (especially in the nival zone) and there may be a complete loss of certain communities.

In the Caucasus generally, and Georgia specifically, there is an especially high rate of endemism amongst for example, the plants of the nival zone. Plant species that have adapted to conditions within the glacial zone face specific threats as the glaciers retreat. The rate of their propagation and vertical migration cannot exceed a mere several metres a year and they simply fail to follow the process of glacial retreat, thus losing their habitats. Ultimately, they will be replaced by plant species more adapted to subalpine and alpine regions, which have a higher rate of propagation. Such developments are already observed in the European alps where a long-term observation programme, GLORIA, monitors more than 60 sites. This research, launched in 2001, has shown that heat-tolerant species are actively occupying the sub-nival where previously they were absent[46]. Similar observations are now being carried out within the Caucasus mountains by Ilia State University and similar trends are being observed raising real fears of extinctions amongst local endemic species[47].

[45] Source: Georgia's Second National Communication to the United Nations Framework Convention on Climate Change.

[46] Source: Gottfried, M. et al. 2012. Continent-wide response of mountain vegetation to climate change. Nature Climate Change 2, 111–115 (2012).

[47] Sources: (a) George Nakhutsrishvili, Maia Akhalkatsi and Otar Abdaladze. 2009. Main Threats to Mountain Biodiversity in Georgia. Mountain Forum Bulletin, Volume IX Issue 2, July 2009 ISSN 1815-2139; (b) Maia Akhalkatsi, Jana Ekhvaia, Marine Mosulishvili, George Nakhutsrishvili, Otar Abdaladze and Ketevan Batsatsashvili. 2010. Reasons and Processes Leading to the Erosion of Crop Genetic Diversity in Mountainous Regions of Georgia. Mountain Research and Development, 30(3):304-310. 2010.

3.1.2. Forest Ecosystems

Forests are one of the planet's most important and well-studied ecosystems and cover 31% of the the earth's land surface. More than half of the world's terrestrial plant and animal species live in forests whilst 15% of worldwide CO_2 emissions result from the destruction of forests (according to IPCC 2007) (7) - the biggest source after the burning of hydrocarbons. The largest amount of carbon, about 548 Gigatonnes of Carbon (Gt. C), is stored in the world's tropical and subtropical forests, followed by boreal forest with 384 Gt. C. Naturally, the conversion, degradation or unsustainable management of forest ecosystems reduces the planets ability to sequester carbon dioxide which will lead to an increase in greenhouses gasses in the atmosphere and, inevitably, to global warming. Forest ecosystems are an important provider of ecosystem services.

The influence of climate change on forest ecosystems has a complex nature and has not been comprehensively studied. It is commonly recognized that climate change strengthens the process of forest degradation. Among various risks are forest fires, strong winds, washing away of soil, erosion and spread of forest diseases. Changes in the composition of forest species is yet another problem that is connected with the migration of heat tolerant species which is facilitated by rising annual mean temperatures. Moreover, climate change also creates favorable conditions for the spread of invasive species.

The impacts of climate change on the world's forests are drawn out over long periods of time. Forest formations, occupying various sites, suffer permanent impacts and as a result are held under conditions of increasing stress. This in turn causes a reduction in regenerative ability. Forest density is expected either to decline or forests will disappear completely from some areas to be repaced by grassland, semi-desert or desert formations. Those species which better adapt to the changing environment will gradually take the place of other, less adaptable species.

In order to forecast possible changes, the global scientific community has been conducting ecological research on forest ecosystems as well as using various types of climatic models[48]. The research enables us to evaluate the responses of various species and various forest types to climate change and provide a good basis for the preparation of forest management plans, as well as adaptation and mitigation plans. Similar models have been created for the northern European forests, where the possible influence of climate change on the distribution of 19 species was studied[49].

WWF Caucasus Programme Office has conducted similar research in the Caucasus[50]. Using the CART (Classification and Regression Tree Analysis) model of assessment they were able to analyze large sets of data in a relatively short period of time. According to the forecasts, negative developments are anticipated against a background of climate changes in the South Caucasus. This will be manifested in a reduction of favourable conditions for the remaining forests in the region. According to comparatively optimistic forecasts, forest types may be reduced by 8%, while the more pessimistic forecasts predict a 33% loss. Moreover, along with the rising temperatures, the number of organisms carrying forest diseases may also increase. For example, in the Lentekhi region, where, according to Georgia's Second National Communication, temperatures have increased over the past 20 years, the area of damaged forests also increased by 20%. Some positive changes may take place for certain formations; however, negative developments are anticipated for most types.

[48] Source: Potential Changes in Tree Species Richness and Forest Community Types following Climate Change. Louis R. Iverson and Anantha M. Prasad. Ecosystems (2001) 4: 186–199.

[49] Source: Sykes, M.T., I.C. Prentice, and W. Cramer. 1996. A bioclimatic model for the potential distributions of north European tree species under present and future climates. Journal of Biogeography 23(2):203-233.

[50] Source: Strategic Guidelines for Responding to Impacts of Global Climate Change on Forests in the Southern Caucasus (Armenia, Azerbaijan, Georgia). WWF Caucasus Programme Office.

If certain measures are not taken, climate change will cause:

1) Sharp declines in the number of timber and non-timber products (such as mushrooms, berries and nuts);
2) Reduction of ecological services provided by forest ecosystems, such as regulation of water amount and quality and protection from erosion and landslides;
3) Reduction of regional biodiversity, including within protected areas;
4) Reduction of the recreational value of landscapes;
5) Creation of favourable conditions for the spread of invasive species.

WWF Caucasus Programme Office has developed strategic guidelines for responding to impacts of global climate change on forests in the southern Caucasus[51]. The guidelines provide an analysis of the current situation and climate change models and describe possible scenarios of climate change as well as analyzing possible developments in the forest fund as a result of climate change impacts. It also provides a number of recommendations, including:

- Adapting the management of existing forests by increasing the natural adaptive capacity and resilience of forests;
- Forest restoration and transformation of forest plantations;
- Increasing protected areas of forest fund and creating new protected areas;
- Establishing government policy that introduces relevant strategies and making appropriate changes to forest law; promoting supportive research and monitoring.

The document also provides recommendations for mitigating the impacts of climate change, in particular:

- To immediately begin research to support the development of adaptation strategies;
- To raise awareness within the forestry community about climate change;
- To develop and introduce methods for reducing deforestation and forest degradation;
- To collect information on changes caused by climate change and to monitor these changes.

3.1.3. Arid and Semi-Arid Ecosystems

Models developed in the last five years predict that climate change will have clear and dramatic impacts on arid and semi-arid ecosystems[52]. Typically, precipitation is expected to decrease and temperatures to rise in such regions and this will be followed by the invasion of thermophilic species, which are more resistant to lack of precipitation[53].

More frequent and drawn-out periods of drought forecast for arid and semi-arid regions, will inevitably disrupt plant communities, with reduced growth in vegetation cover and in some cases, the disappearance of certain plants. The risk of fire may increase as a result of prolonged droughts, and this will further destroy vegetation cover and lead to soil erosion. All this may increase the risk of desertification, which, once established, is often irreversible[54].

[51] Strategic Guidelines for Responding to Impacts of Global Climate Change on Forests in the Southern Caucasus (Armenia, Azerbaijan, Georgia). WWF Caucasus Programme Office.

[52] Source: A case study of a frontal system simulated by a climate model: Clouds and radiation. Jingbo Wu, Minghua Zhang, and Wuyin Lin. Journal of Geophysical Research, vol. 112.

[53] Source: Assessment of potential climate change impacts on Namibia's floristic diversity, ecosystem structure and function Guy Midgley, Greg Hughes, Wilfried Thuiller Gill Drew, Wendy Foden March 2005

[54] Source:Climate change impacts and adaptation in European forests. Kolström, M., Vilén, T and Lindner M. 2011

According to Georgia's Second National Communication to the United Nations Framework Convention on Climate Change (UNFCC), the Dedoplistskaro region, which is wholly located in arid and semi-arid zones, represents one of the country's most sensitive regions in terms of climate change. Data provided in the report indicate a process of ongoing climate changes in the region. Analysis of meteorological records has indicated that for the past half-century, the mean annual temperature has increased by 0.6^0C, and the mean annual precipitation by 6%. The projected decrease in precipitation by 14% by the year 2100 could increase the aridity of local climate, transforming local semi-arid landscapes into arid semi-desert and desert landscapes.

In addition to current measurements, climate change forecasts are also extremely alarming for the region[55]. According to the HADAM3P model, annual mean temperature is expected to increase by 4.1ºC to 15.4ºC. Against the background of a likely decrease in precipitation, such an increase in temperature will create an extremely dangerous situation, especially during the vegetation periods. According to existing forecasts there is a significant probability that the region's semi-arid climate will move to the category of arid during the next 100 years. In terms of biodiversity the area has been recognized, through the designation of both Vashlovani Protected Areas and Chachuna Managed Reserve, as important areas, therefore the risks posed by the changes in climate detailed above may be considered particularly pertinent.

Over 80% of active pastures located in the Dedoplistskaro region are degraded, with some areas facing a significant risk of desertification. Biological research carried out in the area also reveals some worrying patterns. For example, some wildlife species (e.g. *Hystrix indica*, *Allactaga elater*, *A. williamsi* and *Nitaria schoberi*) more typically associated with the region's desert and semi-desert systems have begun to appear. However, these species are not necessarily indicators of arid or semi-arid environments (*H. indica* for example is equally at home in the rainforests of South and Southeast Asia) and their apparent expansion range has not, yet, been directly linked to climate change.

3.1.4. Wetland and Marine Ecosystems

Wetland ecosystems also face a risk that is mainly connected with changes in the frequency of precipitation but also with the unsustainable management of these ecosystems. Internal waters, especially marshlands which represent unique and valuable ecosystems in terms of biodiversity, have an important role in global climate processes due to their ability to accumulate and store carbon. One hectare of virgin peatland, for example, contains 1,300 tons of carbon . Globally peatlands, which cover less than 3% of the land, contain 550 Gigatonnes of carbon; this is as much carbon as is stored in all other terrestrial ecosystems[56]. Unfortunately, as a direct result of human activity in these ecosystems, such as draining for agriculture or extraction for fuel, a great amount of this stored carbon is being released into the atmosphere. It is acknowledged that in the process of draining the swamps, each one metre section of a drain causes the emission of 90 tonness of carbon dioxide per drained hectare[57].

In this respect, the current situation in Georgia is unclear. The Kolkheti lowlands and Javakheti plateau are two extremely important wetland ecosystems; however, there has been no research to investigate the risks facing biodiversity as a result of climate change in these regions (though a number of risks related to marine ecosystems were discussed in Georgia's Second National Communication to the UNFCC:

- Eustasy – rise of sea levels as a result of water thermal expansion and a change of fresh water balance in favour of the ocean;

[55] Source: Georgia's Second National Communication to the United Nations Framework Convention on Climate Change.

[56] Source: Assessment on Peatlands, Biodiversity and Climate Change, Global Environment Parish, F., A. Sirin, D. Charman, H. Jooster, T. Minayeva and M. Silvius (2007)

[57] Source: The Global Peatland CO2 Picture. Peatlands Status and Emissions in All Countries of the World. Hans Joosten, Greifswald University, Wetlands International, Ede, August 2010.

- Storms – increase in frequency of storm surges and their power;
- Sedimentation – activation of solid sediment accumulation processes in glacier-fed river deltas;
- Change in sea surface water temperature – changes in thermal characteristics of the aquatic environment

The report also provides a long-term forecast (prepared for the territories adjacent to Poti, using the PRECIS regional climate model) showing an increase of 1.2^{o}C ambient air temperature, an 8-10% decrease in precipitation, and an increase in the vegetation period of 66 days (29%),by the year 2050.

According to existing data, we can group the risks facing these ecosystems into three categories:

1) Flooding of coastal habitats by the sea

According to some forecasts, by 2050, as a result of increases in the temperature of the Black Sea induced by climate change, the sea level may increase by 0.8 meters during storm surges and will be further aggravated by an increasing rate of eustasy. As a result, some unique habitats may become inundated.

2) Partial or complete replacement of fresh water by saline water in estuaries or other habitats:

Increases in sea levels in the region can result in freshwater systems located near by to become brackish systems, which in turn triggers changes in the biophysical parameters of associated habitats. In some cases the total replacement of fresh water habitats is expected. In Georgia's Rioni River Delta eustasy (the rise of sea level relative to land) has amounted to 20-25 cm since 1925, while sea transgression has increased up to 40-45 km in the Rioni River bed. Lake Paliastomi, which has been linked to the Black Sea since 1970, faces the same risk.

Unfortunately, the Javakheti Plateau region is not discussed in Georgia's Second National Communication to the United Nations Framework Convention on Climate Change and so there is no data available.

3.1.5. Marine Ecosystems

Marine ecosystems faces serious negative impacts fromclimate change because the climate has a strong influence on the productivity and biodiversity of marine ecosystems. During the past 200 years the seas and oceans have been intensively absorbing large amounts of the increasing volumes of carbon dioxide in the atmosphere. According to various data, the world's oceans have absorbed up to one third of anthropogenic CO_2. As a result, the acidity of the oceans has been increasing by 0.02 units every ten years resulting in a cumulative increase, since the pre-industrial period, of 0.1 units. Changes of this magnitude will alter the ocean's physical and chemical processes, reducing the concentration of carbon ions fragmented in water. These ions play an extremely important role in the physical development of planktons, mollusks and crustaceans and it is thought that an atmospheric CO_2 concentration of 450 ppm is critical. Should these levels be exceeded there will be a sharp reduction in ecosystem productivity[58]. Unfortunately, no studies have been carried out in the Black Sea and so we are not able to speculate on its current condition in these respects.

An increase in the sea's surface temperature can also causes serious problems. The displacement of cold and warm layers, for example, can damage or change the habitats of many sea organisms. This

[58] Source: Rockström, J., W. Steffen, K. Noone, Å. Persson, F.S. Chapin, III, E. Lambin, T.M. Lenton, M. Scheffer, C. Folke, H. Schellnhuber, B. Nykvist, C.A. De Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P.K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R.W. Corell, V.J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley, 2009: Planetary boundaries: Exploring the safe operating space for humanity. Ecol. Soc., 14, no. 2, 32.

phenomenon has the strongest impact on the marine plankton; the basis of marine food chains[59]. It should be noted that at the beginning of 2010 the surface temperatures of the world's oceans was one of the highest ever recorded and exceeded the annual mean temperature of the 20th century by 0.6°C[60].

There is some data about the current situation in Georgia in this respect. For example, according to Georgia's Second National Communication to the UNFCCC, the habitat horizon of some plankton species has dropped by 5-10 m, causing a relevant displacement of habitats for some kinds of fishes. From this point of view, the authors of the report believe that the territories adjacent to Rioni and Chorokhi Deltas are the most vulnerable zones, while the Sokhumi coastal area is less vulnerable to climate change. However, it should be emphasized that there are no relevant data to demonstrate this in Georgia. In addition, it should be noted that among the Aichi targets of the CBD Strategic Plan for Biodiversity 2011-2020, the need to assess the influence on marine ecosystems by 2015, as well as to undertake the steps aimed at reduction of acidification, is included (target 10).

3.1.6. Protected Areas

Protected areas play an important role throughout the world in the conservation of biodiversity and habitat protection. They can also play a significant role in the mitigation of climate change. According to the World Database on Protected Areas, for example, 15% of carbon dioxide is absorbed and preserved within protected areas throughout the world[61]. They play, then, a unique role in regulating the carbon cycle and, by extension, mitigating climate change. At a local level, it has been estimated that Mtirala National Park, in western Georgia, stores 143,000 tons of carbon.

Protected Areas also preserve many ecosystem functions, such as freshwater provision, and can thus be described as playing a significant role in the process of mitigation and adaptation to climate change processes. For example, 33% of the world's major cities rely on river basins within protected areas for their fresh water supplies. The seaside resort city of Batumi, in western Georgia, is a good local example of this, as it takes its water from the Mtirala National Park.

It should also be noted that among the targets of the Aichi meeting is the necessity of for increasing the sustainability of ecosystems as major mechanisms for reducing levels of atmospheric CO_2. To this end, it is essential to preserve the existing ecosystems and to restore at least 15% of degraded ecosystems. This issue is especially important against the backdrop of ongoing economic projects in Georgia. To balance them, it is vital to expand the existing protected areas network, to create ecological corridors and to improve management.

However, some of Georgia's protected areas may already be facing a high risk of damage caused by climate change. Both Vashlovani and Kolkheti National Parks require special attention. The Vashlovani National Park, located in Georgia's most sensitive zone Dedoplistskaro, needs constant monitoring as increases in annual mean temperature, coupled with decreased precipitation, are expected. Similarly, Kolkheti National Park faces major problems associated with eustasy and the intensive use of adjacent territories. Moreover, various ongoing and planned infrastructural projects in the coastal zone may have negative impacts on local biodiversity and carbon dioxide emissions.

It is crucial to study and assess the possibilities of Georgia's protected areas in terms of mitigation of and adaptation to climate change and some research is being conducted in this direction (by IUCN, as

[59] Source: Climate-driven trends in contemporary ocean productivity Michael J. Behrenfeld1, Robert T. O'Malley1, David A. Siegel3, Charles R. McClain4, Jorge L. Sarmiento5, Gene C. Feldman4, Allen J. Milligan1, Paul G. Falkowski6, Ricardo M. Letelier2 & Emmanuel S. Boss7.), (M. J. Behrenfeld et al., Nature 444, 752 (2006).

[60] Source: The Impact of Climate Change on the World's Marine Ecosystems. Ove Hoegh-Guldberg and John F. Bruno. Science 18 June 2010: Vol. 328 no. 5985 pp. 1523-1528.

[61] Source: Carbon Storage in Protected Areas – Technical Report (2008). Author: Campbell, A., Miles. L., Lysenko, I., Hughes, A., Gibbs, H., UNEP-WCMC Volume: 2008

well as the Agency for Protected Areas). It is also necessary to create a strategy, with mechanisms, for ecosystem adaptation to climate change, which will be based on biodiversity and ecosystem services and, first and foremost, on the necessity of improving the management of protected areas and the creation of ecological corridors.

Georgia's protected areas, which have a uniform management system (implemented by the central Agency for Protected Areas), established infrastructure and borders, and state funding, represent a potential for effective mitigation and adaptation to climate change. Applied correctly, this system can be used effectively for implementing Georgia's international commitments and for addressing issues that exist at a national level. The creation of a uniform monitoring system, inside and outside protected areas, will enable us to assess effectively the changes caused by climate change and to rule out any anthropogenic factors.

The issue of informing society and the representatives of various governmental branches about the functions of protected areas is one of the major challenges. It is essential to popularize these potential roles of protected areas outlined above and to increase the quality of public awareness.

4. State policy towards the impacts of climate change on biodiversity

4.1. Georgia in multilateral environmental agreements

Georgia is a party to the all of the main legally binding conventions relevant to biodiversity conservation and climate change and their related protocols (see the chapter "Introduction" at the beginning of this compilation). According to the Constitution of Georgia and the Law of Georgia on Normative Acts, such international agreements have prevalence over national legislation, provided that they do not come into conflict with the Constitution of Georgia. Georgia is also a signatory a number of relevant non-legally binding multilateral agreements.

4.1.1. Convention on Biological Diversity (CBD)

Targets 10 and 15 of Aichi Targets adopted at the Tenth Conference of the Parties to the CBD (Nagoya 2010) are directly related to issues of mitigation and adaptation to climate change. They aim at restoration of at least 15 per cent of degraded ecosystems and minimizing the acidification of the planets' oceans by 2020.

4.1.2. United Nations Framework Convention on Climate Change

The Convention requires the parties to implement relevant measures to ensure the sustainability of the climate system. For this purpose, the parties should take precautionary measures to minimize "the causes of climate change" and to "mitigate its adverse effects". The convention introduces the "precautionary principle", whereby a lack of full scientific certainty about the seriousness of a threat should not be used as a reason for postponing precautionary measures against that threat. According to the convention, developed countries should take the lead in combating climate change but it ultimately requires all countries to promote the implementation of all necessary measures to mitigate or adapt to climate change. Georgia has been a party to the convention since 1994 and has submitted two "national communications" to the convention, the second in 2009.

4.1.3. Non-legally binding multi-lateral agreements

Ministerial Conference on the Protection of Forests of Europe (Forest Europe)

The Ministerial Conference on the Protection of Forests of Europe 2011 acknowledged climate change as the key challenge facing the European forest sector. It was the decision of the Conference that the European countries must commit themselves to react immediately to reduce impacts on forests and minimize risks from storms, floods, wildfires, droughts and forest diseases. During the

meeting some objectives, scheduled for 2020, contained obligations for forest adaptation to climate change and the need to develop strategies for impact mitigation as well as their integration into national programs (Forest Europe, 2011).

The Georgian Government shared the position of the Ministerial Conference and assumed the responsibility for developing and introducing its forest adaptation strategy in a way that reflects the risks and consequences that accompany global climate change. The document will also outline strategic plans and actions for the mitigation of, and adaptation to, anticipated changes.

4.2. Relevant domestic normative acts and policy documents

Constitution of Georgia

The major normative act of Georgian environmental legislation is the Constitution of Georgia, according to article 37 of which "everyone shall have the right to live in a healthy environment and enjoy their natural and cultural surroundings. Everyone shall be obliged to care for the natural and cultural environment" (paragraph 3). Taking into consideration the interests of modern and future generations, the State provides environmental protection and engages in the rational use of natural resources, encouraging the sustainable development of the country in line with the economic and ecological interests of society living within a healthy environment.

Law of Georgia "on Environmental Protection"

The Law of Georgia "on Environmental Protection" was adopted (1996) to implement the provisions of the Georgian Constitution The law creates a legal basis for legislative normative acts in the sphere of environmental protection and so provides: protection of the environment from harmful influence; improvement of environmental quality; sustainable development and sustainable use of natural resources; preservation of biological diversity and ecological balance; protection of unique landscapes and ecosystems; certain efforts to settle global environmental problems; definition of citizens' rights and obligations in environmental sphere; environmental education.

The Law on Environmental Protection is a framework law, which creates the legal basis for the development and enactment of a number of environmental laws and subordinate legislation. The Law of Georgia on Environmental Protection is most important among the legislative acts relating to the loss of biodiversity caused by climate change. Article 51 of this law covers issues relating to climate protection and the regulation of greenhouse gas emissions, while article 53 defines general issues of biodiversity protection. However, it should be noted that despite its nature, the law does not have the status of an "organic law". As a result the articles of this imortant normative act are contradicted by other, later adopted documents and are therefore lessened in their potential impact.

Law of Georgia "on Ambient Air Protection"

The Law "on Ambient Air Protection" has direct links with climate change. Article 53 of this law determines that in order to protect the climate from global changes it is necessary to observe the norms of greenhouse gas emissions and to implement measures for their reduction. It should also be noted that, according to subparagraph 3 of article 53, it was planned to adopt the Law of Georgia on Protection of Climate against the Global Changes within the Jurisdiction of Georgia. However, as a result of an amendment approved in 2011 (No 4386 11.03.2011), this has been repealed.

National Biodiversity Strategy and Action Plan 2005

The National Biodiversity Strategy and Action Plan is one of the most important preconditions of the country's sustainable development (adopted on February 19, 2005). The document defines the strategy and concrete actions for the protection and sustainable use of the country's biodiversity (except for that of the Black Sea) for 2005-2010. It represents a framework document, under which coordinated activities should be conducted in the sphere of biodiversity conservation in Georgia.

The document defines the current state of biodiversity, and the key threats facing Georgia's natural environment. It distinguishes nine major issues, covering practically all the aspects of protection and sustainable use of biological resources. These key issues are:

- Protected Areas;
- Species and Habitats;
- Agrobiodiversity;
- Hunting and Fishing;
- Monitoring of biodiversity;
- Biotechnology and Biosafety;
- Environmental education, public awareness and public participation;
- Financial and economic programme;
- Legislation and institutional development;
- Sustainable forestry

Unfortunately, the document does not assess the risks to biodiversity caused by climate change, a shortfall that can be explained by a lack of information at the time of the documents adoption.

Georgia's Second National Communication to the UNFCC (2009)

This document was prepared according to the United Nations Framework Convention on Climate Change in 2009. The process included anational inventory ofgreenhouse gases (GHGs) and the development ofcurrent and future climate change scenarios. Measures for reducing greenhouse gasses and adaptation projects were also prepared.

The vulnerability of three priority areas, the Black Sea coastal zone and the Dedoplistskaro and Kvemo Svaneti regions, was assessed based on future climate change scenarios. Mean air temperature, min/max temperatures, precipitation, relative humidity, wetting regimes and wind were investigated. The presence of trends in extreme events (such as high winds, drought, landslides and floods) characteristic to each of the examined regions were also investigated. Adaptation measures were planned based on the anticipated scenarios that include, amongst others, biodiversity issues. For example, in Kvemo Svaneti it is planned to restore damaged forest areas; in the Dedoplistskaro region the creation of permanent monitoring in protected areas free from anthropogenic impact are planned in order, to assess the impact of climate change on land degradation, endemic species of flora and fauna.

National Security Concept of Georgia 2011

The National Security Concept of Georgia (adopted on December 23, 2011) sets out fundamental national values and interests, a vision for the nation's secure development, threats, risks and challenges, and establishes the main directions for national security policy. The document covers 14 national interests including the environmental security of Georgia. Among the threats and challenges identified within the document are listed environmental challenges, including threats caused by natural processes and man-made crises that might threaten Georgia's natural environment, its bio-diversity, and the well-being of its citizens. According to the Concept, the Georgian authorities acknowledge that protection of the country's environmental security requires close international cooperation.

National Environmental Action Plan (2012)

The National Environmental Action Plan (NEAP) was adopted on January 24, 2012 and covers the period from 2012 till 2016. It is an official document of the Georgian Government, which creates a foundation for carrying out environmental activities in the country.

Chapter 12 of the action plan covers issues of biodiversity and climate change, identifying several key priorities for the country. These include impacts on natural ecosystems and biodiversity, forest and land degradation, desertification, melting of glaciers, decreased water resources and increased damages from disasters are all identified as key priorities. Among the most important issues is the reduction of populations of endangered species and degradation of habitats and the action plan gives special emphasis to problems arising from a lack of information, especially in vulnerable regions. Such regions were identified on the basis of assessments made under Georgia's Second National Communication to the United Nations Framework Convention on Climate Change and are:

- Black Sea coastal zone
- Semi-arid regions
- Highlands/mountainous areas

Among issues that require future study the action plan focuses on an assessment of the vulnerability of ecosystems to ongoing and anticipated climate changes. Special emphasis is also given to planning and the implementation of adaptation measures.

In terms of climate change, the action plan also acknowledges issues arising from low levels of public awareness and the insufficient integration of these issues into various sectoral development plans.

Long-term (20 years) and short-term (5 years) goals have been developed in frames of the action plan. In particular, to achieve the long-term goals the following 5-year targets should be met:

- Target 1. Implementation of urgent adaptation measures in the regions identified as particularly vulnerable;
- Target 2. Identification of climate change impacts on other regions and sectors, and
- Target 3. Reduction of GHG emissions

5. Identified problems

Published materials (literary sources, reports, etc.) as well as materials received directly from the various organizations and experts involved in climate change and biodiversity issues were used to identify problems associated with the impacts of climate change on biodiversity. A survey was conducted among the following organizations and interested persons.

Name of the project	Name of participating organization	Issues covered by the project
Integrated Natural Resources Management in Watersheds of Georgia	Global Water for Sustainability GLOWS[62] Florida International University (FIU) UNESCO Institute for Water Education(UNESCO-IHE)	The influence of climate change on biodiversity in three target areas, covering the Alazani, Rioni and Iori river basins.

[62] **The Global Water for Sustainability (GLOWS**) program is a consortium financed by the United States Agency for International Development (USAID) working to increase social, economic, and environmental benefits to people of the developing world. GLOWS works on-the-ground to implement water supply, sanitation, and hygiene (WASH) services, improve water management practices, and build local capacity. The GLOWS Consortium is led by Florida International University. Together the partners possess skills and worldwide experience in water supply/sanitation/hygiene, water productivity, and water resources management. The program was launched in 2005, which along with international and local partners introduces the practice of integrated management of natural resources on the ground; strengthens the potential of local population through holding trainings at various levels and shares knowledge and experience. Information about Integrated Natural Resources Management in Watersheds of Georgia Program (INRMW) and GLOWS is posted at the following website: www.globalwaters.net

Name of the project	Name of participating organization	Issues covered by the project
	CARE International Warnock International (WI) Caucasus Environmental NGO Network (CENN) and their subcontractor, Sustainable Development and Policy Center	
Natural Solutions to Climate Change: the role of Protected Areas	IUCN Caucasus Cooperation Centre	Assessing the role of protected areas as a significant source of CO_2 absorption and conservation of water resources.
Adaptation of the Forest Sector to Climate Change	WWF Caucasus	Restoration of natural forest areas (Chianuri Forest) and strategy of forestry sector adaptation to climate change.
Identification and Implementation of Adaptation Response to Climate Change Impact for Conservation and Sustainable Use of Agro-biodiversity in Arid and Semi-arid ecosystems of South Caucasus	REC-Caucasus	The issues of agro-biodiversity conservation under conditions of climate change
Enhancing local capacity and regional cooperation for climate change adaptation and biodiversity conservation in Georgia and the South Caucasus	Mercy Corps	Along with other issues, the project aims at assessing those risks, which are related to the issues of biodiversity reduction caused by climate change.
Identification of upper boundaries of the forests (GRDF-CRDF) Scientific-research program of Ilia State University	Ilia State University	In frames of the project the influence of climate change on the diversity of high mountain vegetation cover is being studied.
Foundations of International Environmental law and Climate Change Law for Ilia State University Students and Short Climate Change Law Course for Decision Makers.	Center of Environmental Education at Ilia State University	With financial support of the U.S. Civilian Research and Development Foundation (CRDF) and under the guidance of the Pace Energy and Climate Center (www.law.pace.edu/environment), Ilia State University implemented the project, which aims at teaching the foundations of international environmental law and climate change law to Ilia State University students, as well as offering a short climate change law course to decision makers. The Environmental Education Center of Ilia State

Name of the project	Name of participating organization	Issues covered by the project
		University and the International Union for Conservation of Nature (IUCN) are involved in the project as partners.

The research identified the following key problems which have an impact on biodiversity under conditions of climate change:

- Absence of a state strategy in respect to climate change;
- Lack of research and factual information;
- Threat of extinction of plants in subnival zone as a result of rising temperatures connected with vertical migration;
- Non-sustainable use of forests and pastures;
- Possibility of increasing occurrence of forest diseases;
- Increase in forest fires and their impacts;
- Neglect of climate change factors by the state (the Ministry of Agriculture, the Minister of Energy and Natural Resources, the Forest Department, the Ministry of Environment Protection);
- Non-sustainable land use and its influence on habitats;
- An increase in occurrence of extreme conditions such as droughts, floods and mudslides;
- Change of water regime and a reduction in water flow;
- High anthropogenic press on water ecosystems.

The interviewed experts gave the following recommendations:

1) To create adaptation plans against factors influenced by climate change at both state and regional levels and to create mechanisms for their implementation;
2) To inform local populations, to raise and strengthen their awareness in respect to climate change and enable them to adapt to possible changes resulting from climate change;
3) To reduce natural calamities at the expense of implementation of preventive measures;
4) To strengthen protected areas in respect to biodiversity conservation through research and monitoring;
5) To provide and stimulate effective use of water resources;
6) To conduct research and monitoring;
7) To develop and increase a system of protected areas that increase CO_2 absorption;
8) To restore forests using local species;
9) To introduce the principles of sustainable management of resources;
10) To develop the vulnerability plans and the regional adaptation plans on the ground; to create the mechanisms for introducing these plans;
11) To protect forest boundaries and to prohibit pasturing in the forest area;
12) To restore windbreaks.

THEMATIC FIELD 8. MANAGEMENT AND GOVERNANCE OF BIODIVERSITY

Lead organisation: WWF Caucasus Programme Office

Lead author: Malkhaz Dzenaladze

1. Introduction

Thematic direction 8 – Biodiversity Management, first of all pertains to biodiversity risks that directly depend on (and relate to) environmental management improvement issues (*pollution, environmental impact assessment, overuse of natural resources, habitat degradation, etc.*)

The theme studies the risks existing in Georgia and, to a certain extent, solutions based on application of mechanisms envisaged in the Convention on Biological Diversity (CBD).

The thematic direction involves the following issues:

1) Improvement of regulatory basis (legislation, including international commitments)
2) Management (existing institutions and functions)
3) Biodiversity monitoring issues
4) Biodiversity aspects in decision making process
5) Planning (incorporation of biodiversity issues into intersectoral programmes, policy documents, strategies, etc.)
6) Management tools (TEEB and others)
7) International, regional and transboundary cooperation.

2. Existing legal mechanisms for biodiversity management/governance and ways for further development/improvement (Georgia's biodiversity related law including Conventions and Multilateral Treaties and Agreements

Georgia's legislation in the sphere of biodiversity protection and conservation consists of the Constitution of Georgia, international agreements and treaties, signed by Georgia, legislative acts and subordinate legislation.

The basic principle of the current policy and legislation of Georgia in this sphere is the Constitution of Georgia (1995), in accordance with which (Art. 37): "Everyone shall have the right to enjoy health insurance as a means of accessible medical aid. In the cases determined in accordance with a procedure prescribed by law, free medical aid shall be provided. The state shall control all institutions of health protection and the production and trade of medicines. Everyone shall have the right to live in healthy environment and enjoy natural and cultural surroundings. Everyone shall be obliged to care for natural and cultural environment. With the view of ensuring safe environment, in accordance with ecological and economic interests of society, with due regard to the interests of the current and future generations the state shall guarantee the protection of environment and the rational use of nature. A person shall have the right to receive complete, objective and timely information as to a state of his/her working and living environment."

2.1. International commitments

International agreements and treaties of which Georgia is a party make up an important source of Georgia's legislation. The international agreements and treaties being in compliance with the Constitution of Georgia have priority over the national normative acts.

Georgia is a party to the following international agreements in biodiversity protection and conservation sphere:

- Convention on Biological Diversity
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity
- United Nations Convention to Combat Desertification
- United Nations Framework Convention on Climate Change
- Kyoto Protocol to the United Nations Framework Convention on Climate Change

2.1.1. Convention on Biological Diversity (CBD)

Georgia acceded to the Convention on Biological Diversity in 1994. By joining the Convention the country admitted that biodiversity conservation is a global concern and integral part of the development process. The Convention establishes new approaches in biodiversity protection and conservation sphere.

The overall objectives of the Convention are:

- Protection and conservation of biological diversity;
- Sustainable use of biodiversity components;
- Fair and equitable distribution of benefits derived from the use of genetic resources.

The Convention sets general norms and principles and establishes no concrete binding norms for the Parties in relation to their biodiversity or any of its components. Consequently, the Convention imposes no restrictions on jurisdiction of the Parties in the sphere of use or management of biodiversity in their territories. At the same time, it makes the parties responsible for biodiversity protection and sustainable use of biological resources. The Parties shall ensure regulation of the use of biological resources and set strict rules for physical and legal entities using the resources. The Convention states that ecosystems, species and genetic resources shall be used for people's benefit in ways and rates that will not cause biodiversity reduction or irreversible loss in a long-term outlook. In this connection the parties shall be guided by the so-called "precautionary principle" while making serious decisions implying environmental impact.

The Convention defines biological diversity as "the variability among living organisms from all sources" and "all natural systems". This notion includes varieties of plants, animals and microorganisms, also genetic variations within species. Diversity of deserts, forests, wetlands, mountains, lakes and agroecosystems represents an important aspect of biodiversity. The Convention on Biological Diversity pertains to all biodiversity components – diversity within species, between species and of ecosystsms. The Convention identifies biodiversity conservation and sustainable use problems, sets universal objectives and ways of their achievement. It defines general obligations of its Parties, technical and financial cooperation frameworks.

The Convention states that to ensure biodiversity conservation and sustainable use of biological resources its Parties shall develop biodiversity protection and conservation strategies and corresponding action plans to be incorporated into more large-scale plans in the sphere of environmental protection and development, particularly in the spheres of forestry, agriculture, energy, transport, fishery and urban planning.

The Strategic Plan for Biodiversity was adopted at the 10th meeting of the Parties to the Convention (2010). The very important plan included the Aichi Biodiversity Targets and was binding upon the Parties[63]. The main strategic goals of the Strategic Plan for Biodiversity 2011-2020 include 20 strategic targets.

[63] COP 10. Decision X/2. 18–29 October, 2010. Strategic Plan for Biodiversity 2011-2020 / Annex: STRATEGIC PLAN FOR BIODIVERSITY 2011-2020 AND THE AICHI BIODIVERSITY TARGETS "Living in harmony with nature". https://www.cbd.int/decision/cop/?id=12268ix.aseve,

The main strategic goals of the Strategic Plan for Biodiversity 2011-2020 are:

- Strategic goal (A): Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society;
- Strategic goal (B): Reduce the direct pressures on biodiversity and promote sustainable use
- Strategic goal (C): To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity
- Strategic goal (D): Enhance the benefits to all from biodiversity and ecosystem services
- Strategic goal (E): Enhance implementation through participatory planning, knowledge management and capacity building.

2.1.2. Cartagena Protocol on Biosafety to the Convention on Biological Diversity

Georgia joined the Cartagena Protocol on Biosafety to the Convention on Biological Diversity in 2008. The Cartagena Protocol sets a regulatory framework for:

a) Constrained use of living modified organisms;
b) Their introduction into the environment;
c) Use as food and feed; and
d) Placing on the market.

The existence of the regulatory framework for application of living modified organisms is of special importance for the protection of agrobiodiversity and biodiversity in general while introducing them into the environment.

The protocol states that each Party shall take necessary and appropriate legal, administrative and other measures to implement its obligations under this Protocol. The Parties shall ensure that the development, handling, transport, use, transfer and release of any living modified organisms are undertaken in a manner that prevents or reduces the risks to biological diversity, also taking into account risks to human health.

Work is currently underway to bring the normative acts of Georgia in compliance with the Protocol requirements.

2.1.3. United Nations Convention to Combat Desertification

Combating desertification was identified as one of the greatest challenges during the UN Conference on Environment and Development (Rio de Janeiro, 1992). The conference supported a new unified approach to this problem to ensure sustainable development at the community level. As a result, the Convention to Combat Desertification was developed and adopted on June 17, 1994 in Paris. Georgia became part to the Convention in 1999.

The Convention defines “desertification” as land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities; "combating desertification" includes activities which are part of the integrated development of land in arid, semi-arid and dry sub-humid areas for sustainable development which are aimed at:

- Prevention and/or reduction of land degradation;
- Rehabilitation of partly degraded land; and
- Reclamation of desertified land.

STRATEGIC PLAN FOR BIODIVERSITY 2011-2020 / PROVISIONAL TECHNICAL RATIONALE, POSSIBLE INDICATORS AND SUGGESTED MILESTONES FOR THE AICHI BIODIVERSITY TARGETS / Note by the Executive Secretary / CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY, Tenth meeting, Nagoya, Japan, 18–29 October / Distr. GENERAL, UNEP/CBD/COP/10/27/Add.1, 19 December 2010.
http://www.cbd.int/doc/meetings/cop/cop-10/official/cop-10-27-add1-en.pdf

The objective of this Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with the Sustainable Development Principles.

Achieving this objective will involve long-term integrated strategies that focus simultaneously on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources.

One of the main obligations of the Parties to the Convention is development and implementation of national action programmes to combat desertification. The purpose of these programmes is to identify the factors contributing to desertification and practical measures necessary to combat desertification and mitigate the effects of drought. National action programmes shall:

- Incorporate long-term strategies to combat desertification and mitigate the effects of drought, emphasize implementation and be integrated with national policies for sustainable development;
- Allow for modifications to be made in response to changing circumstances and be sufficiently flexible at the local level to cope with different socio-economic, biological and geo-physical conditions;
- Give particular attention to the implementation of preventive measures for lands that are not yet degraded or which are only slightly degraded;
- Enhance national climatological, meteorological and hydrological capabilities and the means to provide for drought early warning;
- Promote policies and strengthen institutional frameworks which develop cooperation and coordination, in a spirit of partnership, between the donor community, governments at all levels, local populations and community groups, and facilitate access by local populations to appropriate information and technology;
- Provide for effective participation at the local, national and regional levels of non-governmental organizations and local populations, both women and men, particularly resource users, including farmers and pastoralists and their representative organizations, in policy planning, decision-making, and implementation and review of national action programmes.

National action programmes may include some or all of the following measures to prepare for and mitigate the effects of drought:

- Establishment and/or strengthening, as appropriate, of early warning systems, including local and national facilities and joint systems at the subregional and regional levels, and mechanisms for assisting environmentally displaced persons (ecological migrants);
- Strengthening of drought preparedness and management, including drought contingency plans at the local, national, subregional and regional levels, which take into consideration seasonal to interannual climate predictions;
- Establishment and/or strengthening, as appropriate, of food security systems, including storage and marketing facilities, particularly in rural areas;
- Establishment of alternative livelihood projects that could provide incomes in drought prone areas;
- Development of sustainable irrigation programmes for both crops and livestock, etc.

The Convention to Combat Desertification also obliges its Parties to identify and monitor plants and animals acting as desertification indicators.

2.1.4. United Nations Framework Convention on Climate Change

The ultimate objective of this Convention is stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

According to the Convention, “climate change” means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. "Adverse effects of climate change" means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.

The Parties shall take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.

In accordance with the Convention, for the purposes of the Convention, alongside with general responsibilities (promote and cooperate in sustainable use of emissions by sources and removals by sinks of greenhouse gases; take into consideration climate change issues while implementing social, economic and environmental policies and adopting corresponding measures) the Parties shall assume concrete responsibilities and periodically report on their implementation to the Secretariat.

A number of mechanisms, aimed at fulfilment of commitments, assumed under the Convention, have been established within the Convention’s framework. One of the most noteworthy mechanisms is the recently approved Cancun Adaptation Framework, also the resolutions on establishment of Green Climate Fund, Work Programme on Loss and Damage, Land Use, Land-Use Change and Forestry and others.

2.1.5. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

It is noteworthy that Georgia is not a party to such an important international treaty in the sphere of agrobiodiversity as International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). The Treaty entered into force on June 29, 2004. Its main objective is promotion of food security by applying mechanisms for conservation (protection) of plant genetic resources for food and agriculture, sustainable use of these resources and their placing on domestic and international markets. The concrete goal of the treaty is the protection of genetic resources (genetic material) of domesticated species and their wild varieties by creating banks of genetic resources (ex situ conservation), their protection and conservation in their natural surroundings (in situ conservation) and use of international mechanisms for exchange of genetic resources.

Not being a party to the Treaty, Georgia cannot benefit by its advantages and mechanisms.

2.1.6. Multilateral international agreements on protection of biodiversity components (species, habitats, ecosystems and landscapes)

The following multilateral international agreements are of importance in terms of protection of biodiversity components (species, habitats, ecosystems and landscapes):

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)[64];
- African-Eurasian Migratory Waterbird Agreement under the Bonn Convention on the Conservation of Migratory Species of Wild Animals[65];
- Agreement on the Conservation of Cetaceans in the Black Sea Mediterranean Sea and Contiguous Atlantic Area under the Bonn Convention on the Conservation of Migratory Species of Wild Animals[66];
- Agreement on the Conservation of Populations of European under the Bonn Convention on the Conservation of Migratory Species of Wild Animals[67];
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (RAMSAR)[68];
- Conservation of European Wildlife and Natural Habitats (Berne, 1979)[69];
- European Landscape Convention (2000)[70];
- Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

It is noteworthy that none of the above multilateral agreements is fully and consistently integrated into the national legislation except for the norms envisaged in the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

Consequently, it would be advisable to develop draft bills to promote adequate integration of norms of the multilateral agreements on biodiversity into the national legislation.

It is necessary to assess legal and economic expediency (feasibility study) of Georgia's accession to the agreements of which Georgia is not a party (International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and the Nagoya Protocol to the Convention on Biological Diversity on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization).

2.2. National normative acts (*National legislation*)

The key normative acts of Georgia currently in force in the sphere of biodiversity are:

- Law of Georgia "On Environmental Protection" (1996)
- Law of Georgia "On the System of Protected Areas" (1996)
- Law of Georgia "On Fauna" (1996)
- Law of Georgia "On Water" (1999)
- Law of Georgia "On the Protection of Atmospheric Air" (1999)
- Law of Georgia "On the Red List and Red Book of Georgia" (2003)
- Law of Georgia "On Soil Conservation, Recovery and Improvement" (2003)

[64] *Georgia joined the Convention by Resolution of the Parliament of Georgia of February 11, 2000 (Sakartvelos Sakanonmdeblo Matsne, III, 2000, #12, Art. 110) "On accession to the Convention on the Conservation of Migratory Species of Wild Animals*

[65] *Ratified by Resolution of the Parliament of Georgia of March 2, 2001 (Sakartvelos Sakanonmdeblo Matsne, III, 2001, #21, Art. 185)*
[66] *Ratified by Resolution of the Parliament of Georgia of March 2, 2001 (Sakartvelos Sakanonmdeblo Matsne, III, 2001,# 21, Art. 186)*
[67] *Ratified by Resolution of the Parliament of Georgia of December 21, 2001 (Sakartvelos Sakanonmdeblo Matsne, III, 2002 #,3, Art. 24)*
[68] *Resolution of the Parliament of Georgia of April 30, 1996 "On Accession to the Convention"*
[69] *Resolution of the Parliament of Georgia of December 30, 2008 "On Accession to the Convention on Conservation of European Wildlife and Natural Habitats"*
[70] *Order of the President of Georgia #395 of June 9, 2010 "On Approval and Entry into Force of European Landscape Convention"*

- Law of Georgia "On Basis of Spatial Organization and Urban Planning" (2005)
- Law of Georgia "On Protection of the Population and the Territory from the Natural and Man-Caused States of Emergency" (2007)
- Law of Georgia "On Permission for the Impact on Environment" (2007)
- Law of Georgia "Ecological Expertise" (2007)
- Law of Georgia "On Forest Fund Management" (2010)

2.2.1. The Law of Georgia "On Environmental Protection"

The Law of Georgia "On Environmental Protection", often mentioned as "the framework law", is most important among the above listed laws. The norms and principles, established by this law, serve as the basis for different sectoral laws in the sphere of environmental protection.

The main aims of the law are to:

a) define the principles and standards of legal relationships in the sphere of environmental protection;
b) protect basic human rights, guaranteed the Constitution of Georgia in the sphere of environmental protection, namely, the right to live in safe and healthy environment and enjoy natural and cultural environment;
c) ensure protection of the environment and sustainable use of nature by the state, to provide safe environment in accordance with ecological and economic interests of society, taking into consideration the interests of current and future generations;
d) conserve biological diversity, rare, endemic and endangered species of flora and fauna typical for the country, to protect the sea and ensure ecological balance;
e) ensure protection and conservation of endemic landscapes and ecosystems;
f) ensure legal settlement of global and regional problems in the sphere of environmental protection;
g) ensure conditions for the sustainable development of the country.

The law has provided a legal definition of the following terms: "biological diversity" (a variability of living organisms, terrestrial, marine and water ecosystems and ecological complexes, involving a variety of species and ecosystems); "integrated system for environmental pollution control", "best technology", "best technique", ecologically clean products", "cleaner production" and others.

The law defines the basic principles of environmental protection and stipulates that government bodies, physical and legal entities (irrespective of types of property, organizational and legal form) shall be guided by basic principles of environmental protection while planning and implementing their activities. (see. Box 8.1).

The law introduces an important public awareness mechanism – development and adoption of the National Environmental Status Report (initially on the annual basis and then once in three years, according to a subsequently adopted norm).

The law establishes a planning mechanism (system) for environmental protection, including a long-term strategic plan (National Strategy for Sustainable Development), a five-year plan (National Programme of Actions for the Protection of Environment) and voluntary development of environmental management plans for economic entities. The law also allows for development of programmes of action for the protection of environment at regional, local and institutional levels.

Box 8.1 - Extract from the Law of Georgia "On Environmental Protection"

Basic Principles of Environmental Protection:

a) Risk reduction principle" – while planning and implementing activities, the actor shall

undertake corresponding measures to prevent and reduce risk of impact on environment and human health;

b) "Sustainability principle" – use of environment and natural resources in a manner that does not affect social development and ensures protection of environment and natural resources against irreversible qualitative and quantitative change;
c) "Priority principle" – an action that can have an adverse impact on environment and human health, can be replaced with another action that would contain less risk, even if more expensive. The latter should have the priority if its cost does not exceed the cost of compensation of environmental damage, caused by the less expensive action;
d) "Principle of charging for use of natural resources" - use of soil, water, forest, flora and fauna resources and natural resources is chargeable for the actor;
e) "Polluter pays principle" – the actor, also other physical and legal entities, shall pay compensation for environmental damage;
f) "Principle of conservation of biological diversity" – activities shall not cause reversible degradation of biological diversity;
g) "Waste minimization principle" – gives priority to activities utilizing waste minimization techniques;
h) "Recyclability principle" – supports the use of recyclable or biologically degradable materials and chemical compounds;
i) "Restitution principle" – environment degraded as a result of activities shall be restituted in a condition maximally close to its original condition (*restitution in integrum*);
j) "Environmental impact assessment principle" – while planning activities, the actor shall consider and assess possible environmental impact in accordance with the law;
k) "Participatory decision-making principle" – supports public participation in decision-making on most important issues;
l) "Principle of accessibility of information" – information on environment conditions shall be open and publicly available.

Chapters 12 and 13 of the law are dedicated to biodiversity protection and conservation. In accordance with the law, natural ecosystems, landscapes and territories shall be protected against pollution, disturbance, destruction, degradation, depletion and disintegration. The systems subject to protection are: a) coastal zones; b) wetlands, springs, water reservoirs, river heads, glaciers, and caves; c) subalpine and flood plain forests; d) precious woods; e) green zone forests; f) sanitary protection zones and territories.

The law focuses on global and regional management of environmental protection issues. It states that government bodies and physical and legal entities, within the scope of their competence and in compliance with Georgia's international commitments, shall undertake additional measures on the territory of Georgia to promote solution of environmental problems at the global and regional scale.

It is noteworthy that at the moment of its adoption the law enabled integration of European legislative norms into the Georgian legislation.

2.2.2. Laws of Georgia "On Fauna", "On the System of Protected Areas", "On the Red List and Red Book of Georgia", "On Water", "On Permission for the Impact on Environment", "On Ecological Expertise" and "On Forest Fund Management" and the Forest Code of Georgia

The Laws of Georgia "On Fauna", "On the System of Protected Areas", "On the Red List and Red Book of Georgia", "On Water", "On Permission for the Impact on Environment", "On Ecological Expertise" and "On Forest Fund Management" and the Forest Code of Georgia make part of Georgia's environmental legislation and regulate separate aspects of biodiversity use and conservation.
The Laws of Georgia "On Fauna" and "On the Red List and Red Book of Georgia" regulate the legal aspects of conservation and use of wild animals and plants (including endangered species).

2.2.3. Legal aspects of territorial protection and in situ conservation of biodiversity

Out of the above listed laws, the Law of Georgia "On the System of Protected Areas" deserves special mentioning in terms of conservation of biological diversity and in-situ conservation and sustainable use of agricultural biodiversity. In accordance with the law, the system of protected areas has the following purposes:

a) Long-term guaranteed protection of biogeographic units for sustainable development of natural processes;
b) Conservation and recovery of natural ecosystems, landscapes and living organisms;
c) Protection of the gene pool of wild animals and plants included into the Red List of Georgia and conservation of biological diversity;
d) Conservation of unique and rare organic and non-organic natural units;
e) Protection of areas strongly affected by erosion, flood, mudflow, landslide and other processes, also protection of surface water and groundwater sources, flow and discharge areas against man's impact;
f) Conservation and recovery of historical and cultural landscapes and original landscapes of architectural and archeological complexes;
g) Creation of adequate field conditions for education and research on the territory of invaluable and invariable complexes;
h) Creation of favorable conditions for recreation, health protection and tourism in historical and cultural environment;
i) Protection, recovery and development of traditional farming practices and folk arts for the conservation of original historical and cultural environment;
j) Provision of incentives for sustainable use of agricultural, industrial, transport and energy infrastructures and natural resources.

The law determines the following national categories of protected areas: state reserve, national park, natural monument, sanctuary, protected landscape, multipurpose area. These categories are directly related to the categories of the International Union for Conservation of Nature (IUCN) (see Annex 2).

State reserve, national park, natural monument and sanctuary include only the areas owned by the state. They are administered by the government agency responsible for protected area management, namely by the Agency for Protected Areas.

Protected landscapes and multipurpose areas have particular importance to agricultural biodiversity and sustainable agriculture.

In accordance with the law, a protected landscape can be established for conservation of natural and cultural landscapes of national importance and high aesthetic value, formed as a result of natural processes or harmonic interaction of the man and the nature, also for habitat conservation, promotion of recreation, tourism and traditional economic activities. Fishing, hunting and arrangement of hunting farms are permitted on the territory of protected landscapes. Protected landscapes include large land and (or) water areas of national importance, with original natural and cultural landscape of high historical and aesthetic value. Protected landscapes can be divided into different zones.

As for the multipurpose areas, the law states that they shall be created for economical activities, taking account of environmental protection needs and oriented at the use of renewable natural resources. Multipurpose areas involve comparatively large land and (or) water areas with natural conditions for water accumulation, forest and pasture productivity, hunting, fishing, game bird propagation and tourism. The areas shall not include unique natural units of national importance. Fishing and hunting are permitted in the multipurpose areas. Such areas can be divided into zones with different admissible proportions of nature protection and multipurpose use to ensure sustainability and guaranteed use of renewable natural resources.

Multipurpose areas can be used for creation of auxiliary zones (so-called buffer zones) around state reserves, national parks, natural monuments and sanctuaries. The buffer zones in their turn are intended for promoting balanced activities in the sphere of nature protection and sustainable development and income generation among local population.

The areas of both categories may also include territories that do not represent the state property, such as settlements, private agricultural lands, non-agricultural lands and others. Hence, under the law, the National Agency for Protected Areas, directly responsible for protected area management, can manage protected landscapes together with other organizations (*local government bodies*). The Agency for Protected Areas has no authority to manage the multipurpose areas.

Agricultural lands and farms on the territory of protected landscapes and multipurpose areas can be used for in situ conservation of agricultural biological diversity and sustainable agriculture (including biological production).

2.2.4. Law of Georgia "On the Basis of Spatial Organization and Urban Planning"

The Law of Georgia "On the Basis of Spatial Organization and Urban Planning", the key legal act regulating spatial organization, determines spatial organization subjects, principles, priorities, aims and objectives, spatial-territorial planning forms and documentation forms, and its role in territorial development. Under the this law (Article 2, Subparagraphs "a" and "b"), spatial organization represents a unity of laws regulating development of physical environment of territories and infrastructure, national and local policy in the sphere of spatial organization, spatial planning documents, physical conditions determined by activities of physical and legal entities; spatial-territorial planning is an activity that alongside with other issues regulates the use of territories and lands, spatial aspects of improvement of territories, environmental protection, spatial-territorial conditions for recreation, infrastructural and economic development.

According to the law, spatial-territorial planning is conducted at the national level, level of local self-government units and settlements. Consequently, special-territorial documents have different forms for different hierarchy levels. The spatial-territorial document at the national level is Spatial Organization Master Plan; at the self-government level it is the Spatial Organization Plan for Self-Government Unit (municipality), while for settlements it is the Land Use Master Plan of the Settlement (for types and hierarchy of spatial-territorial planning see Annex 1: Legal Mechanism of Spatial-Territorial Planning). Paragraph 4, Article 22 of the law states that municipality's spatial organization plan (approved by a normative act of the Municipal Council (Sakrebulo)) first of all determines municipality's spatial-territorial structure, namely, the following spatial categories: urbanized area, rural area, natural landscape area and special area (see Annex 3).

It should be noted that the auxiliary (buffer) zones and protected landscapes, to be created on the basis of the spatial category (natural landscape area), defined by the acting legislation in the sphere of spatial organization, and the protected area category (multipurpose area) determined by the acting legislation in the sphere of environmental protection, do not enter into legal and institutional collision, but are complimentary notions (see Annex 2: Correlation of protected area categories and spatial categories). Apart from the legal norms of spatial organization and environmental protection, the above postulate is substantiated by the fact that under Paragraph 4, Article 18 of the Law of Georgia "On Protected Areas", the National Agency for Protected Areas is not responsible for managing protected landscapes and multipurpose areas.

2.2.5. Organic Law of Georgia "On Local Self-Government"

The Organic Law of Georgia "On Local Self-Government" determines the scope of exclusive responsibilities of self-government units that the units shall perform independently, according to the established order. In accordance with Article 16, subparagraph 3, paragraph 2, the responsibilities include land use planning, division of self-government unit's territory into zones (green, recreational, industrial, commercial and others), demarcation and alteration of borders. Special norms pertaining

to land use and zoning are reflected in the acting legislation in the spheres of spatial planning and environmental protection.

2.2.6. Legislation in the sphere of regional development

Georgia has no legislation in the sphere of regional development and no definite status of a region as an administrative-territorial unit.

The country's regionalization is strongly impeded by paragraph 3, article 2 of the Constitution of Georgia, according to which "the territorial state structure of Georgia shall be determined by a Constitutional Law on the basis of the principle of circumscription of authorisation after the complete restoration of the jurisdiction of Georgia over the whole territory of the country". Consequently, regionalization of Georgia requires profound legislative amendments. Determination of the main policy direction, development/adoption and implementation of a corresponding legislative initiative are within the jurisdiction of the President and Parliament of Georgia.

- Though there is no special legislation on this issue in Georgia, the acting laws partially manage to regulate it. Thus, Article 27-1, paragraph 2, subparagraph "b" of the Law of Georgia "On Structure, Powers and Procedures of the Government of Georgia" states: "By assignment from the Government, State Plenipotentiary Representative - Governor implements regional social-economic development programs in the administrative-territorial units". Judging from the above, this provision of the law pertains to concrete regional programs, funded by the budget or other financial sources and aimed at improving local infrastructure and economic environment. Consequently, concrete regional programs can be developed on the basis of this provision.
- Article 27-1, paragraph 2, subparagraph "i" of the Law of Georgia "On Structure, Powers and Procedures of the Government of Georgia" reads: "State Plenipotentiary Representative - Governor exercises any other rights provided by the laws of Georgia." Based on this provision, State Plenipotentiary Representative – Governor is authorised to develop, within the scope of his/her competence, any other development strategy for this territory (the conventional region), etc.

2.2.7. Associated legislation

Associated (auxiliary) legislation in the sphere of biodiversity:

- The Law of Georgia "On Protection of Soil" (1994)
- The Law of Georgia "On Agricultural Quarantine" (1997)
- The Law of Georgia "On Pesticides and Agrochemicals" (1998)
- The Law of Georgia "On Plants Protection from Hazardous Organisms" (1998)
- The Law of Georgia "On Vine and Wine" (1999)
- The Law of Georgia "On Soil Conservation and Melioration" (2003)
- The Law of Georgia "On New Animal and Plant Species" (2010)

The above listed laws regulate legal norms pertaining to agriculture and food products; however none of them directly applies to agricultural biodiversity, food security and climate change adaptation.

It is noteworthy that the National Wine Agency, a legal entity of public law within the system of the Ministry of Agriculture, is the only structure in the agriculture system with responsibilities in respect of agrobiodiversity (in farm) protection issues.

Namely, Chapter 3 of the Law of Georgia "On Vine and Wine" (*Chapter III. Genetic Resources of Vine / Protection. Classification of Standard Vine Varieties*) reads: "The genetic resources of the vine – the gene fund of aboriginal (local) varieties and wild vine forms are a national treasure protected by the

State" (Article 4) and "The discovery, investigation, study and conservation of vine genetic resources are funded by the State. This activity may be carried out by natural and legal persons" (Article 5).

Although the law does not indicate directly that the National Wine Agency is responsible for "the discovery, investigation, study and conservation of vine genetic resources", in accordance with it and with the National Wine Agency Charter, the Agency is responsible for the production and cultivation of vine mother plantations, grafting materials and engrafted seedlings, i.e. for technical and phytosanitary control necessary to identify whether industrial vineyards, mother plantations of rootstocks and scions were cultivated using pure varieties included into the standard range of vine varieties.

3. Mechanisms of using biodiversity resources

Georgia has developed the following mechanisms to prevent/reduce risks for biological diversity from the use of biological resources or other activities:

- Rules of using biological resources, determined by different normative acts and conditions of granting licenses and permits for the use of resources;
- Limitation of use of biological resources by setting quotas;
- Environmental impact assessment, ecological expertise and permission for the impact on environment for different activities;
- State control of environmental protection, including monitoring of implementation of environmental legislation, control of fulfillment of licensing requirements and environmental management rules, identification, prevention and preclusion of violations in this sphere;
- System of liabilities for and reparation of damages caused to biological diversity.

3.1. Types of licenses and permits in the sphere of biological diversity

The types of licenses and permits, established by the law and regulating the use of biological diversity are:

Licenses for the use of resources:

- General forest use license, including special logging license and special license for the arrangement of hunting farms;
- Fishing license;
- License for exporting pinecones, snowdrop bulbs and/or cyclamen tubers, included into the annexes to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Permits:

- Permission for the impact on environment;
- Permit for export, import, re-export and introduction from the sea of species, included into the CITES annexes, their parts and derivatives.

3.1.1. Law of Georgia "On Licenses and Permits"

The mentioned types of licenses and permits are determined by the Law of Georgia "On Licenses and Permits". The law establishes a complete list of licenses and permits, determines the procedures for their issuance and other related issues. The law prohibits the establishment of permits and licenses by other laws or by-laws, activities and actions not envisaged by this law.

3.1.2. Administrative bodies issuing licenses and permits in the sphere of use of biological resources; redistribution/change of their competences

In accordance with amendments, introduced into the Law of Georgia "On Structure, Powers and Procedures of the Government of Georgia" on March 11, 2011, the Ministry of Environment Protection and Natural Resources of Georgia was renamed into the Ministry of Environment Protection. The amendments also changed the ministry's competences and functions in the sphere of environmental protection and natural resources, including biodiversity protection and use of biological resources. Part of the ministry's competences and functions were transferred to the Ministry of Energy and Natural Resources of Georgia.

To ensure fulfillment of its new functions in the sphere of management of biological resources, the Ministry of Energy and Natural Resources also incorporated several structural units of the Ministry of Environment Protection and Natural Resources. These were: Forestry Agency and Environmental Inspection.

Until March 11, 2011, the Ministry of Environment Protection and Natural Resources of Georgia had been authorized to participate in the process of issuing or to issue the above listed licenses and permits. Currently, the implementation of these procedures is the authority of the Ministry of Energy and Natural Resources. Below are described the procedures for issuing licenses and permits by the Ministry of Environment Protection and the Ministry of Energy and Natural Resources before and after the redistribution/change of their functions and competences.

Licenses and permits related to biodiversity before and after the change of the competences and functions of the Ministry of Environment Protection and Natural Resources:

3.1.3. Fishing license

The procedure of issuing the fishing license is determined by the Resolution of the Government of Georgia #138 of August 11, 2005 "On approval of the regulations on the rules and requirements of issuance of fishing licenses".

In accordance with this resolution, fishing implied and implies fishing in the Black Sea and inland waters. The license covers fishing in the Black Sea at the minimum distance of 300 m off the shore and fishing in inland waters. Licensing is mandatory. Prior to the redistribution of competences between the ministries, the licenses had been issued by the Ministry of Economy and Sustainable Development based on information provided by and in coordination with the Ministry of Environment Protection and Natural Resources. Currently, this is the competence of the Ministry of Energy and Natural Resources. Fishing in the Black Sea at the distance of less than 300 m off the shore, amateur fishing, fishing for research purposes, fishing in the Lake Paliastomi are not subject to licensing. Setting the rules for these kinds of fishing was the competence of the Ministry of Environment Protection and Natural Resources. Currently, the ministry sets only the rules of fishing for research purposes in coordination with the Ministry of Energy and Natural Resources. The latter also sets the rules for fishing in the Black Sea at the distance of less than 300 m off the shore and for fishing in the Lake Paliastomi in coordination with the Ministry of Environment Protection.

The Ministry of Energy and Natural Resources is currently responsible for issuing fishing licenses (including fishing in the Black Sea), setting quotas on the use of resources and licensing requirements.

Licensing requirements for fishing in inland waters are equal for all licenses. The requirements are specified in the Resolution of the Government of Georgia #138 of August 11, 2005 "On approval of the regulations on the rules and requirements of issuance of fishing licenses". The licensing requirements were developed by the Ministry of Environment Protection and Natural Resources of Georgia prior to the change in ministerial competences.

Additional licensing requirements can be (and as a rule are) set for concrete water reservoirs.

One of the licensing requirements is development of water reservoir and fishery management plans. Prior to the change of ministerial functions, the Ministry of Environment Protection and Natural Resources determined the rules of development and approval of such plans. At present this function is performed by the Ministry of Energy and Natural Resources, which also approves self-management plans – a function, formerly performed by the Ministry of Environment Protection and Natural Resources.

3.1.4. General forest use license, special logging license and special license for the arrangement of hunting farms

In accordance with amendments to the Forest Code of Georgia of July 6, 2010, the following forest management activities were (and are) permitted on the territory of the Forest Fund of Georgia:

a) Logging;
b) Establishment of forest plantations;
c) Production of wood and non-wood materials (seeds, fruit, logs, brushwood, etc.);
d) Use of non-wood forest resources (mushrooms, medicinal herbs and raw materials, other herbs, shrubs and their products);
e) Agricultural activities;
f) Use of resources for special purposes;
g) Scientific and educational activities;
h) Recreation, health improvement, sport and other cultural and recreational activities;
i) Establishment of hunting farms;
j) Establishment of fish farms;
k) Hunting;
l) Removal of the fertile layer of soil;
m) Non-agricultural activities;
n) Establishment of shelters and nurseries for animals;
o) Other activities envisaged by "Forest Management Rules".

In accordance with the Forest Code, forest management is regulated by the general forest management license (hereinafter – General License), the logging license and the special license for the arrangement of hunting farms (hereinafter – Special Licenses) and the license for exporting pinecones, snowdrop (*Galanthus woronowii*) bulbs and/or Cyclamen (*Cyclamen coum*) tubers, included into the annexes to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Other kinds of forest management activities do not require licensing in compliance with the Law of Georgia "On Licenses and Permits".

The procedure for issuing the general forest use license and the special licenses is defined by the Resolution of the Government of Georgia #132 of August 11, 2005, "On approval of the regulations on the rules and requirements of issuance of forest management licenses".

Under the resolution, the general license is a document including the special license for the arrangement of hunting farms and the logging license. Issuance of the general license for any of these activities is not mandatory.

The licenses are sold by auction. Prior to the change in ministerial competences, the licenses were issued by the Ministry of Economy and Sustainable Development based on information provided by and in coordination with the Ministry of Environment Protection and Natural Resources. At present the licenses are issued by the Ministry of Energy and Natural Resources.

The basic licensing procedure has remained unchanged and it is the same for the general license and both special licenses. The procedure is described below.

Special logging license

Amendments to the above resolution stipulated that from January 1, 2010, the special logging license was required only for the State Forest Fund areas subject to forest husbandry activities (i.e. inventory, identification of number, kinds, location of trees subject to felling. Forest husbandry materials make the basis for the forest management plan – see below). Forest husbandry activities were to be conducted by corresponding agencies in charge with forest management, including the Forest Agency of the Ministry of Environment Protection and Natural Resources. The Agency was authorized to determine the size, location and number of forest resources subject to felling. The regulation, however, did not work and was first suspended until January 1, 2011, and later, under the amendment of January 21, 2011, until January 1, 2012. At present the function is within the competence of the Ministry of Energy and Natural Resources.

Hence, forest husbandry activities were and are conducted by holders of special logging license (or the general license), since these activities make the basis for development of forest management plans. Development of the plans and their submission for approval within a year's period is one of the licensing requirements, stipulated by the above mentioned resolution. The forest management plan, based on forest husbandry materials, determines, among other issues, annual felling quotas. Prior to the change in ministerial functions, the procedures for the plan approval and plan approval itself were in the competence of the Ministry of Environment Protection and Natural Resources. At present, the procedures for plan approval are confirmed by the Ministry of Energy and Natural Resources, while the plan is approved by the Agency. As prior to the change in ministerial competences, license holders currently have no right to conduct felling until the approval of forest management plan within one year period from the moment of license issuance.

It is noteworthy that prior to the change in ministerial competences, requirements and rules related to forest management were set and/or approved by the Ministry of Environment Protection and Natural Resources, whereas currently this function is performed by the Ministry of Energy and Natural Resources except for the part of protected areas pertaining only to this sphere.

Special license for the arrangement of hunting farms

In accordance with the Law of Georgia "On Fauna", hunting is permitted only with the special license and only in the form of amateur and sport hunting.

The law allows hunting only in specially allotted areas – hunting grounds (except for migratory bird hunting), sanctuaries and special hunting zones within the protected areas of other categories.

In compliance with the amendments that were introduced into the Law of Georgia "On Fauna" on July 6, 2010, hunting was allowed only in specially allotted areas – hunting grounds (except for migratory bird hunting), sanctuaries, special hunting zones within the protected areas of other categories and in the areas managed by the Forestry Agency, a legal entity of public law within the ministry's system. The amendment was to come into force on August 1, 2010. It authorized the Forestry Agency with issuing one-time hunting permit acting both inside and outside the hunting area. A corresponding amendment was also introduced into the Forest Code of Georgia. The provision, however, had no practical use, since the amendment of the Forest Code required corresponding legislative amendments concerning hunting quotas and other issues. As a result of the amendments, introduced into the Forest Code on November 8, 2011, after the change of ministerial competences, hunting (except for migratory bird hunting) is permitted only based on a special document, issued by the Agency of Natural Resources. The Minister of Energy and Natural Resources sets hunting quotas, objects, rules and terms. Prior to the changes, this function had been implemented by the Minister of Environment and Natural Resources. This kind of hunting just as the migratory bird hunting does not require licenses or permits under the law. As mentioned above, the license is required only for the arrangement of a hunting farm.

A hunting farm is an administered territory, established in order to ensure ecosystem and wildlife protection and sustainable use of resources (in this case game animals), including hunting. A hunting farm can be established based on the special license for the arrangement of hunting farms. Licensing requirements are set by the Ministry of Environment Protection and Natural Resources and specified in the Resolution of the Government of Georgia #132 of August 11, 2005, "On approval of the regulations on the rules and requirements of issuance of forest management licenses". Most of the licensing requirements oblige license holders to protect and restore species, including endangered varieties.

The licensing requirements also stipulate that:

- The license holder shall conduct annual inventory/registration of animal species for the purpose of determining hunting quotas and shall submit the results to the corresponding agency. Hunting quotas shall not be determined in the first year of licensing. Prior to the change of ministerial competences, the license holder used to submit this information to the Ministry of Economy and Sustainable Development, which sent the materials to the Ministry of Environment Protection for consideration and determination of hunting quotas of which it in turn notified the Ministry of Economy. The latter approved the annual hunting quotas by species by passing an administrative legal act/order. It was up to the Ministry of Environment Protection and Natural Resources to approve the procedure for the inventory of animal species in a hunting farm prior to the change. At present, the license holder submits the inventory materials to the Agency that sets the quotas, while the Ministry of Energy and Natural Resources approves the inventory procedures and the quotas.
- The license holder shall develop and submit the hunting farm management plan to the corresponding agency for approval within one year from the license issuance. Prior to the change of ministerial functions, the Ministry of Environment Protection and Natural Resources had approved the procedures for plan development and approval and the plan itself. At present, the Ministry of Energy and Natural Resources approves the procedures, while the Agency approves the plan (the mentioned rule was approved by the Ministry of Environment Protection and Natural Resources in April 2010 and by the Ministry of Energy and Natural Resources. It has not been approved once again since then).

Overview of compliance of the Georgian legislation on licenses and permits with the CITES requirements

In accordance with the Law of Georgia on "Licenses and Permits" of 2005, export, import, re-export and introduction from the sea of samples of species included into the CITES Annexes, require licensing. Concrete rules and requirements are determined by the Georgian Government Resolution #18 of February 6, 2007. Under the resolution, the Ministry of Environment Protection and Natural Resources acted and acts as CITES' administrative body and is responsible for the issuance of licenses.

In compliance with the Convention, license issuance requires a confirmation from a research institution that the concrete species will not be endangered in case of license issuance. The Convention also stipulates the existence of such institutions in participating countries.

The procedures of the CITES' national research institution in Georgia have been determined by the Order #143 of the Minister of Environment Protection and Natural Resources of Georgia of February 21, 2007. The Minister invites the institution to develop recommendations to be taken as a basis for decision-making on license issuance.

In accordance with the Law of Georgia "On Licenses and Permits", snowdrop and cyclamen harvesting for the purpose of export shall be subject to licensing. Georgia annually exports these species for commercial purposes. The license for harvesting snowdrop bulbs and cyclamen tubers is sold by auction in accordance with the predetermined production quotas based on the research

institution's recommendations. The permit for exporting snowdrops and cyclamen for commercial purposes shall be issued based on the production license.

Export license for pinecones and snowdrop bulbs and/or cyclamen tubers, included into the CITES Annexes

Export license for pinecones and snowdrop bulbs and/or cyclamen tubers, included into the CITES Annexes is issued in compliance with the Georgian Government Resolution #21 of February 6, 2007 "On approval of the regulations on the rules and requirements of issuance of the export license for pinecones and snowdrop bulbs and/or cyclamen tubers, included into the CITES Annexes". The need for the license was conditioned by high demand for these resources for export purpose.

Unlike pinecones, snowdrops and cyclamen are included into the Annex 2 of CITES; hence, the use of these resources requires a different regulating mechanism. In compliance with CITES, export of species included into Annex 2 requires preliminary issuance of the export permit. The research body under the Ministry set annual quotas on harvesting of these plants. Based on the quotas the Ministry of Economic Development issued the harvesting license (the ministry was vested with this function in 2008; prior to this it was the competence of the Ministry of Environment Protection and Natural Resources. Currently the license is issued by the Ministry of Energy and Natural Resources), while based on the license the Ministry of Environment Protection and Natural Resources issued and issues the export permit as required by the Convention.

The introduction of the license was conditioned by the growing demand for snowdrop and cyclamen harvesting and export. The demand considerably exceeded the annual resource use quota, set by the research body. This situation significantly impeded the process of issuance of permits for snowdrop and cyclamen harvesting due to quota redistribution among stakeholders. Consequently, the first normative acts, regulating this issue, were adopted in 2005, while in 2007 the Government approved a regulation, which is still in force. In 2008, 10-year snowdrop harvesting licenses were granted to four stakeholders, who will proportionally redistribute the annual production quota during the validity of the license.

Pinecone harvesting quotas are also set on the annual basis.

3.2. Main legislative shortcomings

The acting environmental legislation has the following shortcomings:

- Inadequate and inconsistent representation of international norms in the national legislation;
- The lack of concrete norms pertaining to conservation and sustainable use of biodiversity in the Law of Georgia "On the System of Protected Areas" and the absence of legal relationship between the protected area categories and spatial-territorial categories;
- The lack of the so-called *transition period* (*from the moment of protected area establishment till the moment of approval of its adequate management plan and administration forming*) necessary to fully activate the protection regimes of different protected area categories, which leads to the creation of formally existing protected areas (eg. Ktsia-Tabatskuri Sanctuary);
- Simultaneously acting and often conflicting legislative acts (particularly in the wildlife regulation sphere) and not less conflicting by-laws in the sphere of biodiversity protection and use of resources (see Annex 1);
- Lack of a unified systematized act in the forestry sphere, extremely weak legal status of forest fund lands, directly leading to forest fragmentation (see Annexes 9 and 10);
- Lack of species conservation plans and legal status of eco-corridors in the sphere of species and habitat conservation planning.

4. State control over the biodiversity protection, responsibilities related to biodiversity (existing institutions and their functions) and integration of biodiversity concerns in decision-making (*EIA, environmental permitting*) process

4.1. Existing institutions and their functions

4.1.1. Supreme legislative and executive authorities

The President and the Parliament of Georgia

The President of Georgia is the head of state, vested with vast powers by the Constitution of Georgia, under which the President shall lead and exercise the internal and foreign policy of the state, ensure the unity and integrity of the country and the activity of the state bodies in accordance with the Constitution. The President of Georgia shall be the higher representative of Georgia in foreign relations, shall conclude international agreements and treaties. The President of Georgia shall be authorized to suspend or abrogate acts of the Government and the bodies of the executive power, if they are in contradiction with the Constitution of Georgia, international treaties and agreements, laws and the normative acts of the President. The President of Georgia shall be authorized to issue decrees and orders on the basis of the Constitution and law.

The Parliament of Georgia shall be the supreme representative body of the country, which shall exercise legislative power, determine the principle directions of domestic and foreign policy, exercise control over the activity of the Government within the framework determined by the Constitution and discharge other powers.

The Government of Georgia

Authorities and functions of the central bodies of the government of Georgia are determined by the Law of Georgia "On Structure, Powers and Procedures of the Government of Georgia". Regulations of these bodies are based on and aimed at implementation of this law and other laws of Georgia.

The Government shall coordinate and control the activities of the Ministries. The Government shall exercise its authority based on the governmental program approved by the Parliament of Georgia.

If an issue, submitted to the executive authority for decision making, is beyond the scope of all the ministries, it is up to the government to make a decision on this issue.

The Government's competences also include regulation of financial and budgetary relations. The Government shall submit to the Parliament the draft of the state budget, approved by the President, and shall ensure its implementation after its approval by the Parliament.

Besides, the Government shall approve state target programs in the social, economic, cultural and other fields and ensure their implementation.

The National Biodiversity Strategy and Action Plan (NBSAP), approved by the Government's Resolution #27 of February 19, 2005, shall be regarded as one of such programs. The document features a 10-year strategy of conservation and sustainable use of biological diversity of Georgia and a 5-year plan of concrete actions. The Government approved the NBSAP based on Article 5, subparagraph "p" of the Law of Georgia "On Structure, Powers and Procedures of the Government of Georgia", under which the government shall "ensure implementation of a common state policy in the fields of protection of the environment and natural resources and ecological safety of the population". In accordance with subparagraph "q" of the same article, the Government shall also "organize protection and efficient use of natural resources".

The mentioned law, however, fails to determine the government's competences in the sphere of agriculture. The direct integration of government's competences in the environmental protection sphere into the law is due to the influence of corresponding constitutional norms rather than to prioritization of environmental issues at the legislative level in relation to agriculture or any other sphere (not covered by this law).

Consequently, based on the above mentioned provisions (subparagraphs "p" and "q") of the Law of Georgia "On Structure, Powers and Procedures of the Government of Georgia", the Government is authorized to approve (adopt) policy documents in the fields of protection of the environment and natural resources and ecological safety of the population (eg. strategies, action plans, programs, concepts, etc.) except when approval of such documents/issues is the domain of a ministry.

4.1.2. Role of central authorities in the biodiversity sphere

The Ministry of Environment Protection and the Ministry of Energy and Natural Resources are the key government bodies with various competences in the biodiversity sphere. Besides, a number of departments and agencies have important auxiliary functions in this sphere.

The Ministry of Environment Protection of Georgia

The Ministry of Environment Protection is the key body of the executive authority in biodiversity protection sphere.

The ministry's terms of reference and objectives in the sphere of environmental protection (including biodiversity) are determined by the ministry's regulations, adopted by Resolution #132 of March 16, 2011 and based on legislative amendments, adopted in the beginning of 2011 for the purpose of implementation of the government's institutional reform, namely, on the Law of Georgia "On Introduction of Amendments into the Law of Georgia on the Structure, Powers and Procedures of the Government of Georgia" of March 11, 2011. The Law outlines the functions that fell within the sphere of the Ministry of Environment Protection and Natural Resources before the adoption of the law and were redistributed after its adoption between the newly established Ministry of Environment Protection, the Ministry of Energy and Natural Resources and other bodies (the Ministry of Regional Development and Infrastructure, the Ministry of Agriculture and others).

The ministry's regulations specify all the functions and authorities that the ministry has under the current law. The ministry's objectives and terms of reference directly or indirectly relating to biodiversity issues are:

Biodiversity protection, restoration and monitoring:

- Biodiversity monitoring;
- Determination of priority directions, planning, implementation and coordination of efforts for the the protection and recovery of wild animals and plants;
- Planning, implementation and coordination of efforts for the the protection and recovery of endangered species;
- Making decisions on removal of species, included into the Red List, from their habitats;
- Implementation of public policy on forming, operation and management of the protected area system, coordination and monitoring of efforts in this sphere.

Regulation of biodiversity components:

- Regulation of animal species removal from their habitats for scientific purposes, regulation of population of wild animals;
- Issuing permits for export, import, re-export and introduction from the sea of species, included into the annexes to the Convention on International Trade in Threatened Species of Wild Flora and Fauna (CITES), their parts and derivates;

- Participation in determination of rules and quotas of removing animal species from their habitats (including terms and places of capture, prohibited tools and methods, species subject to capture, sportfishing);
- Participation in setting quotas for the use of fauna resources;
- Participation in development of management planning regulations concerning hunting and fishery farms and coordination of the plans.

General environmental issues:

- Public management of environmental protection;
- Preservation of ecological balance on the territory of Georgia based on the principles of environmental requirements, sustainable nature management and development.

Environmental policy:

- Participation in development and implementation of the national policy on environmental protection and safety;
- Participation in elaboration of national economic and social development concepts, projects and task programs;
- Participation in development and implementation of European and Euro-Atlantic integration policy within its terms of reference;
- Coordination and monitoring of fulfillment of commitments assumed under international environmental treaties;
- Participation in drafting and approval (publication) of legislative acts and subordinate legislation within its terms of reference.

Control, monitoring, environmental education and awareness:

- Implementation of state control in environmental protection sphere within its terms of reference and drawing up administrative offence reports in cases envisaged by the law;
- Implementation of ecological expertise and issuance of permission for the impact on the environment;
- Organization and the state environmental monitoring system;
- Enhancement of environmental education and awareness.

The Ministry is comprised of structural units and legal entities of public law, working under its control (See Annex 4 – Organizational Structure of the Ministry). The ministry's territorial units were abolished as a result of institutional and structural reform, implemented in early 2010.

The Biodiversity Protection Service is the ministry's structural unit directly dealing with biodiversity issues.

The Agency for Protected Areas and the National Environmental Agency are other legal entities of public law, working in this sphere under the Ministry's authority.

The Biodiversity Protection Service

The Biodiversity Protection Service is a structural unit under the Ministry of Environment Protection. The Service deals with policy development and implementation of limited administrative functions and has no supervising functions.

The Service's functions, defined by the Order #29 of the Minister of Environment Protection of June 9, 2011, include all the functions and competences pertaining to biodiversity protection, restoration and monitoring as well as regulation of biodiversity components, falling within the sphere of the Ministry of Environment Protection, except for the establishment, operation and management of the protected area system.

Besides, the Regulations of the Biodiversity Protection Service include the following functions:

- Participation in development of biodiversity protection policy and ensuring its implementation;
- Development of Georgia's Biodiversity Strategy and Action Plan and coordination of its implementation;
- Organization and coordination of implementation of Georgia's international commitments in biodiversity protection sphere;
- Participation in consideration of environmental impact assessment report.

The Agency of Protected Areas

The Agency of Protected Areas (APA) is a legal entity of public law that is part of the MoEP system. Unlike structural units of the Ministry, this agency has administrative and financial autonomy guaranteed to public agencies by law, and fulfills its activities independently, under the supervision of the State.

According to the Georgian law and to APA's Regulations, APA is responsible for in-situ conservation of biodiversity in protected areas. APA fulfills this function through its function of protected area management. The system of protected areas consists of the following PA categories: state reserve, national park, monument of nature, sanctuary, protected landscape, and multiple-use area.

State reserves, national parks, monuments of nature and sanctuaries include only territories owned by the state, so these are directly managed by APA as the authority responsible for protected area management.

Protected landscapes and multiple-use areas may include non-state lands, e.g. populated areas, private agricultural and non-agricultural lands, etc. Hence the law stipulates that the protected areas managing authority, i.e. APA may manage protected landscapes only jointly with other organizations (local self-governments), whereas multiple-use areas are managed exclusively by local self-governments.

Regardless of the management format, APA and MoEP are responsible for development and approval of management plans for all the six categories of protected areas (including protected landscapes and multiple-use areas).

Biological resources may be used in some categories of the protected areas, i.e. protected landscapes, multiple-use areas, sanctuaries and traditional use zones of national parks.

In these PA categories, also in the traditional use zones, balanced activities promoting sustainable development and local income-generation are generally allowed. These include traditional resource use, limited grazing and haymaking to meet the needs of the local population. In protected landscapes and multiple-use areas, land cultivation, seeding and construction of agricultural facilities are also allowed.

Therefore, these categories of protected areas and their separate zones may be used for agrobiodiversity conservation as well as for sustainable agriculture (including biofarming).

In the same time, none of the protected areas has a management plan that regulates agricultural activities and/or agrobiodiversity conservation and rational use in these PA categories, also on agricultural lands located within the protected areas. Management plans do not specify any programs of allowed activities or action plans, which actually limits the rights of the local communities in adjacent areas for traditional resource use. It also limits some functional uses of the protected areas, such as traditional farming and crafts to maintain unique local historical and cultural environment and stimulate income-generation activities that would ensure sustainable agriculture and resource use.

Stimulation of such activities is a direct function and competence of the Agency of Protected Areas that APA should fulfill in respective protected areas (protected landscapes, multiple-use areas,

sanctuaries and traditional use zones of national parks) through management of existing local resources there, i.e. by development and implementation of PA management plans.

The Integrated Environmental Management Department

The Integrated Environmental Management Department is a structural unit of the Ministry of Environment Protection (see Annex 4) that also consists of four divisions: Air Protection Unit, Water Management Unit, Waste and Chemical Substances Management Unit, and Hydrometeorology and Climate Change Unit.

The National Environmental Agency

The National Environmental Agency is a legal entity of public law that is also responsible for issues related to climate change, biodiversity and agriculture, acts under the authority of the Ministry of Environment Protection, also deals with climate issues. The agency's goals, objectives and functions, inter alia, include monitoring of biodiversity.

The Agency was established in 2008, merging together the functions of different former independent institutions, primarily the former State Department Hydrometeorology and Geology. Today the Agency consists of several structural units: the Hydrometeorology Department, Environmental Pollution Monitoring Department, Geological Hazard Management Department, and Environmental Information Service.

In the field of biodiversity monitoring, Environmental Pollution Monitoring Department's Black Sea Monitoring Center (former Black Sea Ecology and Fishery Research Institute) monitors biodiversity in the sea and seashore ecosystems, rivers and inland reservoirs, studies different components of the ecosystems (bacteria, zooplankton, macrozoobenthos, fish fauna, sea mammals, etc) and draws respective conclusions, recommendations and proposals.

In general, the National Environmental Agency has no direct legitimate obligation for systematic monitoring of biodiversity and/or systematic monitoring and analysis of climate change. In these fields, the functions of the National Environmental Agency are incomprehensive, fragmental and non-systematic.

The Ministry of Energy and Natural Resources of Georgia

The Ministry of Energy and Natural Resources of Georgia ensures implementation of the state policy on management and use of natural resources.

The Ministry monitors implementation of the state policy, strategy and programs in the field of management and use of natural resources, ensures their implementation, analyzes progress of implementation and prepares corresponding recommendations. The Ministry encourages investments in resource use and management and implements necessary activities within its terms of reference. The Ministry supports projects aimed at efficient resource use and management based on evalution of potential resources and sustainable development.

The Ministry received the competencies of natural resource management and use after the institutional reform implemented early in 2011. Together with other issues, these competences also included establishment of quotas for wildlife and wild plant (biodiversity) use and determination of use methods. This fact still causes collision between functions and competences of the Ministry of Energy and Natural Resources and the Ministry of Environment Protection.

Generally, the Ministry of Energy and Natural Resources is oriented at wider resource use and liberalization of regulatory mechanisms and norms in this field.

In the sphere of resource management and use, the Ministry is represented by the legal entity of public law under its authority – the Agency of Natural Resources (See Annex 5), that in its turn has territorial offices.

The Agency of Natural Resources was established during the 2011 institutional reform, after the merger of the former Forestry Agency under the Ministry of Environment Protection and Natural Resources and the former Oil and Gas Agency under the Ministry of Energy. Re-organization of the Agency early in 2012 changed the roles and functions of its structural units and eliminated integrated territorial offices of the Agency (see Annex 5 Organizational Chart of Ministry of Energy and Natural Resources before and after April 2012).

Today the Agency has the Forest and Wildlife Department that has territorial offices. Through the Forest and Wildlife Department, the Agency implements forestry management and regulation of forest resources of the forest fund (wood, land, non-wood products, and wildlife) (see Box 8.2 overleaf).

Box 8.2 - Abstract from the Regulation of the Agency of Natural Resources approved by Decree no. 01 of the Ministry of Energy and Natural Resources on March 18 2011

Agency's Goals and Tasks (Article 2) and Rules and Responsibilities (Article 3)

- Management and use of natural resources for the purpose of the country's sustainable development;
- Approval of natural resource use quotas and scopes;
- Management of the forest fund;
- Regulation of forest use;
- Forest maintenance and restoration;
- Sustainable use of biological diversity components on forest fund lands;
- Forest fund monitoring and creation of forest fund database;
- Distribution of forest fund lands for agricultural and non-agricultural uses;
- Preparation of forest fund areas for licensing;
- Control over the forest fund territories;
- Planning and implementation of measures to protect forest from illegal uses;
- Organization of hunting permit issuance;
- Planning for engendered species breeding in captivity, also implementation of activities for implementation of hunting farm management plans.

In terms of biodiversity, functions of the Agency of Natural Resources and the Forest and Wildlife Department in many cases are vague and non-specific (see box 2), e.g. "Sustainable use of biological diversity components on forest fund lands". Such functions and/or their components are not reflected in any regulations or bylaws.

Consideration should be also given to the fact that the Agency of Natural Resources regulates the use of only those species that are subject to licensing under the Georgian Law On Licenses and Permits or to contracting under the Georgian Law On Forest Management. Today the list of such uses includes woody plants, species that are subject to hunting and arrangement of hunting farms, fishing, some plant species (e.g. pinecones) and use of the forest fund lands, including agricultural use.

Ministry of Agriculture of Georgia

The Ministry of Agriculture of Georgia (MoA) is the key agency for implementation of the state agricultural policy.

The Ministry's terms of reference include agriculture, soil conservation and melioration, plants protection within its competence, cattle breeding, agricultural engineering and veterinary.

The Ministry of Agriculture is responsible for strategic agricultural policy-making and implementation. It has long-term obligations for disease control, food security, food safety, animal health, protection of plants, improvement of soil fertility, scientific research and sharing of experience. The MoA fulfills these obligations both directly or through subordinate agencies.

The Ministry system includes its structural units and the following legal entities of public law acting under the governmental supervision (see Annex 6):

- National Wine Agency;
- Laboratory of the Georgian Agriculture;
- National Food Agency.

The Ministry has no territorial units.

The MoA and its subordinate public agencies (except for the National Wine Agency) have no direct legitimate (i.e. stipulated by law or regulation) obligation for agrobiodiversity conservation and maintenance and/or sustainable genetic resource use.

The only legal act that mentions agrobiodiversity in relation with agriculture, hence with the Ministry of Agriculture, is the 'National Agricultural Development Strategy for 2012-2022' approved by the Georgian Government on March 28 2012 (by Governmental Regulation #566).

The National Agricultural Development Strategy includes the 'Environmental Protection' component that stresses the importance of agrobiodiversity. In its turn, this component includes a section on 'Sustainable use of Plant Genetic Resources' containing information on the importance of genetic resources of plants used for agriculture and food production, also on gene pools collected in some scientific research institutions of Georgia.

Namely, the 'Environmental Protection' component of the Strategy mentions that 'Georgia as a part of the Caucasus Ecoregion is an important biodiversity hotspot where conservation and sustainable use of agrobiodiversity has a particular role in agricultural development'.

The section on 'Sustainable use of Plant Genetic Resources; mentions that 'Genetic resources of plants used for food production and agriculture are products of the natural evolution and human intervention. Farmers, plant and animal breeders, also local communities play an important part in the conservation and improvement of the plant genetic resources. They make a significant contribution to the conservation and use of the genetic resources of agricultural plants and animals'. The Strategy also says that 'there is some progress in ex-situ and on-farm conservation of endangered and endemic species and agrobiodiversity'.

In the same time, the Environmental Protection component of the Strategy includes a description of existing environmental challenges in the field of agriculture and a list of activities to be implemented. The list includes the following climate change adaptation activities: establishment and modernization of early warning system for natural disasters, also a number of other activities for mitigation of the climate change impact on agriculture (e.g. planting and maintenance of windbreaks, rational use of fertilizers and chemicals, etc).

The Ministry of Economy and Sustainable Development of Georgia

The Georgian Ministry of Economy and Sustainable Development has a particular role in biodiversity and generally environmental protection, as this is the Ministry responsible for public property privatization and economic development.

One of the Ministry's structural units is the Department of Sustainable Development whose functions are to prepare the Sustainable Development Strategy and support national program of action; participate in implementation of activities to prepare the country for global challenges; identify, generate and analyze innovative sustainable development projects, assess their need and feasibility, and submit respective proposals to the Georgian Government; promote identification of the

country's investment potential and resources in terms of sustainable development; prepare legal initiatives promoting sustainable and secure development, and submission of the initiatives to the Georgian Government for approval as envisaged by law.

Cooperation of the Ministry and the Department with other executive agencies and the society, business and international institutions is critical for achieving the above goals.

The National Statistical Service (GeoStat)

The National Statistical Service (GeoStat) is an independent body of the executive system acting on the basis of recognized principles of international statistics, the Georgian Law On Official Statistics and other regulations.

Accurate statistics are very important for the development of the environmental sector. The National Statistical Service collects and publishes important data related to environmental protection and natural resources.

4.2. Control Over Compliance with License and Permit Terms

Before the re-distribution of competences between the Ministries, control over License and Permit compliance was ensured by the Ministry of Environment Protection and Natural Resources. After the change, the Ministry of Energy and Natural Resources ensures license control, whereas the Ministry of Environment Protection controls permit compliance.

As mentioned above, resulting from amendments to the Georgian Law On the Structure, Competences and Activities of the Georgian Government made on March 11 2011, the Ministry of Environment Protection and Natural Resources changed its name for the Ministry of Environment Protection, also changing its competences and obligations in terms of environmental protection and natural resources in general and biodiversity conservation and use in particular. Some competences and obligations of the Ministry were transferred to the Georgian Ministry of Energy and Natural Resources. In order to fulfill its new functions of resource management, some units of the former Ministry of Environment Protection and Natural Resources – the Forestry Agency and the Environmental Inspectorate – were also transferred to the Ministry of Energy and Natural Resources.

Before March 11 2011, the competence of the Ministry of Environment Protection and Natural Resources included issuance or participation in issuance of licenses and permits. Today the Ministry of Energy and Natural Resources is responsible for most of the procedures.

In addition, the Ministry of Energy and Natural Resources now has the responsibility for approving most of bylaws/regulations in the field of biodiversity, namely for protection of animals and plants.

Most of the bylaws/regulations (norms and rules on licensing and resource use and protection) mention that the Ministry of Energy and Natural Resources is responsible for issuing the licenses and approving norms and rules, yet they do not mention MoEP's role (participation or approval) in these processes. Though, the MoEP's statute says that the MoEP's activities and tasks include governance of the environmental protection; identification, planning, implementation and coordination of priorities of wildlife protection and restoration; participation in establishing terms and quotas for wild animal use (including hunting terms, locations, prohibited arms and methods, species allowed for hunting and non-commercial fishing); participation in hunting and fishing farm management planning and approval within its competences. It seems from the above, that MoEP's involvement in these issues depends on the will of the Ministry of Energy and Natural Resources. It is recommended to improve the situation, since the MoEP is the agency that has rich experience and motivation in biodiversity conservation, as for years it was involved in, and later fully responsible for, regulation of the biodiversity conservation and bioresource use. Cutting down on MoEP's competence in f biodiversity would potentially have an adverse impact of the biodiversity status in Georgia.

4.3. Integration of Biodiversity in Decision-Making

The Environmental Impact Assessment and issuance of Environmental Impact Permits in Georgia are regulated by the Laws On Environmental Impact Permits and On Ecological Expertise. The Law on Environmental Impact Permits has not been recently amended, except for some technical changes reflected in the Regulation On Environmental Impact Assessment (the EIA Regulation) updated and approved by the MoEP by decree no. 14 of October 14 2011. The Law On Environmental Impact Permits contains a complete list of activities that require an Environmental Impact Permit or Environmental Impact Assessment (a total of 21 types of businesses). The Law On Environmental Impact Permits also stipulates the need for public involvement into the permitting process.

According to the Law On Environmental Impact Permits, EIA should also assess the potential impact on biodiversity and identify prevention, mitigation and conservation measures.

General EIA requirements are set out in the Law On Environmental Protection of December 10 1996 that defines environmental requirements during project approval and implementation. According to the law, implementation of activities/projects on the territory of Georgia requires an Environmental Impact Permit in order to secure environmental, social and economic interests of the society and the state, also to protect public health, environment and cultural and material values. Environmental Impact Assessment must be conducted prior to issuing the Environmental Impact Permit.

As mentioned before, today the EIA system is regulated by the Laws On Environmental Impact Permit and On Ecological Expertise. According to the Law On Environmental Impact Permits, EIA is required for activities that are associated with a hazard for human life or health. According to notes to the law, EIA is a planned procedure for examination of the planned activity that aims at protection of separate components of the environment, also protection of people, landscape and cultural heritage. EIA studies, identifies and describes direct and indirect impact on human health and safety, also on vegetation and wildlife, soils, air, water, climate, landscape, ecosystems, historical heritage, or combination of the above, also the impact on cultural values and socioeconomic factors.

The law specifies a complete list of activities that require an Environmental Impact Permit and Environmental Impact Assessment:

a) extraction of mineral resources (except for building (also aggregate materials with the exception of those listed in c));
b) any production using asbestos;
c) manufacture of cement, asphalt, lime, plaster, gypsum and bricks;
d) manufacture of glass and glass products;
e) disposal of solid municipal waste (including construction of waste incinerators); and/or construction of landfills;
f) disposal of toxic and other types of hazardous waste, arrangement of landfills and/or waste processing and neutralization;
g) facilities of any capacity for gasification and liquefaction of coal; coal carbonization; briquetting of coal and lignite;
h) construction of oil and gas pipelines;
i) construction of storages and terminals for oil and petroleum products, also liquefied and natural gas, that have at least one reservoir of over 1000 cubic meters or that have the total capacity of over 1000 cubic meters;
j) construction of motorways, railways of international and national importance, also vehicle and rail bridges, tunnels as well as engineering measures for the protection of the motorways, railways and their right-of-ways;
k) construction high-voltage (35kW and more) aboveground and underground power transmission lines and substations (of 110kW and more)
l) construction of hydropower plants (2MW and more) and thermal power plants (10MW and more);
m) construction of subways;

n) construction of water reservoirs of 10000 cubic meters and more)
o) construction of wastewater treatment facilities (1000 cu m per day and more), also main sewage collectors;
p) construction of airdromes, airports, railway stations and seaports; construction of dams, ports, piers and jetties;
q) chemical production, including chemical treatment of semi-finished products (intermediate products) and production of chemicals; manufacture and processing of pesticides, mineral fertilizers, chemical, paints and varnishes, peroxides and elastic substances (rubber or plastic substances); manufacture and packaging of gunpowder and other explosives, production of accumulator batteries and graphite electrodes; production of refrigerators.
r) oil and gas refineries (over 500 tons per day);
s) metallurgical industry of any type (over 1 ton per hour), except for cold metal processing and jewelry;
t) construction of toxic and other hazardous substance storages.

The law does not specify any procedure for scoping, i.e. determination of the EIA tasks and scopes. The EIA Regulation identifies EIA stages and mandatory issues to be included in an EIA report that cover all activities requiring an Environmental Impact Permit.

The EIA is organized and implemented by the project developer who is also responsible for covering any EIA-related costs.

An EIA report is submitted to MoEP for issuing an Environmental Impact Permit. If a project requires a construction permit, the EIA report and other documents envisaged by law are submitted to a construction permit issuing authority that forwards them to the MoEP. In this case, the MoEP does not issue an Environmental Impact Permit but issues an Ecological Expert Opinion containing terms and conditions that are then reflected in the Construction Permission and must be fulfilled.

Necessary components of the permission issuance procedure include:

- Environmental impact assessment;
- Ecological expertise
- Public participation in the decision-making.

In order to obtain an Environmental Impact Permit or a Construction Permit for a project/activity, the law requires an Ecological Expertise that should inform objective and substantiated environmental decision-making about the project. Issues related to the Ecological Expertise are regulated by the Law On Ecological Expertise. In the process of the Ecological Expertise, the Expert Commission set up by MoEP considers the submitted project document package and the EIA report and draws an Expert Opinion. Only a positive expert opinion is used as a basis for issuing an Environmental Impact Permit or a Construction Permit. The Permits define terms and conditions for the project/activity, including the need to implement measures for preventing/mitigating impact on biodiversity.

In compliance with the Georgian Law On Environmental Impact Permit, the project developers shall:

- Arrange for public disclosure of the EIA report prior to submitting it to the permit issuing authority, by publishing an announcement in central or local printed media.
- Submit the EIA report to the permit issuing authority within one week after publishing an announcement in the printed media.
- Receive and review comments and considerations from a representative of the public within 45 days after publishing the information about the planned project/activity;
- Arrange for public disclosure of the EIA report no earlier than 50 and no later than 60 days after publishing the information about the planned project/activity;
- Compile a report reflecting results of the public disclosure of the EIA report within 5 days after the public disclosure;

After the public disclosure of the EIA report, reporting and finalization of the EIA report, the project developer has the right to submit an application to obtain an Environmental Impact Permit/Construction Permit to the Permit Issuing Authority within one year.

The Permit Issuing Authority shall make a decision on permit issuing within 20 days after the application. If the Authority fails to make a decision about issuance/non-issuance of the permit within this term, the permit shall be deemed issued unless the issuance term is prolonged as envisaged by law.

Challenges related to the biodiversity component of the EIA reports[71]; their approval and further control of the issued permit compliance include the following:

- The Ecological Expertise and inspection methodology, e.g. inspection procedures and individual inspection plans (one a year for every site) for public control of persons holding Permits issued by the Ministry or involved in a business that is subject to ecological expertise, does not envisage biodiversity aspects.
- There are no approved guidelines for integrating biodiversity sections into Environmental Impact Assessments.

Generally, Environmental Impact Assessments for projects to be funded by international donors are conducted on the basis of EIA guidelines and principles elaborated by international financial institutions[72].

As a whole, in view of the specific Georgian biodiversity, it would be advisable to elaborate guidelines for evaluating biodiversity aspects during the Environmental Impact Assessments. The Guidelines would be based on guiding principles and guidelines generated as part of the CBD[73] and other multilateral agreements in the field of biodiversity[74].

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[71] See, for example:

Lajanuri Hydro Power Plant, EIA Report. / Scientific Research Company 'GAMA', president: V. Gvakharia. Tbilisi, 2007.
http://www.aarhus.ge/uploaded_files/32654eada0d6423b3f1574a79dccc68fb24edfbb3cb852c2281aa078b1fe25f8.pdf

Railways Modernization Project. EIA Report. Volume I, prepared by the Global Experience for Georgia Foundation, for the Consortium SYSRA Ltd / SPECTRUM/Georgian Railways Ltd. February 2011. / Rehabilitation and Construction of the Zestaponi-Khashuri Railway.
http://www.aarhus.ge/uploaded_files/5268bdb71539b52ab145e6b3e4f988628ced69c1ae6b7d8bcc5b14b6bad43ca9.pdf

Namakhvani Hydropower Plant Cascades. ESIA Report, 2011. ENKON – Environmental Consultants. Project developer: "NS JV" (Nurol and SK E&C).
http://www.aarhus.ge/uploaded_files/f0016432eb11a2df115d4920ba9a3346d79d5d050bfca608cfb1f689c58b4842.pdf

[72] Procedure for Environmental and Social Review of Projects. The International Finance Corporation (IFC)/ December 1998.
http://www1.ifc.org/wps/wcm/connect/8b643700488552 67ab74fb6a6515bb18/ESRP.pdf?MOD=AJPERES&CACHEID=8b643700488552 67ab74fb6a6515bb18

ENVIRONMENTAL AND SOCIAL PROCEDURES. EBRD, April 2010.
http://www.ebrd.com/downloads/about/sustainability/esprocs10.pdf

IFC Performance Standards on Environmental and Social Sustainability - Effective January 1, 2012.
http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_pps

THE EQUATOR PRINCIPLES JUNE 2006. A financial industry benchmark for determining, assessing and managing social and environmental risk in project financing.
http://www.equator-principles.com/resources/equator_principles.pdf

[73] CBD Guidelines on Biodiversity and Tourism Development
http://www.cbd.int/tourism/guidelines.shtml

CBD - Impact assessment: Voluntary guidelines on biodiversity-inclusive impact assessment / COP 8 Decision VIII/28.
http://www.cbd.int/decision/cop/?id=11042

CBD Technical Series No. 26. Biodiversity in Impact Assessment /Background Document to CBD Decision VIII/28: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment
http://www.cbd.int/doc/publications/cbd-ts-26-en.pdf

[74] Resolution VIII.9: Guidelines for incorporating biodiversity-related issues into environmental impact assessment legislation and/or processes and in strategic environmental assessment' adopted by the Convention on Biological Diversity (CBD), and their relevance to the Ramsar Convention
http://www.ramsar.org/cda/en/ramsar-documents-resol-resolution-viii-9/main/ramsar/1-31-107%5E21514_4000_0__

5. Development of biodiversity monitoring system and application of ecosystem and biodiversity economics (TEEB)

5.1. Establishment of United Biodiversity Monitoring Network

In order to better evaluate the current biodiversity status, Georgia is now in the process of establishing the national biodiversity monitoring network supported by GIZ. Biodiversity monitoring indicators have been selected[75], and guidelines are being elaborated on how to collect and analyze data against each indicator. After the guidelines are completed, the data collection and analysis will start for individual indicators.

The monitoring itself is scheduled for 2013.

5.2. The Economics of Ecosystems and Biodiversity (TEEB)

In 2011, the Government of Georgia joined the The Economics of Ecosystems and Biodiversity (TEEB) piloting process under the UNEP aegis, and started its implementation in 2012.

Today initial stage activities for the TEEB process are underway. Further use of the TEEB outcomes depends on the accuracy and practical value of the pilot research.

Also, works are in progress on the EU-Georgia Associated Agreement in the field of environmental protection. The agreement is expected to strengthen links with the European Union and promote sustainable development and the green economy.

A draft agreement envisages a number of environmental activities to promote creation of conditions not only for humans and ecosystems but also to improve environmental management and effective decision-making, which is very important for the country, the region, and occasionally also for the international community.

6. Integration of biodiversity issues into programme management (policies, strategies, sectoral plans and programmes including spatial/land use development)

6.1. National Security Concept

On December 23, 2011, the Parliament of Georgia approved the National Security Concept[76], replacing the National Security Concept of July 2005[77]. The second Concept reflects the changes in the national security sphere that took place after the adoption of the previous concept, and their influence on threats, risks and challenges facing Georgia.

The National Security Concept of Georgia is the basic document that explains fundamental national values and interests, the vision of the nation's secure development, threats, risks and challenges, and establishes the main directions for national security policy. The Government of Georgia develops, and the Parliament of Georgia ratifies the National Security Concept. Non-governmental

RAMSAR Convention Resolution VIII.4: Principles and guidelines for incorporating wetland issues into Integrated Coastal Zone Management (ICZM)
http://www.ramsar.org/cda/en/ramsar-documents-resol-resolution-viii-4/main/ramsar/1-31-107%5E21494_4000_0__

RAMSAR Convention Resolution VIII.16: Principles and guidelines for wetland restoration
http://www.ramsar.org/cda/en/ramsar-documents-guidelines-principles-and-20878/main/ramsar/1-31-105%5E20878_4000_0__

IMPACT ASSESSMENT AND MIGRATORY SPECIES. Adopted by the Conference of the Parties at its Seventh Meeting (Bonn, 18-24 September 2002)
http://www.cms.int/bodies/COP/cop7/proceedings/pdf/en/part_I/Res_Rec/RES_7_02_Impact_Assessment.pdf

[75] As part of the CBD, a list of biodiversity indicators for the national biodiversity monitoring networks was approved in 2009.

[76] Resolution of the Parliament of Georgia №5589 of December 23, 2011 "On Approval of the National Security Concept".

[77] Resolution of the Parliament of Georgia №1895 of July 8, 2005"On Approval of the National Security Concept".

organizations and other representatives of the civil society have played an important role in drafting the Concept.

Based on the National Security Concept, the Government of Georgia implements measures to ensure the protection of fundamental national values and the advancement of national interests, and to respond adequately to the risks, threats, and challenges, facing the country. The National Security Concept creates a basis for the development of specific strategies and plans that are updated along with changes to the National Security Concept.

The Concept establishes national values of Georgia, national interests, threats, risks and challenges to the national security of Georgia. Among the fourteen national interests, the Concept mentions ensuring of environmental security of Georgia and the region, while among the twelve threats and challenges it mentions environmental challenges, stating that natural processes and man-made crises may threaten natural environment, its biodiversity, and the wellbeing of citizens of Georgia.

The Constitution of Georgia outlines eighteen priotities of the national security policy of Georgia, including environmental security.

The Concept states that the environmental security policy of Georgia protects people and the environment by reducing the use of natural resources and preventing environmental damage caused by natural and manmade crises. Special attention is paid to such disasters as floods, landslides, avalanches, and earthquakes, as well as industrial accidents, etc. The goal of Georgia's environmental policy is to develop and implement efficient measures to prevent pollution of all kinds—of air, water, and earth, to protect forest resources to manage radioactive and other hazardous materials on the territory of Georgia, to prevent pollution of the Black Sea, etc.

The Government of Georgia is aware that the country's environmental security demands close regional and international cooperation and that for this purpose Georgia cooperates on environmental security with countries in the region. Successful cooperation between Azerbaijan, Armenia, Turkey, and Georgia will contribute to the protection of the natural environment and the improvement of environmental security.

6.2. National Program of Action for the Protection of Environment

The Second National Program of Action for the Protection of Environment for 2012-2016 was adopted by Georgian government's decree N127 of January 24, 2012.

The Second National Program of Action for the Protection of Environment is an official document, outlining the country's plans in the sphere of environmental protection for 2012-2016. The program forms a solid basis for future environmental planning. Recognizing importance of country's economic development, the program focuses on sustainable development instead of prohibitive prospects.

One of the main aims of the program is to strengthen legislative, administrative and institutional frameworks at all levels thus promoting integration with the European Union. Program implementation will foster partnership between all economic entities (governmental, private and non-governmental sectors), promote healthy environment and public welfare, contribute to creation of favorable conditions for the long-term economic development of Georgia, and finally, support the participatory approach.

The program involves basic sectoral directions, including biological diversity and climate change directions. Alongside with sectoral directions, the program involves general directions that include the overlapping issues of sectoral directions, so that their solution will be equally beneficial for all environmental sectors. Given the complex and inter-sectoral nature of environmental issues, the need for integrating environmental strategy and policy into development plans or policies of other sectors is analyzed in a separate section of the program.

In accordance with the program, general environmental measures are:

- Improvement of legislation;
- Raising stakeholders' awareness;
- Improvement of monitoring, inspection and law-enforcement systems;
- Enhancement of knowledge on policy-making issues.

The priorities in the sphere of biodiversity and protected areas include conservaton of viable populations of endangered species and degradation of habitats; improvement of fishing and hunting practices and development of the protected area system; measures to fill in gaps in biodiversity conservation database and sustainable use of natural resources.

The program identifies habitat destruction and irrational use of natural resources as the main causes of climate change, endangering many animals and plants in Georgia. The program mentions poaching as the main cause of the reduction in the large mammal populations.

The program underlines that improvement of the status of large mammals is possible only through the implementation of special conservation measures. Such measures are underway to restore gazelle population in the Vashlovani National Park and Bezoar goat population in the Borjomi-Kharagauli National Park. Conservation management plans have been developed for the following species and groups of species: West Caucasian tur, leopard, bats, brown bear, Caucasian Grouse, water birds and land birds, Eastern Imperial Eagle, Lesser Kestrel, sturgeons, Caucasian Salamander. As regards ecosystems, forest ecosystems require conservation above of all. Logging and firewood production remain one of the main threats to biodiversity since firewood remains the main source of heating in some villages and towns. With certain measures at hand to restore the Chiaura and Ivri floodplains, there is a pressing need for planning and implementing complex measures to ensure rehabilitation of the Alazani and Ivri floodplains.

A focus also should be on protecting ecosystems against invasive species. Intensive research is necessary to better analyze impact of invasive species and develop both preventive (border control) and control measures (mechanic, chemical, biological) in order to restrain their spreading and minimize damage.

Modern and effective mechanisms of data collection, storage and analysis are necessary to effectively assess changes in the status of habitats and species, also impact of the existing threats on biodiversity. There is no sufficient data and capacities at hand at present for effective and focused decision-making on biodiversity conservation issues.

The program acknowledges that global climate change also has an adverse impact on biodiversity status. Assessments, conducted in the process of preparation of the Second National Communication to the Climate Change Convention, showed that the sea coastline, arid and semi-arid zones and high mountains are the areas particularly susceptible to climate change in Georgia. In 2008, Georgia ratified the Cartagena Protocol on Biosafety and thus committed to develop a mechanism for the fulfillment of Protocol provisions.

The program identifies the long-term (20-year) goal of the national biodiversity policy in the sphere of biodiversity and protected areas as protection, recovery and conservation of Georgia's unique ecosystems, variety of species and genetic resources. The long-term goal can be attained through the effective management of protected areas and creation of a PA unified system, sustainable management of biological resources and equitable and fair sharing of benefits arising out of their use. To attain the long-term goals, the program identifies the following short-term (5-year) goals:

Goal 1 - Rehabilitation, protection and conservation of viable populations and habitats of selected endangered species;

Goal 2 – Enhancement of fishing and hunting management through sustainable use of fauna resources;

Goal 3 - Creation of a unified effective system of protected areas;

Goal 4 – Enhancement of protected areas management through establishment of administrative capacity building and financial sustainability mechanisms;

Goal 5 – Provision of adequate data support for the sustainable management of biodiversity conservation and use of biological resources through the establishment of national biological monitoring system.

6.3. Territorial planning, protection and management of biodiversity/agricultural biodiversity and its integration into spatial/territorial development laws

Integration of territorial planning, protection and management of biodiversity and agricultural biodiversity into the current legislation in the field of spatial/territorial development is very important for in-situ conservation of biodiversity/agricultural biodiversity.

It should be noted that territorial biodiversity conservation has a long history in Georgia. In the 20th century, the protected areas system was mainly developing in the form of state reserves. By the end of the century, the total area of the protected areas system was 168.000 ha or 2.4% of the country's territory. A new stage of development of the protected areas system started after the restoration of Georgia's independence in 1991. The main goals of the protected areas system were:

- to ensure sustainable biodiversity conservation by integrating representative sections of all ecosystems into the protected areas;
- to ensure their interconnection within the protected areas system;
- to establish internationally recognized and tested categories of protected areas (see Annex 1. Correspondence of the national and international protected area categories) that would also meet the need of th elocal population.

The protected areas system witnessed a very dynamic development over the past decade, spreading to 7% of the country's territory. The protected areas include almost 8% of the total area of forests in Georgia.

It is noteworthy that no adequate attention was paid in the past or is paid today to the creation of protected areas of the 6th category – multipurpose area. Some protected areas face serious problems due to the lack (or only declared existence) of multipurpose areas. Local communities also have problems living in the vicinity of areas, where use of certain natural resources is prohibited or restricted.

In order to fulfill its basic functions, the territory itself should function steadily and its natural ecosystems should maintain stable structure, while use of agricultural lands should be in compliance with environmental safety norms. To attain this, it is necessary to introduce, on the one hand, sustainable resource use methods, and on the other hand, pay special attention to activities, oriented at local communities and promoting sustainable development and growth of alternative incomes. The multipurpose areas generally create good opportunities for successful development of tourism (namely, agrotourism and ecotourism).

As stated above, spatial organization issues are regulated in Georgia by legal acts, pertaining to spatial organization and associated spheres (environmental protection and others), involving internationally recognized norms and principles of special-territorial development.

The Law of Georgia "On the Basis of Spatial Organization and Urban Planning" is oriented at introduction and implementation of a decentralized, polycentric, diverse and balanced spatial development model. The law determines the main function of spatial organization (sustainable development of the country, its Caucasian, European and international integration) and identifies the following national spatial organization principles (planning and management of natural landscape area):

The spatial organization guidelines are used for attaining general goals of spatial-territorial planning concerning natural, anthropogenic and managerial processes. The goals are:

- Use of territorial development methods, implying reduction of adverse impacts of economic and other activities and sustainable use of territories and natural resources to ensure healthy and safe environment to the present and future generations;
- Creation of adequate, equal living and working conditions in the country (creation of "equal opportunities space");
- Decentralized, polycentric, diverse and balanced development of territories and settlements;
- Creation of spatial preconditions for socio-economic development;
- Interconsistency of interests of physical and legal entities, local, regional and national interests in the use and development of territories;
- Protection and development of cultural heritage;
- Protection and restoration of ecological balance;
- Sustainable use and protection of natural resources, including recreational resources;
- Creation of conditions for policy-making on development of inhabited areas and infrastructure;
- Integration of sectoral development programs and sectoral plans into the spatial development policies and plans.

The spatial organization guidelines and general goals of spatial-territorial planning are in full compliance with the goals and objectives of agricultural biodiversity protection and conservation, sustainable agriculture, food security and climate change adaptation.

Based on the above, it is necessary to introduce amendments and addenda into the Law of Georgia "On the System of Protected Areas" and Law of Georgia "On the Basis of Spatial Organization and Urban Planning" to ensure mutual integration of the issues of spatial planning, protection and management of biodiversity and agricultural biodiversity in terms of their in-situ conservation into the current legislation on protected areas and spatial-territorial development.

7. International and transboundary cooperation in the field of biodiversity

Regional and transboundary cooperation in the field of biodiversity is most perspective for creation of transboundary protected areas (the Javakheti Protected Areas, Georgia, and Arpi Lake National Parks, Armenia). Transboundary conservation of biodiversity helps countries in implementation of their CBD commitments. Recent improvements in the protected area system management have been possible only with collaboration and close partnership between stakeholders.

The integrated approach used in the South Caucasus in recent years has created a solid basis for further development of the system of protected areas. Such an approach can be used as a model for promoting international agreements at the national, regional and local level. Yet further development of cooperation between key stakeholders in the process remains a priority to address urgent challenges that would be otherwise unsolvable. There is a basis for strengthening cooperation between Georgia and Armenia, Georgia and Azerbaijan, and Georgia and Turkey with the purpose of implementing CBD goals in the years to come.

The following can be considered as priority actions in the field for the future:

- Develop an effective environmental network in the South Caucasus by planning and creating ecological corridors in view of climate change tendencies;
- Integrate protected areas and biodiversity into national development and funding strategies and programs;

- Identify economic and other benefits of ecosystems and protected areas and present these at the local and national level by evaluating the benefits and using other innovative methods;
- Promote effective international cooperation in the field of biodiversity conservation by setting up the Caucasus Biodiversity Council and implementing the Ecoregional Plan;
- Elaborate programs for raising public awareness about biodiversity and protected areas;
- Harmonize legal, institutional and judiciary environment by improving the legislation and strengthen stakeholder cooperation;
- Complete fault analysis and create new protected areas to ensure ecological representativeness of the protected area system;
- Use sustainable and adequate funding mechanisms by diversifying funding sources and develop innovative funding tools;
- Ensure adequate capacity of human and technical resources through long-term capacity-building programs;
- Improve effectiveness of protected area planning and management by using participatory approaches in order to prevent conflicts of interests, better conserve biodiversity, and incorporate interests of local communities;
- Create adequate protected area database and implement a monitoring system at the local level.

THEMATIC FIELD 9. BIODIVERSITY OF FORESTS

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1. Overview of the biodiversity of Georgia's forests

Forests are considered the most important biome for biodiversity conservation in Georgia, covering about 40% of the country's territory. Many endemic and relic species of woody plants and herbs (flora) as well as important and rare animal species (fauna) are associated with forests.

Flora

As a consequence of its location and its physical and climatic diversity Georgia has a remarkably rich and diverse flora in comparison to other temperate countries. There is a high level of endemism, which includes components of various biogeographical origins. Many groups of plants are believed to originate in the Caucasus Mountain Range and the process of plant speciation is believed to be still taking place.

Forests in Georgia are highly diverse, consisting of broadleaf, coniferous, arid open and lowland (including floodplain) forests and woodlands, which are shaped by elevation, soil conditions and climate. Broadleaf forests consist primarily of oriental beech *(Fagus orientalis)*, Georgian oak *(Quercus iberica)*, hornbeam *(Carpinus caucasica, C. betulus)* and chestnut *(Castanea sativa)*. Most oak species growing in Georgia are endemic to the Caucasus region. Georgian oak (*Quercus iberica*) is the main species growing in the lower and mid-elevation forest belts, and floodplain oak *(Q. pedunculiflora)* is the dominant species in the floodplain areas.

Chestnut, hackberry *(Celtis caucasica),* box tree *(Buxus colchica),* zelkova (*Zelkova carpinifolia*), yew *(Taxus baccata)*, elm *(Ulmus carpinifolia, U. glabra)* and high-mountain maple *(Acer trautwetteri)* are regarded by many experts as particularly valuable tree species which need special care and protection; for instance, in terms of biodiversity, chestnut is a mast (fruit bearing) species important for feeding forest animals, such as wild boar *(Sus scrofa)* and brown bear *(Ursus arctos).*

In the Colchic foothills chestnut and beech forests with evergreen understorey dominate. Dark coniferous forests, made up mainly of oriental spruce *(Picea orientalis)* and Caucasian fir *(Abies nordmanniana)* are found in the western part of the Lesser Caucasus Range and on both sides of the western and central Greater Caucasus Range.

Native pine forests *(Pinus kochiana)* occur in the northern parts of Georgia in the high mountains of Khevsureti. They are also found in the southern Caucasus, especially in the Kura River watershed in Georgia. Arid open woodlands form on dry, rocky slopes in south-eastern Georgia, made up of juniper *(Juniperus foetidissima),* pistachio *(Pistacia mutica)* and hackberry species. Lowland forests are found in floodplains and on low river terraces, generally growing on alluvial, swampy, or moist soils. Very few lowland forests have been preserved to this day. Some stands remain in the Kolkheti lowlands and in the Kura, Iori and Alazani river valleys. According to expert estimates in total there are about 15-25 woody plants growing in forests which could be regarded as endemics of Georgia,.

Fauna

Most of Georgia's and the region's rare and endangered animal species are associated with forest ecosystems. Some of the bat species, brown bear *(Ursus arctos),* turs *(Capra caucasica, C. cylindricornis)*, chamois *(Rupicapra rupicapra)*, Caucasian red deer *(Cervus elaphus)* and Caucasian salamander *(Mertensiella caucasica)* depend on ecologically intact forest. The endemic invertebrates such as Caucasian running beetle *(Lyrurus mlokosiewiczi)* are also strictly associated with forest ecosystems.

Forests provide leaves, nuts and roots on which roe deer *(Capreolus capreolus)* and wild boar feed. Forest ecosystems are also associated with the common otter *(Lutra lutra)* and European mink *(Mustela lutreola)*. West- and east-Caucasian turs *(Capra caucasica, C. cylindricornis)* and the Caucasian black grouse (*Tetrao mlokosiewiczi*) - species that live in the sub-alpine belt - use mountain forests as wintering habitats. Caucasian populations of European wild cat *(Felis silvestris)* and pine marten *(Martes martes)* are relatively abundant and important for conservation of these species world-wide.

The forests of the Western-Central Caucasus (Georgia) are largely isolated from other large forest massifs in Europe and Central Asia and contain most of region's endemic species. Most of these endemic species are associated with forest landscapes - Caucasian adder *(Vipera kaznakovi),* Caucasian mud-diver *(Pelodytes caucasicus)* and Caucasian toad *(Bufo verrucosissimus)* (all three are on the International Union for Conservation of Nature (IUCN) Red List), several endemic rodents including Robert's snow vole *(Chionoys roberti)*, Pontic forest mouse *(Apodemus ponticus)*, Caucasian mole *(Talpa caucasica)* and Shelkownikow's water shrew *(Neomys schelkovnikovi)*.

Caucasian forests are also rich in bird species harboring eagle owls, seven species of woodpeckers and some species of smaller birds coexisting here with wide-spread European birds.

2. NBSAP-1 achievements and unmet needs

NBSAP-1 included the following strategic objective for forest biodiversity - *To conserve forest biodiversity through sustainable forest management* - and eight strategic objectives. Other parts of the NBSAP-1 action plan included activities related to forest biodiversity.

Limited progress has been made towards achieving the specific objectives and strategic goal for forest biodiversity.

National forest policy and strategy:

Several drafts of a forest policy and strategy have been prepared since 2005 in the framework of various projects and iniatives. None has been been formally adopted. Adoption of a forest policy and strategy with participation of all key stakeholders based on an ecosystem approach and sustainability principles remains a priority. The lack of up-to-date information about the state of the forest fund is a serious drawback. The most recent inventories (apart from those carried out by licence holders on a small part of the forest fund) were carried out 20 or more years ago. As a matter of priority a survey and inventory of the entire forest fund needs to be carried out in sufficient detail to be able to decide which territories should still be classified as forest land and forest, to categorise the territories in terms of their environmental protection value and commercial value, and to identify territories that require rehabilitation and restoration.

Forest management standards:

Efforts have been made to adopt a new set of forestry regulations and standards that would address biodiversity-related concerns; however, no major progress has been made so far; the standard elaborated by the experts is voluntary and is based on Forest Stewardship Council (FSC) principles and criteria and addresses the needs of biodiversity conservation; it was prepared by a group of experts coordinated by WWF-CauPO and supported by GTZ (now GIZ). The standard needs to be endorsed by FSC; in order to promote voluntary forest certification, it is important to formally establish a National Initiative. Elaboration and adoption of sustainability-based forestry legislation, standards (both mandatory and voluntary) and guidelines designed to safeguard biodiversity conservation remain a priority.

Regulation of forest use:

Based on the Forest Code (1999), long-term wood use licensing was launched in 2007; however, the private and public benefits from this system are still quite limited. The introduced licensing system includes several types of forest use by private companies, including the use of wood for 20, 10 and

five years; this new system has experienced a number of difficulties and, as a result, only 5% of the forest fund is managed under the licenses.

Further steps that need to be taken are clearer specification of the rights and responsibilities of the license holders; adopting and implementing advanced forestry regulations and standards; to adopt new regulations on forest use fees, taking into consideration the interests of all stakeholders.

High Conservation Value Forests:

Although some legal provisions on HCVFs exist, no detailed management prescriptions (including restrictions of logging in ecologically sensitive areas) have been elaborated and implemented.

Further steps that need to be taken are identification and mapping of HCVF and elaborating management prescriptions for these forests; old-growth forests should be assigned a special protection regime; categorization system of Forests Europe could be interesting; this system encompasses protected and protective forests; for the first category, the purpose of management is biodiversity conservation, which is consistent with IUCN I, II and IV categories; the second category envisages the protection of landscapes and special natural features; management objective in the third category is maintenance of protective functions of forests.

Forest restoration:

Only a few reforestation projects have been implemented. In recent years, the state forest authorities have not been able to conduct forest restoration due to the lack of funding. A few projects aimed at the restoration of natural forest landscapes have been implemented by WWF, GIZ, REC-Caucasus and other organizations on a pilot basis; the total area restored is just a few hundred hectares.

Further steps that need to be taken are the elaboration and adoption of guidelines on reforestation and forest transformation (from monocultures to close to nature forests with higher biodiversity); adoption of a program on implementation of these measures; making joint efforts to identify funds for the implementation of these programmes.

Establishment of plantations for timber production:

Practically no plantations comprised of native species and managed for timber production have been established. No adequate legal provisions exist for promoting managed tree plantations of native species (e.g. *Alnus*, *Populus*, *Salix* etc); financial resources of the state forestry authorities are limited; the private sector has not demonstrated any significant interests.

As an immediate priority - creation of favourable legal and economic conditions to encourage private investments in this field; in the longer term, the establishment of plantations managed by the state.

3. Major threats to forest biodiversity and their causes

Forest biodiversity is still facing various threats, including illegal logging, unsustainable grazing, pests and diseases, poaching, unsustainable hunting and unsustainable forest management. Climate change, forest fires and infrastructure development represent additional, relatively recent challenges.

Over the last two decades, **illegal logging** (logging without permission or in violation of the established legal procedures) has been a serious problem in Georgia. Two major types of logging can be distinguished - for fuelwood and for construction timber. In the 1990s and early 2000s the volumes of illegal logging were extremely high, amounting to several millions of cubic metres a year. According to official estimates the volume of illegal logging has reduced in recent years (from 53,854 m3 in 2009 to 7,339 m3 in 2011); however, experts consulted during the preparation of this situation analysis believe that the actual volumes are much higher, mainly due to the high demand for fuel wood.

The most significant driver of logging for fuelwood is rural poverty. Many rural households cannot afford to purchase alternative energy resources such as liquid gas. Because of strict law enforcement on one hand and improved natural gas supply to the villages on the other, the volumes of fuelwood harvesting have been reduced. However, relatively remotely located villages in Georgia still do not have gas supply. As a result, the demand for fuelwood is still high, exceeding the natural capacity of forests growing near these villages. The problem is aggravated by the lack of awareness about ecological and socio-economic consequences of illegal logging.

Additionally, fuelwood is burned in an efficient way. The use of dried fuelwood, efficient wood stoves and sustainable (selective) harvests of wood would substantially reduce the negative impacts on forests.

The major drivers of logging and processing of commercial timber are domestic and foreign market demands. The volumes of illegal harvesting of commercial timber have been substantially reduced in recent years due to the strict law enforcement and border controls. In contrast, the volumes of legally harvested timber might increase, due to the growing market demand (which is related to the economic growth in the Caucasus and neighbouring regions in recent period). However, in recent years, there are variable tendencies in this respect (see Table 9.1).

Table 9.1: The volumes of legally harvested wood in the period 2006-2011

Years	The volumes of harvested wood, m^3		
	Timber	Fuelwood	Total
2006	102,946	481,495	584,441
2007	100,921	704,501	805,422
2008	78,915	761,158	840,073
2009	49,197	658,103	707,300
2010	73,473	725,419	798,892
2011	90,823	562,664	653,487
Grand total, 2006-2011	**496,275**	**3,893,340**	**4,389,615**

Source: Agency for Natural Resources

Combating illegal logging is complicated by frequent changes in legislation and limited capacities of and coordination among relevant state authorities. Due to the generic character of the present definition of illegal logging, often it is not possible to determine whether the harvested wood is legal or not.

For effective protection of forests against illegal activities it is essential to supply relevant law enforcement authorities with adequately qualified staff and advanced communication means. In 2011 the functions of the Environmental Inspectorate were transferred to the Monitoring Department of the MoENR (due to the abolition of the former). Further changes are planned in this direction for the nearest future. At present the forest protection function is fulfilled by the rangers of the Forest Resource Management Department of the Agency for Natural Resources of the Ministry of Energy and Natural Resources (MoENR). The average area under the control of one ranger is quite high (up to 5,000 ha), which makes it difficult to protect forests effectively.

According to expert estimates **unsustainable grazing** by livestock (cattle, sheep, goats and pigs) causes much greater damage to forest ecosystems than illegal logging. The main causes of excessive grazing are limited control by the state authorities, rural poverty and limited alternative livelihood opportunities, improper range management, lack of sufficient control by shepherds and a lack of awareness of the population. For many families, livestock keeping is almost exclusively the sole source of livelihood. Unsustainable range management practices (e.g. the concentration of livestock in relatively small areas near villages, failure to use pasture rotation systems, etc) and the lack of agricultural subsidies and extension services further aggravate the problem. Forests located around population centres are particularly affected by overgrazing.

In general, the capacities of state forestry authorities are still insufficient to safeguard law enforcement at a sufficiently high level. Without adequate legislation, standards and capacities, it is likely that unsustainable forest use will continue.

Forest **pests and diseases** represent another significant threat. One of the most prominent diseases is chestnut cancer (*Cryphonectria parasitica*, formerly called *Endothia parasitica*), which apart from chestnut, already threatens other species, such as oak. The problem of Dutch Elm Disease (caused by the fungus *Ceratocystis ulmi*) which has already destroyed most of the mature elm trees *(Ulmus glabra)* in Europe is also occurring in Georgia, though to a lesser extent than in other parts of Europe. A relatively new disease, the fungus causing the so-called "scorching of box trees" threatens large areas of natural box tree ecosystems in western Georgia; trees may lose all their leaves and die. The species of fungi causing this disease is still being investigated.

Effective combating against forest pests and diseases requires comprehensive scientific and field assessments, monitoring and active intervention measures. These measures are very difficult to implement due to the lack of funding and technical capacities.

The **collection of non-wood forest products** - e.g. early flowers of *Staphylea colchica*, bulbs of snowdrops *(Galanthus spp.)* and cyclamen *(Cyclamen vernum)*, seeds of Caucasian fir *(Abies nordmanniana*) - is an important activity for supporting the livelihoods of rural people. There are official data on the volumes of resources of Caucasian fir and snowdrops licensed for harvesting (see Table 9.2; however, there is no reliable information about the real volumes of collection of these products. At present, no license is issued for the collection of cyclamen bulbs.

Consequently, it is very difficult to assess the sustainability of collection of these products. According to the estimates of experts, there are no obvious signs of the reduction of volumes of these products. The Ministry of Environment Protection is planning to conduct a detailed assessment of the conditions of snowdrop and cyclamen resources. The findings from this study will allow more sustainable annual collection quotas to be established.

Table 9.2: Information about the volumes of resources of Caucasian fir and snowdrops licensed for harvesting for the period 2008-2011

Years	Caucasian fir cones (tonnes)	Snowdrop bulbs (units)
2008	91	10,540,832
2009	388.7	11,462,057
2010	300.4	13,044,836
2011	(no data available)	15,000,000

There is a bigger problem with respect to the collection of other non-wood forest products such as fruits, berries and mushrooms. The existing forest legislation allows collection of these products free of charge for personal consumption; however, no thresholds have been specified beyond which the collection of these products would be regarded as commercial. Furthermore, no payments or fees are envisaged by the present legislation for the collection of these products in commercial volumes. No annual quotas are defined either. This might create significant risks of unsustainable extraction especially for mushrooms.

The first direct signs of **climate change** can already be observed in Georgia and the Caucasus in general. These include more frequent and intensive rainfalls, increased temperatures, melting of the glaciers, heavier floods, longer draughts and even colder winters.

Although the exact magnitudes of the negative impacts of climate change upon forest biodiversity are very difficult to predict, they are likely to be very significant. Climate change also increases the likelihood of forest fires.

In the past **forest fires** occurred relatively seldom and at the smaller scales in Georgia, affecting a few hectares of forests (mainly conifers); however, with the increased incidences of droughts and higher summer temperatures which Georgia is experiencing forest fires have become a much more serious problem. The levels of risks of natural forest fires vary across different parts of Georgia. For instance, natural pine *(Pinus kochiana)* forest in Tusheti is more vulnerable than forest located in other areas due to the relatively dry climate. Although these forests usually survive natural, so-called "low-running" fires, some pine stands have died due to this type of fire.

At present fires encompass tens or sometimes even hundreds of hectares of forests each year. In 2005, about 500 hectares of forests were burnt near Abastumani. The biggest damage caused by forest fires in recent period occurred in 2008: nearly 1,000 ha of forests were either seriously damaged or completely burnt in Shida Kartli and Samtskhe-Javakheti regions during the military conflict with the Russian Federation. In 2010 about 370 hectares of forests were burnt in Georgia, mainly broadleaves. In general, around 2,500 hectares of forests were destroyed or seriously damaged due to forest fires in the last 3-4 years.

Forest fires are often triggered by irresponsible human behaviour (e.g. lighting campfire in inappropriate areas or seasons and throwing a burning cigarette). Shepherds often deliberately burn grass in the pastures and sometimes the fire moves to the forests.

While naturally occurring fires in limited areas are beneficial for the succession of certain forest types, artificially caused fires are usually detrimental to forest biodiversity.

Preventing and combating forest fires is still very difficult in Georgia due to the inadequate early warning and fire-fighting systems and a lack of capacity. The necessary equipment is lacking, while the responsibilities and functions should be distributed more clearly among the relevant authorities (Ministry of Energy and Natural Resources, Ministry of Interior, Emergency Service and local self-governing bodies).

In addition, the mountainous terrain, steep slopes and lack of roads make some of the forests very difficult to access. Nevertheless, in recent years the forestry and other relevant state authorities gained some experience in forest fire fighting. For instance, the state Emergency Service uses special helicopters equipped with water tanks. However, better coordination is required among the authorities. Existing human and technical capacities should also be enhanced and strengthened.

Current state strategies for economic development will lead to large-scale **infrastructure development**. There are plans to construct new pipelines, hydro-power stations, electricity transmission lines, railways, roads and other types of large-scale infrastructure.

Hydro-power development is given a particular focus in the economic policy of the country. There are plans for many new hydro-power schemes; some of them may require clearance of significant areas of forest.

Expansion of open-cast mining could result in significant direct (cutting large areas covered with trees) and indirect (air pollution, which could damage surrounding forests) environmental damage.

Because of the strategically important location of Georgia and its "corridor" function between Europe and Asia, transportation networks (railways, motor roads, motels) will be modernized and extended.

In the conditions of rapid infrastructure development, careful planning and sufficient consideration of ecological aspects are essential. Decision-makers need to be aware of the economic values of natural ecosystems (especially the values of forest biodiversity and protective functions). Socio-economic and ecological consequences of the potential damages to the environment should not be overlooked. Serious biodiversity losses through the destruction of natural habitats and animal migration routes should be prevented.

Hunting is another very important factor directly affecting biodiversity. Key legislation dealing with hunting includes the Forest Code (1999), the law "on Wild Fauna" (1996), the law "on the Red List and Red Book" (2003), the law "on Licenses and Permissions" (2005), the law "on Management of the State Forest Fund" (2010) and the regulation "on the Rules of Extraction of Wild Fauna Species, Dates and the List of Allowed Hunting Weapons and Equipment" approved by Order #07 of the Minister of Energy and Natural resources (6 April, 2011) and changes to this regulation approved by Order #275 of the Minister of Energy and Natural resources (27 December, 2011).

The Law on Wild Fauna (1996) states that hunting is subject to licensing. Only sport hunting is allowed in Georgia (i.e. hunting for the purpose of selling the carcass of the killed animal is not allowed).

Illegal hunting (poaching) is still a serious problem in Georgia, negatively affecting biodiversity of forest fauna. In recent decades, poaching and the illegal wildlife trade increased significantly as a result of the economic crisis, rural poverty and a lack of awareness among hunters. Unsustainable hunting of game and poaching of rare species is widespread in mountain regions in particular. It is relatively easy to hunt ungulates and, as a result, the latter are particularly vulnerable. Wild/bezoar goat (*Capra aegagrus)*, wild boar, red deer and roe deer depend on forests. With economic growth in Georgia and neighboring countries and opening of borders, the demand for certain fauna species might grow, creating more favorable grounds for poaching.

At present, control mechanisms to reduce poaching are not fully effective and administrative resources for enforcement are limited. Government agencies are responsible for setting quotas for game species. However, due to the lack of funding and limited capacities, monitoring of game numbers and population dynamics is not carried out. There is no reliable information about the numbers of individuals of game species remaining in the wild, which puts the animal populations (mostly ungulates) under great risk.

Legal, but unsustainable hunting is another problem apart from poaching, caused by a lack of knowledge of basic hunting rules. These factors are causing a rapid decline in the number of individual animals of game species.

Until recently, with the exception of migratory birds, hunting was only permitted in special hunting reserves. Most of these reserves lack the necessary infrastructure and capacities. From 2011 onwards hunting is allowed outside the hunting reserves (but not in strictly protected areas and forests located in the vicinity of population centers). The relevant amendments have been made in current Forest Code (1999) and Law on Red List and Red Book (2003). The impacts of this decision on biodiversity are very difficult to predict, as very little time has passed.

In spring 2011, the Ministry of Energy and Natural Resources (MoENR) approved a regulation allowing hunting certain Red List species (e.g. brown bear, bezoar goat, red deer). The motivation behind this decision was to promote hunting tourism. These decisions were very negatively perceived by the majority of environmental NGOs. According to the latter, this step might encourage poaching at even larger scale. Some NGOs claim that hunting should only take place within special reserves. In exceptional cases, hunting outside the reserves could be allowed for certain species such as hare or roe deer (as there is a lack of hunting reserves in Georgia).

In 2012, the Agency of Natural Resources initiated the process of assessing game numbers (including rare species) in order to determine more ecologically sustainable annual hunting quotas. For this purpose, the agency conducted a tender in February-March of the same year in which Ilia State University was the winner. An agreement was signed between the agency and university, according to which the relevant staff of the university (12 or if necessary more specialists) will conduct inventory and assessment of relevant species of wild fauna (including rare species) by the end of 2012. As a result of this work, it will be defined which species can be hunted and by which annual quota, taking into consideration the principle of sustainability.

Legally permitted, but **unsustainably conducted forestry operations** may pose additional challenges to the biodiversity of forests. Unsustainable logging happens when tree stands are selected for felling without due regard to conservation values of forests. In the past decades, carelessly conducted tree cutting (e.g. failure to avoid damage to natural regeneration, excessive soil compaction and damage, etc) significantly affected ecologically sensitive mountain forests in Georgia. The quality of currently conducted forest management in terms of biodiversity is discussed in a more detail in the next section.

4. The quality of forest management with respect to biodiversity

Sustainable forest management means forest management that is economically viable, socially acceptable and environmentally sound. Biodiversity conservation is an essential part of sustainable forestry and is shaped by a number of factors, including policy, institutions, legislation, financial and human resources capacities, and management "on the ground".

Principles and criteria for sustainable forest management have been outlined in a number of international agreements and processes such as the so-called "Statement of Forestry Principles" (adopted in Rio de Janeiro in 1992), the Expanded Programme of Work on Forest Biodiversity (within the Framework of the Convention of Biological Diversity (CBD), Forests Europe and voluntary forest certification systems. Key provisions of these agreements and systems include:

- Ecosystem-based approach;
- Reduction of the threats to forest biodiversity (e.g. illegal logging, invasive species) and their underlying causes;
- Restoration of forest biodiversity;
- Enhancing the institutional enabling environment;
- Addressing socio-economic aspects (e.g. poverty and a lack of alternative livelihoods for local population);
- Categorization of forests;
- Special protection and care of High Conservation Value Forests.

Georgia has been a party to the CBD since April 1994 and participates in other international and regional forestry processes such as Forests Europe, the Bern Convention (1979) and the European Landscape Convention (2000).

In January 2012, the Georgian Government approved the Second National Environmental Action Plan (NEAP, 2012-2016). The plan comprises 11 thematic fields, including forestry. Specifically, major problems experienced in the forestry sector (e.g. absence of sustainable forestry mechanisms, unsustainable logging, over-grazing, habitat degradation etc) and their causes, conducted measures, stakeholders and legislation are analyzed. The long-term forestry-related goal is defined as "improvement of the functional conditions of forests by means of development of sustainable forestry". Concrete measures include the adoption of a new Forest Law, elaboration of technical and methodological bases for sustainable forestry, implemention of urgent measures in priority areas (forest restoration, combating pests and diseases) etc. The successful implementation of the NEAP requires active cooperation among relevant authorities and, most importantly, securing adequate financial resources.

Recently the Georgian government made significant commitments which are directly related to forest biodiversity. In his speech at the 16th Conference of the UN Framework Convention on Climate Change in Cancun, Mexico, (December 2010), the President of Georgia shared the country's vision and planned actions on adaptation to and mitigation of negative impacts of climate change. Among these commitments, restoration of forests and improving the quality of forest management were mentioned.

Based on the initiative of the President of Georgia and with strong support from the World Wide Fund for Nature (WWF), Georgia was nominated as one of several countries for piloting TEEB (the Economics of Ecosystems and Biodiversity). TEEB was initiated by the German Government and European Commission and is financially supported by the United Nations Environment Programme (UNEP). It is planned to involve more donors in this initiative.

In Georgia, the economic benefits of biodiversity and ecosystems and costs of their degradation will be evaluated and demonstrated. The aim is to support the mainstreaming of biodiversity and ecosystem considerations in decision-making, which should result in ecologically sustainable management being integrated into national and regional planning. The TEEB initiative was launched in Georgia in 2012.

Despite the efforts undertaken by the Georgian state forestry authorities, no major improvements can be observed in the quality of forest management in recent years. The current policy, legislative and institutional set up of the forestry sector of the country does not fully respond to the above-mentioned international requirements related to sustainable forestry and biodiversity conservation.

4.1. Forestry policy

Georgia does not have a formally approved forest policy and strategy though several attempts have been made to prepare them. In the spring of 2006, a national working group supported by the Food and Agriculture Organization of the United Nations (UN FAO) prepared a draft forest policy and submitted the document to the MoEP. That document was not approved and instead a new draft document was elaborated; the new document was not approved either. In 2007 the MoEP prepared another new document entitled "Forestry Policy of Georgia" and uploaded on its website but formal approval of this document did not occur. In 2009, the ministry prepared the "*Vision for the Development of the Georgian Forestry Sector".* The document was discussed by the stakeholders but no further steps was taken.

It is necessary to elaborate and adopt a forest policy and strategy (with the participation of all relevant stakeholders) in order to define more clearly the long-term strategic priorities and objectives for the forestry sector.

4.2. Legislation and institutional set up

The Forest Code states that the principles of protection and sustainable management of Georgian forests are based on the Georgian Constitution, Statement of Forest Principles adopted at the "Earth Summit" in Rio de Janeiro in 1992 and principles reflected in Article 5 of the Georgian Law "on Protection of Environment" (1996). The latter includes biodiversity conservation, risk mitigation and prevention, sustainability and several other important principles.

The code contains special provisions, according to which all major types of forest ownership are allowed (including private ownership). It also states that a law on forest privatization should be adopted before forest privatization starts; however, the adoption of this law has been postponed several times, one of the major reasons for the delay being that Georgian society in general is not ready for such important changes. According to the widespread view among the society, after the transfer of state forests to private owners, the latter will clear the forests to get a rapid income. Due to the limited capacities of the state forestry authorities, it would be difficult for them to properly monitor private forests in case of large-scale privatization.

It should be mentioned, however, that according to amendments to the Law "on State Property" (10 December 2010) the privatization of former collective and state farm forests located within the boundaries of population centres is allowed.

Local and communal forests

Problems exist with respect to the establishment of community and communal (municipal) forest management systems. The Forest Code states that the Local Forest Fund shall be managed by local self-governing authorities. However, the boundaries of the Local Forest Fund have not been drawn and the transfer of forests to local self-governing authorities has not taken place. In addition, the municipalities are not ready to take over the responsibility for forest management, mainly because they lack funding, capacity and experience. The division of responsibilities for forest management between local self-government bodies and central government is not very clear.

The potential Local Forest Fund mainly consists of former collective farm forests located near population centres. These forests are degraded and their wood resources are very limited. Similar difficulties (e.g. lack of capacities) are experienced by local communities which makes the establishment of sustainable community forestry schemes problematic. Nevertheless, according to expert views, there is potential in certain locations (such as Svaneti, Dedoplistskaro, surroundings of Tbilisi) for the development of sustainable community or communal forestry schemes. In these areas, communities and households are willing to manage surrounding forests in a sustainable way. These people possess some traditional (indigenous) knowledge of sustainable, ecologicaly sound forest use.

Institutional changes

In 2004, the State Department for Forests (an autonomous executive body under the subordination fo the president) was incorporated into the MoEP as a line department in the ministry's system; later the department was re-established as an agency (a legal entity of public law under the subordination of the MoEP). In 2007, the number of staff of the Forestry Department was sharply reduced, while the salaries of the remaining staff were increased substantially, in order to boost the efficiency of administration. Several Regional Forestry Offices were established, each containing a few forestry units. As a result of this reform, the average forest area under the responsibility of one forest ranger increased to about 5,000 ha. At present, the rangers lack equipment and transportation means to control the forest areas under their responsibility.

In 2011, the functions of the forestry agency were transferred to the Agency of Natural Resources of the MoENR. At this stage, it is difficult to judge about the effectiveness of this change in terms of the quality of forest management. Much will depend on the availability of financial and human resources and, most importantly, willingness to incorporate social and environmental concerns into forest management.

Licensing of forest use

In 2005, the Regulation "on the Procedure and Terms of Forest Use Licensing" was adopted, which provided for general and special (either logging or hunting) types of licenses. According to this law, all licenses were to be sold through auctions. One auction for long term logging licences was held in 2006, and three more in 2007 and, as a result, four wood production licenses were issued to private logging companies for 20 years. In 2008, the authority to issue forest use licenses was transferred from the MoEP to the Ministry of Economic Development. In subsequent years several more wood production licenses (for 20, 10 and five years) were issued on the basis of auctions. By May 2012, private companies had obtained 69 licenses of this type over an area of 161,671 ha, which is around 5.7% of the total forest cover.

This new system of licensing has experienced a number of problems. No reliable forest inventory was conducted before the auctions. Several important obligations were imposed upon the license holders, such as conducting detailed forest inventory, reforestation and provision of certain volumes of wood to local population for fuelwood harvesting. In addition, these companies had to prepare a management plan and within a certain time have their operations certified by an independent and

internationally recognized forest certification organisation. Approval of the management plan by the Ministry was a precondition for starting logging operations.

All these obligations as well as poor accessibility of forest cutting areas created substantial difficulties to the licensees. Consequently, implementation of advanced and environmentally sound logging operations (which are usually associated with substantial investments) is problematic.

In 2011, the MoENR announced that it planned to transfer much of the state forests to private companies on the basis of long term lease (about 50 years). Such important steps should have been preceded by comprehensive prior evaluation and analyses in terms of their social, environmental, economic and policy consequences, but these were not carried out. Furthemore, reliable information should be available about the conditions of forest resources potentially available to private companies, but that information is not available.

Such far reaching institutional changes need to be accompanied by relevant changes in legislation. In the second half of 2011, the Ministry of Energy and Natural resources started to actively work (with the participation of stakeholders) on the elaboration of a new Forest Law (which is to replace the Forest Code adopted in 1999). The new Forest Law will almost exclusively address forestry issues, while nature conservation and biodiversity aspects will be covered by other relevant legislation, such as Law on Protection of Environment (1996). The definition of forest is more clearly reflected in the new Forest Law. The general biodiversity-related requirements are also incorporated. The notion of a 49-year forest lease is introduced. It is also envisaged to divide the forest cover into three major categories: Protective, special purpose and management. Logging will be restricted in the first two categories. However, the concrete norms (for instance, logging rules, which are very important for biodiversity) should be defined in the special regulations. Only after the adoption of these regulations it would be possible to judge about the effectiveness of the new forestry legislation.

The MoENR aims to regulate economic aspects of forestry and natural resource management in general. The responsibility for biodiversity conservation is mainly left with the MoEP. The functions and responsibilities in terms of biodiversity (as well as other aspects) have to be clarified very explicitly, in order to safeguard adequate management and protection.

Finally, it should be emphasized that frequent institutional changes in the forestry sector have reduced the stability and slowed down the adoption and implementation of sustainable management practices in recent years.

Forest categorization

Adequate protection and, at the same time, obtaining maximum benefits from forests in a sustainable way (multipurpose management) requires forests to be categorised according to their social, economic and environmental functions. For instance, the so-called “corridor function” of forests – i.e. provision of ecological corridors for linking habitats and migration of species – should be supported. Ecologically sensitive ecosystems, such as pristine forests, should be incorporated into protected areas or given special protection regimes where commercial harvesting should be forbidden. Logging should also be restricted in forests which fulfill vital ecological (soil erosion and landslide prevention) and recreational functions.

In recent years the concept of High Conservation Value Forests (HCVF) has been implemented in many countries. The characteristic features and management regime in HCVFs are outlined in the 9th Principle in the *Principles and Criteria* of the Forest Stewardship Council (FSC). Six types and sub-types of such forests are distinguished, which include biodiversity, large natural landscapes, ecological (protective) and social functions. Management of these forests is envisaged in a way that protects and enhances these valuable and unique features.

Current Georgian forestry legislation and management standards do not adequately provide for multipurpose forest management and functional zoning. The Forest Code defines green zone, resort,

soil and water protection forests and forests with special significance (floodplain and subalpine forests, buffer forests protecting roads and water bodies etc). The Code generally restricts logging operations in most of these ecologically sensitive forest categories.

The concept and definition criteria for HCVFs have been included in the regulation “on the Procedure and Terms of Forest Use Licensing" (2005) with the active participation of representatives of NGOs and scientific institutions and experts. Some logging restrictions are provided for these forests. However, more detailed management prescriptions are needed to identify, map and protect valuable natural forest ecosystems, including ecological corridors, HCVFs and pristine forests. The FSC Principles and Criteria were used in the formulation of relevant definitions.

Last, but not least, forestry should be considered in the wider land use context, in order to achieve real sustainability.

Forest management on the ground

Forest management operations on the ground are mainly performed by private companies holding wood use rights for five, 10 and 20 years.

Most of the methods of “close to nature forestry” practiced in central European countries and being part of modern forest laws and certification systems still have not being incorporated into forest operations in Georgia. Examples for biodiversity friendly elements of sustainable forest management are:

- Obligation to leave deadwood and import biotope trees;
- Obligation to reforest with native species;
- Selective logging instead of clear cuts;
- Minimization of damage to remaining trees and natural regeneration.

In August 2010, the Georgian Government adopted a resolution “on Maintenance and Restoration of Forests”, in which it is stated that forest restoration and afforestation should be conducted in line with the requirements of biodiversity conservation. In addition, according to the resultion, preference should be given to native, site-adapted species, which, undoubtedly, is a step forward.

The basis for felling operations of licensees in Georgia is the so called forest use (exploitation) plan. The template of this document applies *inter alia* to forest protection measures and reforestation as well as to biodiversity and environment protection measures, which forest users have to follow.

Often the decision on the trees to be felled and method of felling is made by woodcutters without adequate training. Control of felling operations is carried out with focus on correct felling of marked trees. Biodiversity factors (e.g. deadwood, damages on regeneration, etc.) are given less consideration.

Forest roads are vital for sustainable use of forest, but they could be also source of negative impacts on biodiversity by disturbing habitats of wild animals. Unfortunately often forest roads in Georgia are constructed without considering possible impacts on the protection function of forests and biodiversity. Management directives for forest roads considering biodiversity as well as health and safety norms for the workers should be developed.

Inside the cutting areas the use of heavy log haulers often damages the forest soil and negatively impacts soil fauna and flora.

Nevertheless, in general the condition of forest biodiversity is relatively better within forest cutting compartments inside licensed forest areas, in comparison to those areas where no license was issued and where cuttings took place in a chaotic way in the past. The reason is that as a rule, workers with more practical experience are operating within licensed areas. Despite the fact that biodiversity

conservation is not the first priority for the license holders, they try to abide the norms defined by the relevant legislation, including those related to biodiversity (unlike illegal loggers).

5. Projects related to forest biodiversity

Recently implemented projects related to forest biodiversity have had a pilot character. For instance, WWF-Caucasus Programme Office implemented a project on "Mitigating Impacts of Climate Change through the Restoration of Forest Landscapes in Southern Caucasus" during the period of 2008 – 2012. The project was supported by German government (Ministry of Environment and Nuclear Safety) and implemented with assistance of WWF Germany via Kreditanstalt fuer Wiederaufbau (KfW). The main objectives were to restore degraded natural forest landscapes and improve existing capacities in this area. As a result of the implementation of the project, nearly 250 hectares of floodplain and mid-mountain forests were restored (by planting and promoting natural regeneration) with several native species. Although main purpose of the project was to enhance the resilience of forests against climate change (i.e. adaptation), the improvement of biodiversity through restoration of habitats and connectivity is a very important additional benefit.

Another example is the project on Climate Tolerant Rehabilitation of Degraded Landscapes in Georgia. The project was implemented in Dedoplitstskaro Municipality by Gesellschaft fuer Internationale Zusammenarbeit (GIZ) office in Georgia with the financial support of the Ministry of Environment and Nuclear Safety of Germany (from November 2008 to October 2011). The main objective was to mitigate impacts of climate changes through the development of appropriate models for rehabilitation of degraded landscapes. As a result, tens of hectares of windbreaks and arid forests were restored under this project by using native species such as ash *(Fraxinus excelsior)* and pine *(Pinus eldarica).*

NACRES (Noah's Ark Centre for the Recovery of Endangered Species) has implemented a project on *Ecosystems and Species Conservation in Georgia: Brown Bear, 2005-2006.* The project was supported by British Petroleum and its partners – Baku-Tbilisi-Ceyhan and South Caucasus Pipeline companies as well as Environmental Investment Programme (EIP). The objective was to conserve brown bear and its habitats in Trialeti Mountain Range and Borjomi-Kharagauli NP through sustainable and participatory management. Zoological and ecological research was conducted in target areas on the conditions of bear population and its habitats as well as existing threats. In parallel, socio-economic research was conducted on the destruction of bear habitats and causes of poaching. After the collection of necessary information, an Action Plan was elaborated through participation of key interested parties. The future activity should include the implementation of this Action Plan.

It is also worth to mention the activity on *Elaboration of the Conservation Management Plan for Alazani Floodplain Forest* within the framework of the Global Environmental Facility (GEF) / World Bank (WB) Project – "*Protected Areas Development*", approved in 2001). Within the framework of this activity, an NGO Georgia's Protected Areas Program (GPAP) elaborated a plan for conservation, restoration and integrated management of Alazani floodplain forests (multipurpose use territory – IUCN Category VI), which is the first step towards the adoption of the National Program on Conservation of Flood Plain Forests, envisaged by the NBSAP 2005.

Regional Environmental Centre (REC) Caucasus has started the project "Support Development of Biodiversity Conservation Policies and Practices in Mountain Regions of the South Caucasus". The project aims to build capacities of local communities and self-governing authorities to address biodiversity loss in forest ecosystems of mountains in South Caucasus, to improve participatory biodiversity management in general. The project is funded by Norwegian Ministry of Foreign Affairs and will be implemented in Armenia, Azerbaijan and Georgia in 2011-2014. The specific objectives include: Awareness raising of key stakeholders on values of biodiversity and forest ecosystem services and demonstration of relevant practical aspects through implementation of pilot activities on restoration of degraded forest ecosystems.

Substantial additional financial resources (including state budget funds) are necessary, in order to implement the positive outcomes of these projects at a much wider scale.

6. Present condition of forest biodiversity, negative impacts and observed trends

Georgia has a relatively high percentage of forest cover, according to which it belongs to the forest-rich countries. However, due to the over-use of the forests, canopy cover has reached critically low thresholds (less than 50%) in more than 55% of forest area. Such forests have significantly reduced protective functions and have lost the ability to regenerate naturally which negatively affects biodiversity. The country's forest biodiversity is threatened by climate change, unsustainable use (logging and grazing), forest fires, introduction of alien species and unsustainable hunting/poaching. Unsustainable infrastructure development may introduce additional threats.

It should be emphasized that the present condition of forest biodiversity is not studied intensively and, therefore, concrete figures are very difficult to find. Nevertheless, in this chapter some general aspects and trends are described.

6.1. Climate change

Climate change has already started to have significant impacts on nature and people in Georgia, effects that will become even more visible in the future. Higher temperatures, lower or higher levels of precipitation than the long term historical norm add stress to forest ecosystems and their biodiversity.

6.2. Unsustainable forest use

The detailed description of current impacts of forest management "on the ground" upon biodiversity is given above. This section considers broader contexts.

Forests which have been degraded through unsustainable logging or application of incorrect management practices can no longer provide vital ecosystem functions such as soil protection and flood control. They are also not able to regenerate naturally. An important component in many forest types is the presence of old trees and dead wood which serve as the only habitats for many specialist species: if they are removed, many species – such as woodpeckers – run the risk of disappearing.

Beech forests play the leading role in the region's timber industry. Careless clear-cutting of mountain beech stands has permanently damaged a significant portion of valuable beech forests in Georgia. Oak forests, largely cleared for farmlands and pastures, have been spared mostly in remote canyons and on relatively poor soils. Chestnut forests in the Colchic foothills have also been logged intensively. In western Georgia broadleaf forests have been cleared for tea and hazelnut plantations in the past. Coniferous forests have been logged in soviet times for paper production and timber, resulting in the reduction of these resources.

Although in general the collection of non-wood forest products does not seem to be depleting the existing resources, in some areas it is unsustainable. For instance, excessive chestnut collection by local villagers occurs near population centers, which hampers natural regeneration. Until recently, the collection of *Abies nordmanniana* seeds was conducted by using unacceptable methods, such as cutting the tops of the trees. At present this practice has been sharply reduced through strict law enforcement. However, further assessment studies on natural capacity of this resource are needed to get a clearer picture on sustainability of seed collection.

Arid open woodlands form on dry, rocky slopes in the eastern and southern Caucasus and are made up of juniper species and pistachio. These forests are particularly vulnerable, suffering from unsustainable logging and grazing. Lowland forests are mainly found in floodplains on low river

terraces, generally growing on alluvial, swampy, or moist soils. Very few lowland forests have been preserved to this day - some stands remain only in Kolkheti lowlands and in the Kura, Iori, and Alazani river valleys.

In Georgia, the density of grazing wildlife (e.g. red deer) is often so low that damage by game can be ignored. However, uncontrolled and excessive grazing by domestic animals seriously threatens the forest ecosystem. Natural regeneration of forests is undermined through grazing. In addition, already regenerated plants are often completely destroyed. This contributes to the degradation of biodiversity at the genetic level. Often this damage is irreversible. Overgrazing causes the compaction of soil which triggers erosion, which in its turn contributes to natural habitat loss.

Improper management as well as other anthropogenic factors (forest fires, grazing, etc) cause undesirable forest successions - the replacement of valuable natural forest stands with economically and ecologically less valuable forests. One example could be the gradual transformation of natural forests of Georgian oak (eastern Georgia) into the scrubland mainly comprised of species such as *Paliurus spina christi*. Unsustainable forest management also triggers the spread of pests and diseases.

6.3. Non-native species

According to expert estimations 50,000 to 60,000 ha are covered by planted forests in Georgia. These plantations partly consist of exotic and species that are not well adapted to the site (e.g. *Pinus nigra*) and are mostly homogenous monoculture monocultures. These monocultures are much poorer in biodiversity than "close to nature" forests with native tree species.

6.4. Invasive species

An example of an invasive species is the so-called "Tree of Heaven" *(Alianthus altissima).* It is a popular garden plant introduced from China to many other parts of the world. As an exotic species it potentially threatens the natural areas in Georgia especially in floodplain areas. If uncontrolled, it can out-compete valuable native species, such as wingnut *(Pterocaria pterocarpa)*. Other potentially invasive species are *Paulownia* and *Criptomeria*. The former is planted on private agricultural land for its fast-growing and good quality timber. However, the question whether *Paulownia* can give good quality timber in Georgian conditions, needs further investigation. *Criptomeria* has been used in windbreaks for decades. If uncontrolled, these species could threaten native forests in the future. In any case, the potential threat from invasive species should be studied more carefully.

6.5. Unsustainable hunting/poaching

The numbers of large herbivores in Georgia have dropped dramatically in the past century due to poaching and over-hunting. Many hunted species, such as red deer (*Cervus elaphus*) and brown bear *(Ursus arctos)*, have lower rates of reproduction in comparison to other species; consequently, these species are particularly vulnerable and their numbers have been substantially reduced in recent decades. Red deer numbers have plummeted from 800 to around 150 in Lagodekhi Nature Reserve. The population of brown bear has decreased by about a third in the past 15-20 years. Bezoar goat, and turs are also heavily poached in the Caucasus. Leopards have been driven to near extinction due to poaching and habitat destruction. Lynx, otter, martens, wild cat, fox, and jackal are killed for their furs.

The magnitudes of impacts of poaching and uncontrolled hunting need to be carefully assessed. Based on this assessment, remediation measures should be elaborated and implemented. If conducted properly, managed hunting can increase the size and number of healthy populations of animals. It can also generate significant income, which could be reinvested into biodiversity conservation.

6.6. Forest fires

Forest fires cause damage or destruction of trees, bushes and natural regeneration. Soil layer and microorganisms are also burnt. If not occurring naturally, forest fires change the directions of forest succession. This could delay the establishment of optimal potential natural vegetation cover for decades and even centuries.

6.7. Infrastructure development

As it was already mentioned, infrastructure development (dams, pipelines and power lines) is a relatively new threat to forest biodiversity. Based on present assessments, significant areas of forests will be cleared for infrastructure building. However, it is not very clear how large forest areas will be affected in total (either directly or indirectly). For instance, in the case of dams it is expected that several thousand hectares of forest areas will be covered by water, while much larger area covered by forest will be affected indirectly through local climate (moisture and temperature regimes) change. It needs to be mentioned, that certain forest area has already been cut due to construction of pipelines and power lines. Even the clearance of a relatively small forest area could cause irreversible damages if this forest is located within ecological corridor or other environmentally sensitive area.

7. Main threats and underlying causes

Based on the information presented above the main threats to forest biodiversity and their underlying causes can be outlined as follows:

- Unsustainable (including illegal) logging
- Rural poverty and a lack of affordable alternative energy resources;
- Market demand (both domestic and international) for forest products;
- Lack of awareness among the loggers and consumers;
- Limited capacities of the state forestry authorities for control and extension service;
- Gaps and ambiguities in legislation.
- Excessive livestock grazing
- Rural poverty;
- Lack of alternative livelihood opportunities;
- Lack of awareness of the farmers;
- Inefficient livestock management systems;
- Absence of subsidies, small grants, favorable-term loans and a lack of extension services to the farmers.
- Forest fires
- Climate change (however, the issue needs further investigation);
- Irresponsible forest visitors;
- Irresponsible practices (e.g. burning grass);
- Lack of capacity to adequately combat forest fires.
- Climate change
- “Greenhouse gases” emitted into the atmosphere by the industry, agriculture and transport sectors;
- Deforestation and forest degradation.
- Unsustainable infrastructure development
- Rapid economic growth and tourism development;

- Pressure for decision-making in the short periods of time;
- Insufficient knowledge and consideration of ecological values, underestimation of economic consequences of the destruction of natural ecosystems.
- Unsustainable hunting and poaching
- High demand for certain fauna species;
- Lack of proper control mechanisms, including lack of reliable data for setting quotas;
- Limited capacities of hunting reserves;
- Limited knowledge and awareness of the hunters;
- Week control/law enforcement.
- Unsustainable forest management
- No formally approved National Forest Policy and Strategy document;
- Frequent institutional and legislative changes within the forestry sector;
- Limited funding and capacities, lack of adequately trained staff in forest management organisation and supervisory bodies;
- Lack of clarity with respect to the optimal sharing of powers and responsibilities between the state and the private sector;
- Inadequate license conditions for private companies;
- Outdated forest inventory data and inadequate management standards.

THEMATIC FIELD 10. BIODIVERSITY OF INTERNAL WATERS

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1. Introduction

Internal waters was adopted as a thematic area at the fourth meeting of the Conference of the Parties (COP) to the Convention on Biodiversity (CBD) in Bratislava, Slovakia (1998). The programme identifies the actions that Parties need to carry out to halt the trend of biodiversity loss, including monitoring, assessment and evaluation of biological diversity of internal water ecosystems, conducting environmental impact assessments of water development projects, development of pollution prevention strategies, choosing and using appropriate technology, and promoting transboundary cooperation, ecosystem-based management and the involvement of local and indigenous communities at all appropriate levels. Georgia became the party of convention from 1994. The programme on biodiverity of internal waters collaborates with several organization and conventions, such as, Ramsar convention, Convention on Migratory species and other.

The extent and distribution of internal water ecosystems are not properly documented at the global or regional scale and in some cases there is no comprehensive documentation even at national levels. Several inventories have been published listing the major river systems with their drainage area, length and average runoff. The International Lake Environment Committee (ILEC) and the UNEP-World Conservation Monitoring Center (WCMC)'s global map of wetlands, among others, maintain geographic descriptions, and/or physiographic, biological and socio-economic information on lakes; they do not provide comprehensive information on the distribution and extent of lakes at the global level. There are about 10,000 lakes with a size over 1km² worldwide. Internal waters such as wetlands, underground water and human-made systems are not well documented except in North America and Western Europe. Information on the status and trend of water availability and quality is also generally lacking.

The fraction of water available on Earth as fresh water supports a stunningly and disproportionately high level of biodiversity, which includes not only life living within water, but that which depends upon internal water habitat. For example, although estimates vary, of the 30,000 or so recorded species of fish, about 40% are freshwater species. Taking into account the relative abundance of marine and freshwater habitat, that makes freshwater species diversity around 1000 times higher than marine species on a volume of habitat basis.

Information on species important for conservation pursuant to Annex I of the CBD, is generally fragmentary and, in a number of countries and regions, lacking for some categories of internal water biodiversity, particularly for species of socioeconomic, scientific and cultural value. Similarly, related information for genetic diversity (including genomes, populations etc.) is even more fragmentary, as is accurate data for ecosystem diversity. This information needs to be improved to be more useful to policy and decision-makers.

Internal water biodiversity is critically important to poverty reduction and the achievement of human development targets. The direct use of internal water biodiversity (e.g., for internal fisheries) provides food security for countless millions of the world's poor. Moreover, the broader ecosystem services provided by internal water biodiversity, such as climate regulation, flood mitigation, nutrient recycling, water purification and waste treatment, are critical to human welfare and development. Internal water biodiversity is critical to the achievement of most, if not all, of the Millennium Development Goals and their targets.

1.1. Internal waters of Georgia

Georgia is rich in water resources. There are 26,060 rivers within the country; their total length reaches 59,000 km. length. 99.4% of the rivers are less than 25 km long, 121 rivers -25-100 km and 16 rivers - 100-599 km.

Georgia's rivers belong to two major basins divided by the Likhi ridge. The longest is the river Kura which starts in Turkey and crosses eastern Georgia before flowing into the Mingechauri reservoir in Azerbaijan. Two more large rivers, the Alazani and the Iori, also flow into this reservoir but they begin their journey in the mountains of the Great Caucasus, passing through the Kakheti region. Other rivers in the east of the country are the Liakhvi, Ksani, Aragvi, Paravani, Algeti, Ktsia-Khrami. Among the rivers of western Georgia the largest is the Rioni; its whole length lies on the teritory of Georgia, originates in the mountains of the Greater Caucasus and flows through Kutaisi and Poti and into the Black Sea. Other important rivers of western Georgia are the Inguri, Chorokhi, Kodori, Bzipi and Tskhenistskali.

About 860 lakes are located in Georgia; the majority are very small and their total area does not exceed 170 km^2 (0.24% of the country's territory).

Despite their small number, lakes in Georgia are notable for the variety of their genesis. There are tectonic, glacial (the largest number), riverine, coastal, karstic, suphosic and man-made lakes. Freshwater lakes dominate. Some of them are characterized by very low salinity (34, 1-100mg /l), but there are salt lakes (from 24 g/l to 69 g/l) as well - these are the lakes of the Iori plateau. Georgian lakes belong to 3 hydro-chemical formations: hydro-carbonate (the most common), chloride and sulphate. The largest lake in Georgia is Paravani Lake (surface area 37.5 km^2); other large lakes are: Paliastomi (18.2 km^2), Ritsa (1.49 km^2), Tabatskuri (14.2 km^2), Bazaleti (1.0 km^2). Lake Takatsuki is the largest lake by volume – 221 mln.m^3. Ritsa is the deepest lake (116 m).

In Georgia there are 12 water reservoirs. The total area of reservoirs is 107 km^2, volume - 2.4 $km^{3.}$. Lakes and reservoirs in Georgia have different applications both for fishing (Paravani, Tabatskuri, Paliastomi, Jandara lakes, Tsalka, Sioni, Tbilisi,Shaori,Tkibuli, Gali water reservoirs) and for the purposes of tourism and sport (Lisi, Kakhisi, Bazaleti lakes, Tbilisi and Sioni water reservoirs).

Marshes are a typical component of the Georgian landscape, especially in the Kolkheti plain and on the volcanic plateau of southern Georgia. Marshes are distributed in both the lowlands and sub-alpine and alpine belts. Widly distributed are eutrophic marshes; the areas covered by mesotrophic and oligotrophic marches are limited. In western Georgia marshes with sphagnum bogs are distributed up to the sub-alpine belt in western Georgia and to 2,000 m.a.s.l. in the eastern region where they are affected by the drier climate.

The wetland alder forests and unique peat bogs located in the coastal Kolkheti lowlands as well as Paliastomi Lake are designated as RAMSAR sites. Kolkheti national park and Kobuleti nature reserve and managed reserve include coastal peat bogs that are especially important for their unique floristic composition and abundance of endemic and relict species.

Tabatskhuri alpine lake and the neighbouring high mountainous wetlands are included in Ktsia-Tabatskhuri managed reserve; established in 2007. In 2011 the creation of Javakheti protected areas gave legal protection to Karstakhi and Suldi marshes and Khanchali, Bugdasheni and Madatapa lakes.

1.2. Biodiversity of Internal waters of Georgia

1.2.1. Fish

In fresh waters of Georgia 91 of fish species are distributed, among them 61 are freshwater inhabitants and 30 are migrant species. 13 species of fishes are listed on the Red List of Georgia: Atlantic sturgeon (*Acipenser sturio*), Colchic sturgeon (*Acipenser colchicus*), Fringebarbel sturgeon (*Acipenser nudiventris*), starry sturgeon (*Acipenser stellatus*), Russian sturgeon (*Acipenser*

gueldenstaedtii), Persian sturgeon (*Acipenser persicus*), beluga (*Huso huso*), Pontic shad (*Alosa pontica*), brown trout (*Salmo trutta fario*), kutum (*Rutilus frisii*), Colchian khramulya (*Capoeta sieboldi*)(=*Varicorhinus sieboldi*), Ciscaucasian spined loach (*Sabanejewia caucasica*) and Monkey goby (*Neogobius fluviatilis*). Besides native species there are nine introduced/invasive species in Georgian internal waters; Crucian carp (*Carassius carassius*) is the most widely distributed.

All sturgeon species areendangered in Georgia. The current conservation status of endemic species of the Mtkvari River and Kolkheti lowland needs urgent investigation. In this respect the following habitats are most important: upper sections of the Mtkvari river, Chorokhi basin, Paliastomi lake; lower sections of the Rioni river (spawning areas of sturgeons), Bebesiri lake, and lakes on the Javakheti plateau.

Depending on the region of the country the following economically important species can be distinguished: Javakheti Plateau – cisco (*Coregonus spp.*) and common carp (*Cyprinus carpio*); river Kura (Mtkvari) – transcaucasian barb (*Capoeta capoeta*), khramulya (*Capoeta sieboldii*) and common carp (*Cyprinus carpio*); river Alazani –catfish (*Silurus glanis*); Jandari Lake, Kumisi Lake and other south-east Georgian lakes - common carp (*Cyprinus carpio*), silver carp (*Hypophtalmichthys molitrix*); rivers of the Black Sea basin – mullets (*Mugil spp.*), fringebarbel sturgeon (*Acipenser nudiventris*), shads (*Alosa spp.*), common carp (*Cyprinus carpio*) and common bream (*Abramis brama*).

In the last few decades Georgia's internal waters have been widely invaded by the crucian carp (*Carassius carassius*). It is not an important stock fish but it is now a common invasive species in almost every water body in Georgia because of its high adaptability and dispersal ability.

1.2.2. Other vertebrates related to internal waters

13 species of amphibians are known for Georgia. Two of them are included on the the Red List of Georgia: Caucasian salamander (*Mertensiella caucasica*) and Syrian spadefoot (*Pelobates syriacus*).

50 species of reptiles are distributed in Georgia; four of them are associated with internal waters: European pond turtle (*Emys orbicularis*), Caspian turtle (*Mauremis caspica*), grass snake (*Natrix natrix*) and dice snake (*Natrix tessellata*).

Wetland ecosystems of both the Kolkheti lowlands and the Javakheti plateau are also important habitats for migratory birds with up to 300 species of birds having been registered in the Kolkheti protected territories and adjacent areas. A further 91 species have been registered at Javakheti lakes, many of them included on both the Georgian and IUCN Red Lists. The territory is a significant habitat for endangered species included on the Red List of Georgia, among them *Pelecanus onocrotalus, Pelecanus crispus, Ciconia ciconia, Coconia nigra, Anser erythropus, Tadorna ferriginea, Marmaronetta angustirostris, Oxyura leucocephala* and *Grus grus*.

Kolketi lowland (lake Paliastomi and Black sea coastal zone) and lakes of Javakheti plateau are important wintering and resting areas for approximately 100 species of migratory birds. Many of them are included in the Convention on Migratory Species (CMS – the Bonn Convention) and the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA). To protect migratory birds, special efforts are needed (included ex-situ conservation and reintroduction), but in Georgia there are no official programmes aimed at monitoring water birds.

Small vertebrates associated with inland waters are Eurasian water shrew (*Neomys fodiens*), nutria (*Myocastor coypus*), greater white-toothed shrew (*Crocidura russula*), European water vole (*Arvicola terrestris*), European otter (*Lutra lutra*) and European mink (*Mustela lutreola*).

1.2.3. Invertebrates

Data about invertebrate animals inhabiting Georgia's internal waters are fragmented and incomplete. A general review of the researches of about Georgian benthic and planctonic fauna are presented in section 5 below. In comparison with groups, more complete but old data are available

for crustaceans and mollsucs. According to the available information 58 species of molluscs and 111 species of crustaceans (70 spp. *Cladocera* and 41 spp. *Copepoda*) have been recorded in Georgian internal waters; however the data is quite old and its usefulness needs serious re-evaluation.

1.2.4. Flora

The flora of Georgia's internal waters is quite diverse. It includes at least 2,605 taxa of algae. In running waters mostly benthic plant species are represented; the commonest species or higher taxonomic groups are: Reophyls - *Cladophora glomerata*, *Hydrurus foetidus*,*Ulothrix zonata;* Epiphythes - *Cladophora glomerata*, *Hydrurus foetidus*,*Ulothrix zonata;* Epilithic plants - *Merismopedia glauca*, *Gloeocarpa turgida*, *Achnanthes lanceolata* და *Cymbella affinis.* In standing waters (lakes, reservoirs, ponds and marshes) planktonic complexes are most diverse; frequently occurring and widely distributed species are - *Merismopedia tenuissima*, *Microcystis aeruginosa*, *Gomphosphaeria lacustris*, *Ceratium hirundinella*, *Gloeococcus schroeteri*, *Pediastrum tetras* და *Scenedesmus arcuatu*. In lakes on the Javakheti plateau are distributed north-alpine complexes - *Melosira distans*, *Meridion circulare*, *Diatoma anceps*, *D. hiemale*, *Eunotia alpina*.

Many relic and endemic species are distributed in the Kolkheti lowlands in peat bogs: Drosera rotundifolia, Rhinhospora alba, Rhododendron luteum, Rhododendron ponticum, Osmunda regalis, Soligado turfosa, Drosera rotundifolia, Trapa colchica.

Freshwater fungi, mosses and lichens are not well studied. 17 species of *Hypomices* are recorded for Georgian fresh waters.

Data taken from a variety of national biodiversity studies (GEF/UNEP, NACRES) was published in 1996 and this represented the country's first attempt at collating and assessing the status of various components of national biodiversity. An updated analysis was prepared in 2009 by ECODIT, with USAID financial support. Both of the above-mentioned documents included aspects related to the biodiversity of internal waters, although the data is far from complete; even more, in the 13 years following (1996-2009) information and knowledge on the biodiversity of Georgia's internal waters has not changed.

2. Biodiversity Strategy and Action Plan of Georgia, related activites to the internal waters biodiverity, achievments and shortcomings

The Biodiversity Strategy and Action Plan (NBSAP-1) adopted in 2005 set out a ten-year strategy for the conservation and sustainable use of biodiversity; concrete steps were planned for five years. Taking into account the condition of biodiversity in the country, problems and threats acting on it, nine key areas or issues were identified: protected areas; species and habitats; agrobiodiversity; gunting and fishing; monitoring; biotechnology and biosafety; environmental education, public awareness and public participation; finance and economics; and legislation and institutional development. Issues related to the biodiversity of internal waters were addressed in the chapters dealing with protected areas (A), species and habitats (B) and hunting and fishing (D).

In the situation analysis for hunting and fishing it was noted that reproduction of fish stocks had decreased significantly since 1991 and some reproductive facilities had been destroyed. Use of chemicals and electric shock during fishing were frequent. Poaching (with forks) as well as dams on the migration spawning routes of anadromous fish such as sturgeon had been found to be an insurmountable barrier to the fish migrating to their spawning areas. It was noted that the ecological condition of water reservoirs in the country had become much worse in recent years. Stocks of valuable fish species had been significantly decreased; Atlantic sturgeon, Black Sea salmon and a number of other species were near to extinction. Although the analysis showed the poor condition of the biodiversity of Georgia's internal waters the NBSAP did not include objectives and actions improving the condition of internal waters.

Strategic Goal (A) - to develop a protected areas system to ensure conservation and sustainable use of biological resources - included the actions:establish protected areas on the Javakheti Plateau (A3); designate new Ramsar sites on the Javakheti Plateau (lakes Khanchali, Madatapa, Bugdasheni) (A4); identify potential Ramsar sites and prepare necessary designation proposals (A7). Up till now only action A3 has been carried out: the law "on the Establishment and Management of Javakheti Protected Areas was adopted in 2011.

Strategic Goal B - to maintain and restore Georgia's habitats, species and genetic diversity through in-situ, ex-situ and intersitu conservation measures, and through sustainable use of biological resources - the following actions must be noted: conduct an inventory of plant and animal species and assess their status using IUCN categories of threat (B1); implement conservation programmes for endangered, rare, endemic and relic species (B4); prepare a conservation action plan for waterbirds and initiate its implementation (B11); establish bird ringing centres (B16); assess the impact of invasive species and develop management strategies for these species (B17); conduct a nationwide inventory of wetland ecosystems (B20); develop a national strategy for wetlands (B21); implement the existing Javakheti Wetlands Conservation Management Plan (B22).

Strategic Goal D - to promote sustainable hunting and fishing through adequate planning, restoration and protection of key biological resources. The following actions can be considered as relevant to internal waters: improve the licensing procedure for hunting of migratory birds (D1); define hunting quotas for migratory birds and conduct studies on hunting (to identify sites where wildfowling will be permitted and those where all hunting should be banned, based on bird counts on these sites) (D2); provide professional training to government officers and hunting farm employees (D6); restore or establish hatcheries dedicated to the recovery of native fish species using modern technologies (D9); ensure that income generated from the use of biological resources may be used for conservation and renewal of these resources (D10).

The following strategic goals addressed cross-cutting issues which are relevant to the biodiversity of internal waters: biodiversity monitoring (E); environmental education, public awareness and public participation (G); finance and economics (H); legislation and institutional development (I).

3. Effective Legal Documents Governing Conservation of Biodiversity of Internal Waters and International Agreements

3.1. National Policies and Legislation

The use of Georgia's internal waters and the conservation of their biodiversity are regulated by the Constitution of Georgia (Article 37) and a number of laws, including the law "on Environment Protection" (1996), law "on Water" (1999), law "on Fauna" (1996), law "on the Red List and Red Book of Georgia" (2003), law "on Permits of Environmental Impact Assessment (2007), law "on Ecological Expertise" (2007). In addition, there are numerous by-laws regulating the conservation and use of biodiversity based on the above laws.

The **Law on Water** is the basic law governing the use of Georgia's territorial waters and biodiversity thereof; it provides for the protection of water bodies, the efficient use of water resources, and the sustainable management of biodiversity. According to the law, all of the internal waters of Georgia of all types comprise the state water fund; they include internal and transboundary rivers, natural and artificial lakes, waters of artificial channels and pools, marshes and ground waters. Key goals of the law are elucidated in Article 4, which states that the law shall:

a) Ensure implementation of unified state policies in the sphere of water protection and use;

b) Protect water bodies (including the Georgian part of the Black Sea) and efficient use of water resources taking into consideration the interests of present and future generations and the principles of sustainable development;

c) Ensure stability of water fauna and their sustainable use;

d) Prevent harmful impact on water and effective liquidation of the results.

The law obligates the state (Articles 10, 11, 12) to establish state standards (quotas, limits, norms) for the use of water and water resources, development of methodologies for establishing standards and the introduction thereof; creation of a unified state information fund of water and water resources; implementation of unified scientific-technological policies in the sphere of water protection and its safe use, coordination, organization and funding of the scientific-research and other works.

The law (Article 13) also allows individuals and legal entities to receive complete, timely and unbiased information about water status from governmental authorities.

Chapter III of the law fully determines the strategy of protection of water and its resources. Article 17 unambiguously and without specifying any particular cases, states the necessity of protection of anadromous fish varieties and this means that in case of human intervention into any such water ecosystem the status of anadromous species should be identified and relevant measures should be taken for their protection (Article 17, Section 5; Article 18, Section 2).

It should be noted that the Order of the Minister of Agriculture of Georgia (#2-206, 25th November 2011) on "Approval of the Rules of Technical Operation of the Melioration Systems" determining technical characteristics of the dams does not provide for fish paths and technical measures for protection of anadromous fish.

According to chapter three of the law, protection of water bodies should be ensured: a) to prevent contamination, pollution, drying and such other negative impacts, which may harm the health of the population, reduce the fish reserves, worsen water supply conditions and cause worsening of physical, chemical and biological properties of water, reduction of natural self-cleaning ability, disturbance of hydrological and hydrogeological regimes and other undesired outcomes; b) to protect water bodies that have special scientific, aesthetic and recreation significance; c) to give the category of protected areas to certain water bodies; d) maintain the diversity of species of water fauna; e) maintain and protect sea and other water bodies, coastal zones; f) prevention of harmful impact on water and effective liquidation of the outcomes.

According to Article 53 at a time of usage of water body for fishery needs the list of water bodies or sections thereof and types of water usage limitations are set by the document "on the List of Water Bodies and Sections thereof of Specific Significance for Fisheries and on Limitation of Water Usage within their Scopes", which had not been developed or is not available to the public. The mentioned document should regulate measures to protect significant water bodies or species in licensed or other farming ponds, together with the law "on the Red List and Red Book of Georgia".

Chapter VIII of the same Law, obliges the state to provide state monitoring of water, comprising a unified system for the regular observation of quantitative and qualitative characteristics of water in water bodies and waste waters and analysis of information intended for collection of information about the condition of water and water bodies, their interaction with the environment (natural and anthropogenic), evaluation of energetic potential of the water resources and rivers, and forecasting of the harmful impact of water (floods, mudflows, landslides etc.). State monitoring of water is provided within the scopes of a general state system of environment monitoring (Article 80), proper operation and funding of which should be ensured by the state.

The **Law on Permits of Environmental Impact Assessment** specifies activities that are subject to obligatory environmental expertise and establishes the legal basis for the participation of the public and for public information in the course of the issuance of an environmental permit for performance of such activities on the territory of Georgia, in the process of state ecological examination and environmental impact assessment, in the issuance of a permit, and in decision-making on the issuance of a permit. The activities subjected to environmental expertise include: construction of hydropower stations (with 2 megawatt and greater capacities) and heat power plants (of 10 megawatt and greater output); construction of water reservoirs (of 10,000 m^3 and greater volume);

construction of the water treatment facilities (over 1,000 m^3 and greater per day capacity), as well as main sewage collectors; construction of dams, moorings and berths, piers and spur-dikes; s) arrangement of reservoirs for toxic and other harmful substances.

The **Decision of the Government of Georgia #138, 2005 on Approval of the Statute on Rules and Conditions of Issuance of Fishing License** sets the conditions of fishing license issuance. A licensee undertakes to be engaged in fishing and other economic and non-economic activities in full compliance with the law, including protection of the species provided for by the law and annual monitoring of the reserves and composition thereof in the licensed water body. It is significant that no standards have been adopted for setting the quotas license conditions and management plans to provide basis for decision making. The setting of fishing quotas requires application of a sound scientific methodology, detailed descriptions of which should be submitted and evaluated by competent persons.

The **Order of the Minister of Energy and Natural Resources #07, 2011 "on Approval of the Statute on Rules, Terms and List of Devices and Equipments to Gain the Objects of Fauna by the Species** regulates the rules and terms for gaining the objects of fauna and its species and determines the list of equipment and appliances (devices) allowed for this purpose. The first chapter provides key concepts and definitions. Section 1 of Article 2 defines "fish – water vertebrates without permanent body temperature, as well as crustacea and molluscs." The legislators are aware that crustacea and molluscs are invertebrates.; their inclusion with fish is for the simplicity of the concepts provided for in the Law, as the Law regulates catching of the crustacea and molluscs. Still, a separate definition would be better. Based on such judgment it is unclear why water mammals were not included in the definition of fish, while in Article 8, among the species of fish prohibited for catching, in Subsection b, Section 1 sea mammals were named. The definition of fish should be formulated differently if it is intended to include molluscs, crustacea, fish and sea mammals, clearly showing that this is a conditional name, or it would be better to separate out animals that are completely different from fish, in this case crustacea, molluscs and sea mammals.

According to chapter II of the statute (Means and Rules of Hunting) a person hunting for the migratory birds shall maintain, together with the documents evidencing the right of keeping and carrying a shotgun, the receipt (original) evidencing payment of the levies imposed for withdrawal of migratory birds from the environment provided for by Georgian law. It should be noted, that the receipt is effective for almost six months and there are no regulating actions requiring the hunter to sub,it detailed information about the varieties and quantities of killed birds. Respectively, the Agency of Natural Resources has no information about the varieties and quantities of the birds taken from the environment by hunters; in addition, it is unclear how the daily limit specified in Annex 4 of the statute was established, while no census of the bird species was provided.

The third chapter of the statute deals with the rules of fishing and protection of fish stocks. In the new version of the Statute, Article 3, specifying fishing restrictions (with the exception of amateur and sports fishing) reduces the fishing restriction distance in the river mouth and adjacent territories of the sturgeon and salmon rivers from 500 to 300 meters, further aggravating the threat to which the endangered species are subjected.

Chapter 5 of the statute lays down specific conditions. It would be good if fishing restrictions were applicable to all varieties specified in the Red List of Georgia. It is also significant to evaluate the state of endemic species of internal waters of Georgia and Caucasus, fishing restriction of which should be included into this statute.

Two of eleven environmental priority directions provided by Second National Environmental Action Plan of Georgia (NEAP-2) deal directly with internal waters and their biodiversity and sustainable development. Among them the first thematic direction – "Water Resources" - includes a thorough situation and problem analysis and a set of strategic and preventive actions, among which regular water bio-monitoring should be mentioned. Unfortunately, for this direction a very limited budget is

allocated and in addition, support and funding of the human resources training and re-training programmes are not considered at all. Monitoring of chemical elements is of significance and it is good that the number of objects of monitoring has been increased in this respect (polyaromatic hydrocarbons, pesticides and oil have been added).

It is desirable that the new NBSAP should pay greater attention to monitoring. The report on the second thematic direction – Biodiversity of Protected Areas - clearly reflects the extreme scarcity of data about water biodiversity and related problems. In the absence of information sound decisions cannot be made. In this respect, actions provided for by NEAP-2 could help. The priorities of NEAP-2 include development of biodiversity databases (including for water biodiversity), improvement and operation of unified monitoring systems, and networks of protected areas. However, it is significant to note that NEAP-2 cannot provide a complete picture in terms of evaluating the measures provided for by NBSAP-1, in particular, the current Red List of Georgia and several types of management plans are not sufficient for effective biodiversity protection. Moreover, the work of the Red List Commission, which in the recent years has stopped, was limited to the considering activities; the Commission did not participate in the identification of the species status through research studies.

The applications submitted to the Commission related to consideration of the status of species did not, as a rule, rely upon the results of scientific researches and thus, lacked proper substantiation. It should be noted that the developed species management plans do not comprise part of a unified national environmental strategy; rather these are the products of fragmented isolated scientific-conservation projects implemented by individual scientists or research organizations with donor funding. In addition, the response from the side of government with regard to implementing the management pans is minimal; this is a waste of resources when one considers that a management plan developed several years ago requires significant updating and modification as the condition of the object to be managed may be changed.

Evaluation of the biodiversity of internal waters, development of the database, establishment of quotas and other problems are scheduled in NEAP-2 as objectives for next five years though responsibilities for their funding and implementation are unclear. Water resources, description of biodiversity and permanent monitoring should be within the interest of the state as it is only by the state involvement that sustainable development is possible. NEAP-2 mentions that the strengthening of scientific research and the use of results of research in dealing with environmental problems is decisive and needs strengthening in Georgia.

For effective implementation of measures for the protection of water biodiversity the state should apply an integrated approach at institutional (joint efforts of the Ministry of Environment Protection, education-research institutions and non-governmental sector) level and with respect of funding (together with donors the government should ensure financing of minimal needs).

According to **Order # I-293 of the Minister of Environment Protection and Natural Resources of Georgia on Approval of Indicators of Biodiversity Monitoring System** the methodology for biodiversity monitoring indicators should be prepared. One of the indicators prepared in accordance with the order is “Intensity of Fishery (Change in the total catches of fish stock)”, Pressure indicator P4. As the internal water bodies of Georgian currently are not used as a significant commercial resource with respect to fish production, the mentioned indicator is not used actively for monitoring of biodiversity of internal waters. Such an approach is absolutely unjustified and the indicator should be used for internal waters as well.

3.2. Internal waters in international agreements

Article 5,subsections e and f of of the **Convention on Migratory species (CMS)** and **African-Eurasian Waterbird Agreement (AEWA)** obligate the signatories to protect the habitats and maintenance of the network of relevant habitats located along the migration ways; this means permanent

monitoring of the condition of water habitats located along the migration ways of migratory waterfowl, which is not provided.

According to, Article 2, Section 2 of the **Ramsar Convention on Wetlands**, wetlands should be selected for the List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology. In the first instance wetlands of international importance to waterfowl at any season should be included. According to Section 5 of Article 4 the Contracting Parties shall promote the training of personnel competent in the fields of wetland research, management and wardening. In this direction, the hydrobiological researches either are not conducted at all or conducted with unjustified methodologies and there are no programs for training of professionals at all.

According to Chapter II, Article 4, secton 1, of the **Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)**, each party shall take necessary legislative and administrative measures to ensure conservation of the species of wild flora and fauna and especially those, listed in annexes I and II and to ensure conservation of endangered natural habitats. These annexes specify 12 fish varieties, evaluation of the condition of which and taking of protecting measures is of critical necessity.

Atlantic sturgeon is included in Annex I of the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**, all other sturgeons of Georgia listed on Annex II.

4. Natural resources of internal waters of Georgia, licenses and licensed reservoirs

There are many rivers lakes and artificial reservoirs in Georgia, in most of them fishing activities are actively carried out. Commercial fishing in reservoirs is subject to licensing. The condition of ichthyofauna is assessed for licensing and specific conditions for fishing are defined. For the restoration of fish resources the sustainable use, protection and the reproduction of endangered and endemic species must be provided.

The main legal documents regulating the fishery in Georgia are as follows: the law “on Fauna”, the law “on Licenses and Permissions”, decision of the Government of Georgia “on Approval of the Statute on Rules and Conditions of Issuance of Fishing License” (N138, 11.08.2005), order of the Minister of Energy and Natural Resources “on Approval of the Statute on Rules, Terms and List of Devices and Equipments to Gaining the Objects of Fauna by the species” (N 07, 6.04.2011).

The law “on Licenses and permissions”, articles 18 and 19 control the procedures and conditions for issuing fishing licenses. The administrative organ issuing fishing licenses is the Agency of Natural Resources under the Ministry of Energy and Natural Resources. Internal water reservoir licenses are be issued by auction. The basis for conducting an auction is: the statement of the license applicant, or the decision of the responsible agency.

The agency with the help of hired experts conducts preliminary studies of the reservoir that is th subject of the envisaged issuance, carries out the study of ichthyological characteristic and determines of fish stocks and quotas.

Licensing conditions for 26 water reservoirs have been prepared by the Biodiversity Protection Service for 2010 (Table 10.1).

Table 10.1. Studied water bodies and their reserves

№	Name	Location	Stocks (tonnes)
1	Paravani Lake	Ninotsminda municipality	120

2	Kartsakhi Lake	Akhalkalaki municipality	22
3	Bugdasheni Lake	Ninotsminda raioni	4.7
4	Sagamo Lake	Ninotsminda municipality	27
5	Sioni reservoir	Tianeti municipality	31
6	Tkibuli reservoir	Tkibuli municipality	22
7	Algeti reservoir	Tetritskaro municipality	16
8	Akhmazi Lake	Ninotsminda municipality	1.2
9	Shishveli Lake	Ninotsminda municipality	0.9
10	Zresi lake	Akhalkalaki municipality	17
11	Gremiskhevi reservo	Dusheti municipality	6
12	Samsari Lake	Akhalkalaki municipality	2
13	Udziro Lake	Akhmeta municipality	0.3
14	Kaishauri reservoir	Dusheti municipality	0.1
15	Lipi reservoir	Tetritskaro municipality	4
16	Bestrasheni Lake	Tsalka municipality	-
17	Ujarma Lake	Sagarejo municipality	-
19	Japana Lake	Lowland of Guria	-
20	Pantiani reservoir	Dmanisi region, villiage Pantia	8
21	Tabatskuri Lake	Borjomi municipality	30
22	Nadarbazevi Lake	Guria municipality	4.5
23	Jandara Lake	Gardabani municipality	68
24	Tsalka reservoir	Tsalka municipality	75
25	Santa Lake	Tsalka municipality	2
26	Suldi Lake	Akhalkalaki municipality	2.5

Up to September 2012 licenses have been issued on six reservoirs: Tabatskuri Lake, Nadarbazevi Lake, Jandara Lake, Tsalka reservoir, Santa Lake and Suldi Lake. In reports based on preliminary

studies conducted on the mentioned reservoirs the following methods used during the research have been outlined: fish species composition and stock have been determined using control catch method (costal siene nets, set nets). Size, weight and age composition were determined using methods described by Chugunova (1959), Pravdin (1966); also the number, total and per hectare productivity were calculated during which the dynamics of artificial stocking were foreseen. During the evaluation fishery data collected through a survey of professionalpoachers and the local population were also taken into account. The identification of the commercial fish quantity, their stock and supplement conditions are determined by dynamics of the fish yield, fishery efforts or in accordance with the result of each cast (Monastirsky, 1952), by stocking and stocked fish viability. Biometric and statistical treatment of the collected material was carried out by the methods described by Tyurin (1963), Ricker (1970) and Lakin (1980). Fishery quotas were determined on the basis of the interpreted data. In summary, very outdated methods were used for the assessments of the condition of the water reservoirs; the quality of the assessments is therefore questionable and need to be reviewed.

The order of the Minister of Energy and Natural Resources "on Approval of the Statute on Rules, Terms and List of Devices and Equipments to gain the objects of fauna by the species" (N 07, 6.04.2011) and the Order of the Minister of Economics N 1-1/133, 28.01.2010 "on Carrying out auctions for issuing internal water fishery license" provide for obligations on licence holders:

- To inform the Agency of Natural Resources by the 5th day of each month about the resources obtained in the previous month;
- To assist the Agency of Natural Resources in the fulfillment of legal actions during the verification process and among them catch verification in order to take those seines and devices out of water being used for fishery purposes;
- To submit a plan of water object and fishery management with a duration of not less than five years to the Agency of Natural Resources;
- To use water facilities and their resources only within the frames and purposes specified in the license;
- To comply with the rules and quotes set by the ministry. To provide maintenance of high conservation value of fish, hydrobionts biodiversity and viable populations;
- To provide the Agency of Natural Resources with information about the fish yield and on other hydrobionts indicating species and quantities;
- To submit a request to the Agency of Natural Resources annually for the approval of fish resource extraction and quotas;
- To reflect the information prepared on the basis of relevant study of fish stock recourses in the request;
- To provide rational use of water in the water reservoir and take care of its quality maintenance and restoration.

Data on quotes and stocks of licensed water reservoirs obtained from Service of Biodiversity Protection, the Ministry of Environment Protection and the Ministry of Energy and Natural Resources are given in tables 10.2 and 10.3).

Table 10.2. Resources of licensed water reservoirs after years by preliminary calculation

Object	Quota (tonnes)	Stock at the time of issue of the licence (tonnes)	Stock after 5-7 years (tonnes)	Stock After 20 years (tonnes)
Nadarbazevi Lake	4.5	4.5	18	27

Jandari Lake	56.1	68	159	238
Tsalka Reservoir	67.05	75	200	400
Tabatskuri Lake	12.4	30	60	90
Santa Lake	2	2	3.5	5

Table 10.3. Stock and quotas of licensed reservoirs by species

№	water body	Species	Quota (tonnes)	Stock (tonnes)
1	Nadarbazevi Lake	Crucian carp	2.835	
		Common carp	0.945	
		Silver carp	0.54	
		Grass carp	0.09	
		Spotted silver carp	0.09	
Sum			**4.5**	**4.5**
2	Jandara Lake	Crucian carp	47	
		Common carp	8	
		Gobio spp.	1.1	
Sum			**56.1**	**68**
3	Tsalka Reservoir	Crucian carp	59.25	
		Transcaucasian barb	4.8	
		Common carp	1	
		Whitefish	1	
		European vendace	1	
Sum			**67.05**	**75**
4	Suldi Lake	Crucian carp	1.475	
		Common carp	0.65	
		Spotted silver carp	0.375	

Sum			**2.5**	**2.5**
5	Tabatskuri Lake	European vendace	10	
		Transcaucasian barb	2	
		Common carp	0.4	
Sum			**12.4**	**30**
6	Santa Lake	Crucian carp	1.42	
		Common carp	0.34	
		European vendace	0.06	
		Grass carp	0.04	
		Spotted silver carp	0.14	
Sum			**2**	**2**

It must be noted that there is a great inaccuracy in connection with quotas and stocks of the licensed water reservoirs: in most cases quotas are equal to or not much less than stocks, which confirms once again the necessity of serious studies to be carried out in this field.

In the same letter received from the Ministry of Energy and Natural Resources are given the facts of violation of license condition. The owners of licensed facilities of the Tsalka reservoir, the Suldi Lake, the Tabatskuri Lake have been fined for violation of license conditions; this is an important fact within the legal framework for conducting effective management of internal waters.

The survey of the owners of licensed reservoirs and the opinions expressed at the workshops (annex 3, annex 4) revealed that licensees face the following problems: it's hard for them to find experts to carry out preliminary research of water reservoirs; they demand government support for the development of reservoir infrastructure; the issue of poaching is unsolved as well, which is a serious problem for all interviewed; for this their demand is to intensify government control in regions and to increase the staff of the environmental inspectorate who will regularly and seasonally control reservoirs.

5. Scientific aspects of the study of the biodiversity of Georgia's internal waters

Information on internal waters of Georgia is fragmentary and unreliable; however, because of the absence of new data, old data is still widely used. Since 1930 until today results of studies of internal water have been reflected in more than 300 published works (articles, books, theses) obtained by the authors of this analysis.

Analysis of the collected sources identified the intensity of different thematic researches in different years. The 1960s are distinguished by ichthyological studies and the1940s, 1950s and 1970s by hydrobiological studies in general. In the following decades researches carried out in all these directions were gradually decreased. In recent years they have been very small in number or have not been carried out at all. The 70s of the twentieth century and the first decade of the twenty first century are distinguished by the frequency of studies carried out on water and aquatic plants

(Figure 10.1). The number of ichthyological studies carried out on rivers in the 1960s and 1970s exceeded the ones conducted on lakes. The opposite was the case in other decades (Figure 10.2).

Figure 10.1. Publications on biodiversity of internal waters of Georgia

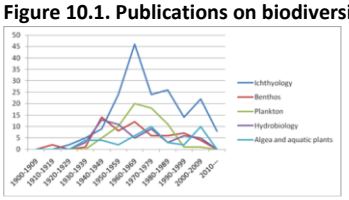
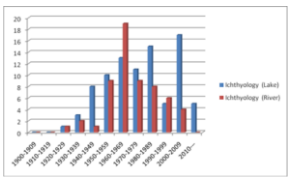


Figure 10.2. Ichthyological studies on Lakes and Rivers of Georgia.



The research analysis dealing with the plankton study showed that lakes are better studied in this direction than rivers (Fig. 10.2). The similar picture was shown in benthos analysis (Fig. 10.4).

Figure 10.3. The study of Plankton in the Lakes and Rivers of Georgia.

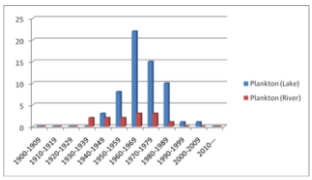
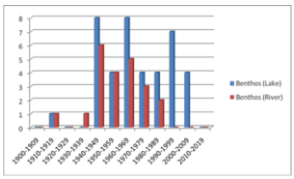
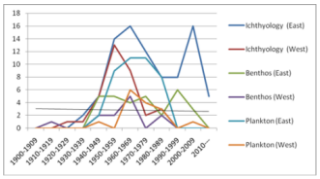


Figure 10.4. The study of Benthos in the Lakes and Rivers of Georgia.



On the bases of the scientific publications it was revealed that internal waters of the East Georgia were better studied in comparison with the same of the West Georgia (Figure 10.5).

Figure 10.5. Biodiversity researches carried out in internal waters of the East and the West Georgia.



Our analysis also reveals which water objects have been studied most (Figures 10.6 and 10.7).

Figure 10.6. Lakes and reservoirs.

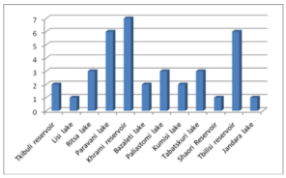
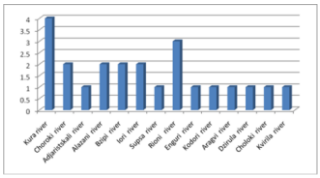


Figure 10.7. Rivers.



The average number of scientific studies in Georgia is very low; e.g. in Finland an average of 18 scientific publications dealing with one lake only (Lake Pyhajarvi, which is five times larger than Lake Paravani) were published annually during the last 20 years whereas in Georgia there were on average only three research publications a year on internal waters.

The data on scientific research brings to light two very important problems. The first is the decrease of hydrobiological studies since the 1960s and 1970s which fell to nearly zero in the last years and it happened against the background of an exponential increase of the research intensity in developed countries. This illustrates the critical decrease of resources and government interests in this direction from one side and the small number of the professional staff the other side.

The second major problem indentified by the analysis is that 100% of publications are directed to the faunistic, floristic and ecological research. There is practically no research based on the results of monitoring, which means that there is no reliable data on which to base long-term plans from the point of view of ensuring sustainable development of internal waters.

If we take into consideration that foreign financing of projects has been substantially increased in the last 10-20 years, the small amount of basic research or monitoring results (implying the results reviewed by international organisations) reveals an ineffective use of the financing.

6. Implemented and ongoing projects related to the biodiveristy of Georgia's internal waters

Georgia is looking for an enhanced cooperation with the European Union. The priority areas for cooperation have been agreed by the Georgian Government and the European Comission in the

Country Strategy Document for 2007-2013 under the European Neighbourhood and Partnership Instrument. The mutually agreed EU/Georgia Action Plan shows Georgia's commitment to implement jointly agreed priorities in compliance with international and European norms and principles. The plan identifies priority actions for key environmental sectors, including water management. In the European Union the most important piece of legislation covering protection of the water environment is the Water Framework Directive, which defines the key principles as well the key objectives and the implementation plan for the management of water resources in the European Union.

Many projects have been implemented in the water resources sector in Georgia and many are ongoing. A large amount of money has been and is being invested in those projects, although many problems are still not solved and there are no significant results. Below are listed projects related to Georgia's internal waters; the project implementation period and financing organisations follow the title of each project.

Trans-Boundary River Management Phase II for the Kura River basin - Armenia, Georgia, Azerbaijan. 2008-2011. EU. Notable results are: development of a common monitoring and information management systems; joint water quality monitoring on transboundary rivers Kura, Alazani, Khrami, Debeda; draft basin management plans, including tentative programme of measures, prepared for the selected pilot river basins in each project country using the EU Water Framework Directive methodology (in Georgia – the Alazani, -Khrami-Debeda and Aragvi rivers); improvement to water databases; training and technical guidelines. Attempts at joint monitoring and information systems were made during project implementation, but a joint monitoring system has not been developed yet. The instruction "Introduction to Biomonitoring of Water Quality" was developed in the frame of the project; however the performance of the instructions is far from perfect. The project was extended through 2012 and 2013 as **Trans-Boundary River Management Phase III.** The aim of the project is improvement of water quality in the Kura basin by transboundary cooperation. The project will help to develop water quality monitoring and assessment using the methodologies of the EU Water Framework Directive.

Georgia Waters - Capacity Building on Water Monitoring and Management in Georgia. 2010-2013. Government of Finland. The project is being implemented by the Finnish Environment Institute (SYKE) and National Environmental Agency of Georgia. The aim of the project is to collect reliable information on the internal waters of Georgia and water ecology and mitigation of the negative influence of climate, strengthening of transboundary cooperation and development of a water monitoring system.

Together with those projects shoud be mentioned the project **Reducing Trans-Boundary Degradation in the Kura-Aras Basin. 2011-2013. UNDP/GEF**. The project aims at: 1. Identifying the principal threats and root causes of the trans-boundary water resources of the Kura Aras-River Trans-boundary Basin; 2. Developing and implementing a sustainable programme for policy, legal and institutional reforms and investments to address these threats. A principal focus of the project is to assist balancing overuse and conflicting uses of water resources in trans-boundary surface and groundwater basins. The project builds upon a number of initiatives undertaken by the countries themselves or through donor assistance.

Establishment of Javakheti National Park in Georgia. 2009-2013. KfW. The goal of the project is to establish Javakheti National Park and five wetland sanctuaries in accordance with IUCN guidelines and Georgian legislation; to develop and implement selected support zone programmes in order to decrease the pressure on the national park and sanctuaries and to foster the acceptance of the population; to promote transboundary cooperation in biodiversity conservation in the project area. The law "on Establishment and Management of Javakheti Protected Areas" came into force in 2011.

Implementation of the UNECE Water Convention and Development of an Agreement on the Management of Transboundary Watercourses Shared by Georgia and Azerbaijan. 2010-2012.

ENVSEC. The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes was negotiated to strengthen measures for the protection and ecologically sound management of transboundary surface and groundwater. Implementation of the convention is important for improving water management in the southern Caucasus. Support has been requested by Georgia and Azerbaijan to establish a bilateral water agreement and by Georgia for the preparation of the ratification and the implementation of the UNECE convention. Water quality of the shared waters is one important issue.

Water Management in the South Caucasus (Armenia, Azerbaijan, Georgia). 2000-2004. USAID. The project goal was to increase the dialogue on sustainable water management between Georgia, Armenia, and Azerbaijan and to encourage bilateral actions on the sustainable use of natural resources.

South Caucasus Water Program (Armenia, Azerbaijan, Georgia). 2005-2008. USAID. The goal of this project was to increase regional cooperation in the management of shared water resources that is effective and sustainable.

Joint River Management Programme on Monitoring and Assessment of Water Quality on Transboundary Rivers (Armenia, Azerbaijan, Georgia). 2002-2003. EU/TACIS. This project covered four rivers, including the Kura. The overall objective of the project was to support the prevention, control and reduction of adverse trans-boundary pollution impacts. Although the focus was strongly on monitoring, the project addressed related legislative, institutional, economic and financial issues.

Reducing Transboundary Degradation in the Kura-Aras Basin (Armenia, Azerbaijan, Georgia). 2003-2005. UNDP, SIDA. The project objectives were: identification of institutional needs for proper management of water resources in the basin; identification of technical needs for integrated water resources management and planning in the basin; promotion of sustainable water resources management.

Trans-boundary Cooperation for Hazard Prevention in the Kura-river basin (Armenia, Azerbaijan, Georgia). 2003-2006. The Federal Environmental Agency of Germany. The main objective was to identify the risks and uncertainty and especially the following general conditions for the project: development of an industrial hazard prevention system; development of an early warning model; inventory and assessment of potential polluters; development of appropriate safety measures for the polluters; development of early warning system in the Kura basin.

REC Caucasus Water Program (Armenia, Azerbaijan, Georgia). from 2001. EU,USAID. Aims at strengthened cooperation and coordination between the various stakeholders of the three countries of the region for integrated management of transboundary water resources.

Support to Transboundary Management of the Kura River Basin (Armenia, Azerbaijan, Georgia). 2007-2010. EU TACIS. The overall objective was to improve the water quality of the Kura river.

Water Governance in the Western EECCA Countries. 2008-2010. EU TACIS. The main objective of the project was to contribute to the reduction of pollution, to fair sharing and effective use of scarce water resources, to the improvement of the quality of shared water resources such as trans-boundary rivers

Fostering dialogue between Riparian States for Development and Establishment of Initial Legal and Institutional Frameworks for increased Cooperation and Joint Management of the Kura-Araks River Basin. 2007-2010. UNDP/GEF/ENVSEC. Aim: Formation of the Kura Araks Environmental programme under a UN umbrella.

Implementation of the UNECE Water Convention and Development of an Agreement on the Management of Transboundary Watercourses shared by Georgia and Azerbaijan. 2009-2010. UNECE/OSCE. The objective of this project was to support Georgia to ratify and implement the

UNECE Water Convention and to strengthen transboundary water cooperation between Azerbaijan and Georgia.

Creation of an Enabling Environment for Integrated Management of the Kura-Aras Trasboundary River Basin. 2010. EU, USAID. Elaboration of a road map on sustainable management of the Kura-Aras river basin through the introduction of the EU Water Directive.

Development of Environmental Monitoring and Management Systems in Georgia. 2007-2008. Government of Finland. Main aim: strengthen environmental monitoring and management tools, to modernize water monitoring methods, restore some parts of the monitoring network, upgrade the environment laboratories and preparing a framework for Georgia's water monitoring strategy and action plan.

The review shows that since 2000 a large number of projects has been implemented related to internal waters of Georgia with a total value of many millions of Euros and US Dollars. The majority of the projects were and are mainly on strengthening transboundary cooperation, development of sustainable water resources management, information of society, development of united monitoring system, reducing stress factors of the water ecosystems and other general issues. The human and financial resources spent on research of biodiversity of internal waters and their monitoring process is scarce; these issues received weak consideration in above mentioned projects.

More efforts are needed to encourage cooperation between specialists and the systematization of scientific component of the projects, because without the outcomes of such cooperation effective implementation of the projects is impossible.

In addition to the above mentioned projects are the following projects related to aquaculture.

"**Review of fisheries and aquaculture Potentials in Georgia"** was a follow-up to previous FAO technical assistance efforts in the fields of fisheries and aquaculture development in Georgia, with particular reference to the FAO project TCP/GEO/2904 (A) *"Strengthening the Capacity of the Department of Fisheries to Support Fisheries Sector Rehabilitation"* completed in 2006. The review was carried out by a team of international and national experts under the technical and administrative supervision of the FAO Subregional Office for Central and Eastern Europe, Budapest, Hungary. The review emphasized that efficient and sustainable exploitation of potentials requires the concerted and coordinated attention and actions of decision-makers in the government administration and all actual and potential stakeholders of the Georgian fisheries and aquaculture sector.

In order to overcome existing problems of aquaculture, between February and June of 2011 was developed and successfully implemented the project **TCP/GEO/3301 "Upgrading Georgian Fish Farm Facilities and Supporting the Restart of Fish Seed Production"** (**FAO-SEUM**). A physical survey of 121 fish farms and their production facilities, individual and group discussions with farmers, and three successful practical training workshops on the artificial propagation of carp and African catfish are the most important results of the project.

7. Problems related to protecting the biodiversity of Georgia's internal waters and recommendations for NBSAP 2

Most internal waters are not protected and have been and continue to be modified a result of anthropogenic factors (water pollution, illegal fishery and dams). The problem is compounded by invasive species. These factors have a serious negative impact on the biodiversity of internal waters. Fish resources are significantly decreased in Georgia's internal reservoirs of. The exact current condition of fish species in internal waters (except sturgeon and the Black Sea salmon), among them species endemic to the Caucasus ecoregion, is unknown. A comprehensive inventory and evaluation of the ecological condition of Georgia's internal waters has not been carried out.

The main threats to the biodiversity of internal waters are illegal fishery, the construction of dams on rivers, invasive species and pollution. These threats are compounded by the lack of an effective monitoring system and lack of qualified staff.

Illegal fishing remains a major problem. In 2008 there were 272 violations of fisheries regulations, 494 cases in 2009, 427 cases in 2010 and 231 cases in 2011. If we take into consideration that actual number of violations is larger than the recorded number, the pressure from from illegal fishing becomes obvious. Poachers often use electric devices, poisoning and explosive substances that cause irreparable damage to the biodiversity of Georgia's internal waters.

Large dams destroy fish and fisheries. The reduction of fish species in head waters above the dam is caused by the blocking of migration routes of fish. As a result, fish reproduction declines and fish movement from the tail waters is stopped. In addition, water flow and quality is significantly changed in the tail waters, which negatively influences fish populations. The present year is a year of construction of huge dams. Serious attention should be paid to the evaluation of the effects of these dams on the environment to avoid negative impacts instead of improving the economic situation of the country.

Invasive species and the lack of their control are the threat to the biodiversity of internal water reservoirs. Monitoring of species such as crucian carp (*Carassius carassius*) is necessary. Crucian carp appeared in Georgia as an invasive species in the last 30 years and it is widely spread in Georgia's reservoirs; however its influence on the ichthyofauna of reservoirs is unknown, consequently it has not been possible to define appropriate mitigation.

The lack of a monitoring system and of qualified staff exacerbates the threats to the biodiversity of Georgia's internal waters. Old and incomplete data makes it impossible to prescribe activities which are necessary for sustainable fisheries management.

Pollution of surface waters in Georgia by organic substances such as phenols, hydrocarbons, copper, manganese, zinc and nitrates significantly exceed the threshold level. Until recent years surface waters of Georgia in lowland areas were heavily polluted by chemical fertilizers, industrial waste and sewage waters. The first two factors were considerably reduced as a result of the reductions in agricultural and industrial activity brought about by the economic crises which followed Georgia's independence. It is likely that there is still a large quantity of dangerous elements (heavy metals) concentrated at the bottom of the water reservoirs. At present the main sources of surface water pollution are municipal sewage systems, pharmaceutical factories and industrial facilities. It is necessary to study the composition of different substances in the internal water animal organs together with the water quality chemical composition studies.

Under the current arrangement of functions the Ministry of Agriculture is in charge of fisheries and marketing, in particular of safety of food products, veterinary, hygiene and quality control, fish industry and aquaculture). Fisheries development is the competence of the Administration Development Sector of the Ministry of Agriculture. Projects are planned, though there are no confirmed data in this direction. At present the Ministry of the Environment Protection and the Ministry of Energy and Natural Resources are in charge of the fishery issues. The aquaculture section has not been regulated yet.

In order to tackle the above-mentioned problems the following aspects of internal water biodiversity and sustainable management which are closely related to each other should be foreseen in the new NBSAP:

1) **Support studies of inland waters biodiversity**. The Government should be the main funder of scientific research programmes carried out in the country. It is very important to find donors and investment in this field; however, the conservation of biodiversity in the country should not depend on them. Data on inland waters biodiversity of Georgia and its condition is quite outdated, incomplete and limited. We know almost nothing about invertebrate

animals associated with water. Definition of the priorities in this field is essential for the conservation and management of available resources.

2) **Provide support for training in the field of water resources**. Skilled personnel in the field of aquatic biodiversity are just as important as in other fields. In Georgia there is a catastrophic shortage of professionals in this field. Research institutions, which are the only centres for the preparation of such staff, should be motivated to intensify efforts in this direction. On the one hand state support is reflected in the financing of research projects and on the other hand in the integration of interested parties (as the integration of the Government agencies and research institutions in the implementation of monitoring and evaluation of research projects).
3) **Improve the system of environmental impact assessment.** Potentially harmful activities associated with aquatic ecosystems – e.g. construction, agriculture and others - should be evaluated objectively and using modern methods. Aquatic ecosystems must not be violated without the assessment and appropriate preventive measures. This is especially important for migratory fish species which are affected by construction.
4) **Regular and systematic monitoring of the biodiversity of internal waters.** In order to identify threats and assess their impact, to reveal tendencies and plan preventive measures it is necessary to carry out regular collection and analysis of data.
5) **Research and monitoring of invasive species and development of appropriate preventive measures**. Invasive species represent one of the sources of intense degradation of natural ecosystems. In order to plan preventive measures it is necessary to continuously monitor and assess their impact on the environment.
6) **Control of water quality and pollution prevention**. Assessment of water quality is important both for the management of freshwater resources and aquatic biodiversity.
7) **Enhancement and activation of the inspection of the environmental protection**. Increase the number of staff.
8) **Improve the system of determining fishery resources and quotas**. It is important to establish standards and methods for sustainable use of biodiversity.
9) **Identify endangered species and plan mechanisms for their protection**. Review the Red List to assess the conservation status of the protected species and carry out the appropriate protective measures.
10) **The qualificationa of specialists.** To perform every measure that is associated with the water and its biodiversity, conclusions have to rely on recommendations of qualified specialists.
11) **Raise public awareness.** For effective management it is necessary to draw public attention to internal waters and to raise the public's understanding of the functions of internal waters.

THEMATIC FIELD 11. BIODIVERSITY OF THE BLACK SEA

Lead organisation: Ilia State University

Lead authors: Zurab Gurielidze, Natia Kopaliani, Nana Devidze, Maia Shakarashvili, Zurab Javakhishvili

1. Introduction

The state of Black Sea ecosystems has significantly deteriorated in the past decades. Pollution has been compounded by overfishing, which has aggravated the state of this comparatively small, partly closed water body. The natural conditions in the Black Sea magnify human impacts: water is mainly anaerobic (87-90%), devoid of oxygen and inhabited by bacteria that reduce sulphate and archaebacteria that create methane. Pollution activates the process of reduction of sulphate and decreases the life zone. Therefore, protection of the Black Sea is a concern of numerous states and it largely depends on international cooperation. On April 21, 1992 Turkey, Georgia, Ukraine, Romania, Bulgaria and the Russian Federation signed the Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention). Georgia ratified the convention on January 15, 1994.

In 1996 the countries of the Black Sea basin worked out and signed a strategic action plan for the protection and rehabilitation of the Black Sea. According to the action plan, Georgia, Romania, Ukraine, Bulgaria, Russian Federation and Turkey are responsible for the rehabilitation and protection of the Black Sea's ecosystems and the sustainable use of the Black Sea's natural resources. In 2009 in Sofia the Black Sea countries updated the action plan. Based on activities implemented under transboundary cooperation, the plan aimed at, among other things, the preservation of biodiversity and habitats, reduction of the process of eutrophication and improvement of the quality of water.

The first transboundary diagnostic analysis of the Black Sea (TDA) was carried out in 1996 and the ecological state of the Black Sea was identified. In 2007 TDA was implemented for the second time and focused on four key problems:

1) Eutrophication/enrichment with food substances
2) The change in living resources in the sea
3) Chemical pollution
4) The change of biodiversity/habitats including introduction of species.

In 2007 the organic pollution of the Black Sea by the rivers of its basin was 30% lower than in 1996. This was chiefly due to the agricultural and industrial decline in several countries of the Black Sea rather than governmental actions aimed at the protection of the sea. It should be mentioned that the Black Sea's ecosystem respond to the above-mentioned change rather slowly. Many years have to pass until a decrease in organic pollution has a positive impact on the Black Sea's ecosystems.

In recent years the taking of live resources from the Black Sea has increased, although it is half that of the 1980s. With regard to chemical pollution, the situation differs by territories: in some places the level of pollution is extremely high, whereas in other places it is low. There is an increased risk of pollution from shipping and from gas and oil pipelines installed on the coastline.

It should be stressed that at least one habitat is degraded in the territorial waters of every country of the Black Sea basin.

One of the important threats for the Black Sea ecosystem is invasive species Almost nothing is being done to tackle the threat. Shipping and aquaculture are key sources of invasion by alien species.

By 2007 the state of biodiversity improved near the Black Sea's shelf: the number of so-called dead zones (devoid of oxygen and saturated with hydrogen sulfide) has decreased. However, in certain parts of the Black Sea shelf, especially in the outfall of the Dniester river, the low concentration of

oxygen is still a problem. Implementation of the Black Sea Action Plan has differed among countries: no actions or only some planned actions have been implemented on the territory of Bulgaria, Ukraine and Georgia.

It is important to work out a new action plan taking into account the current state of biodiversity of the Georgian part of the Black Sea. This plan should be based on current legislation and correspond to international laws related to the protection of the Black Sea.

2. The Uniqueness of the Black Sea

Table. 1 .Key characteristics of the Black Sea

Geographical coordinates	46°33' - 40°56' N 27°27' - 41°42' E
Length of the coastline	4340 km
Length of the Georgian coastline	*320 km*
Water surface area	*432 000 square km*
Volume of water	*547 000 cubic km*
Maximum depth	*2 212 meters*
The volume of water brought by rivers	*340, 6 cubic km*
Salinity	*18-22 per mille*
Biodiversity	*fungi, algae, high plants - about 1619 species* *Invertebrates - about 1983 species* *Fish – about 168 species* *Sea mammals – 4 species*

The Black Sea is an internal European sea almost isolated from the world ocean. Its key features are given in Table N1. The strait of Kerch to the North-East connects it with Azov Sea, the Bosphorus strait to the south-west connects it with the Sea of Marmara, from where the Dardanelles strait connects it with the Aegean and Mediterranean Seas. According to scientific research, the Black Sea basin has been at some times separated from and at some times connected to the world ocean due to tectonic processes. The Black Sea obtained its present shape about 10,000 years ago when it became connected to the world ocean via the Bosphorus and Dardanelles straits.

The Black Sea is the world's largest meromixis water area where the water is permanently stratified: the deeper layers do not mix with the upper layers. The upper layer of water obtains oxygen from the atmosphere, whereas below 130-150 metres the water is rich in hydrogen suphide. As a result about 87-90% of the water is anoxic i.e. devoid of oxygen; only the upper layers and shelf waters contain. Salt water flows into the Black Sea from the Mediterranean via the Bosphorus strait and less dense fresh water (from the rivers which flow into the Black Sea) flows out. The result is a strong, vertical salinity gradient – a halocline . The zone of hydrogen sulphide begins under the halocline and this hampers the movement of oxygen from the upper to the lower layers of the Black Sea.

The anoxic conditions in the lower levels of the Black Sea were created about 7,300 years ago. It is thought that this process was caused by the flow of the Mediterranean via the Bosphorus strait which started at the end of the last glaciation.

The bacteria that form hydrogen sulphide yield about 10,000 tons of sulphur per day. Below 150-200 metres the concentration of hydrogen sulphide increases to a depth of 1,000 metres, where the concentration is comparatively stable, at 9.5 mg/litre to a depth of 1,500 metres.

The depth of the layer of hydrogen sulphide below the surface of the Black Sea depends on the geographic peculiarities of different areas of the Black Sea and varies from year to year and seasonally. Seasonal atmospheric changes cause significant changes in circulation, which affects the

layer of hydrogen sulphide. Its upper limit of the hydrogen sulphide layer is deepest in summer and highest in spring.

Apart from hydrogen sulphide, the Black Sea contains another gas of anaerobic bacterial origin – methane, which is created by the metabolism of the micro-organsim Archaea. In conditions of salinity, high pressure and low temperature, methane forms gas-hydrates, which resemble ice. One volume of gas-hydrates contains several tens of volumes of methane.

The Black Sea is characterized by unique bacterial reefs. In anoxic areas where there is a high concentration of methane there are formations of various types: round-shaped porous plates and tower-shaped or tree-shaped plates that are 30-100 centimeters in height. There are brownish-pinkish coral-shaped sprouts covered with 2-3 centimetres of bacterial mucous mat. The coral-shaped sprouts consist of 99.6% aragonite ($CaCo_3$).

In the microbial mats of the Black Sea's "microbial reefs" at 230 metres depth there are bacteria of the *Desulfosarcina*/*Desulfococcus* group which are capable of reducing sulphate, and methane oxidizing bacteria of the Archaea clade, ANME-1 cluster. The most widespread structure of the Black Sea reefs is superficial mat, pink inner layer and porous carbonate solid axis.

The exact age of microbial mats is unknown, although it is thought that these coenoses are several thousand years of age. According to scientific research, the microbe reefs are similar to the first forms of life on the earth. In ancient times, oceans contained such reefs. Their study will explain how the first live organisms existed and multiplied at an early stage of development of the earth.

The Black Sea is comparatively poor in species. The number of species widespread in the Black Sea comprises about one third of the species widespread in the Mediterranean Sea. This indicates the inefficiency of the process of migration of Mediterranean species into the Black Sea. The factors that hamper migration are as follows:

- significant contrast of the temperatures between the two basins: 15-16 degrees in the Aegean Sea and 7-8 degrees in the Black Sea in winter;
- the difference in salinity: 39 psu in the Aegean Sea, 18-19 psu in the Black Sea;
- the double layer of the flow in the system of the Bosphorus and Dardanelles;
- significant vertical and horizontal contrast between temperature and salinity, caused by the double layer of flow; the difference in temperature and salinity and the lack of oxygen lead to physiological stress, which is a physiological barrier for live organisms in the process of migration; this barrier hampers the spreading of the Mediterranean species to the North-east.

The process of "Mediterranization" of the Black Sea would be possible only after a long period of physiological adaptation for each of the species.

For certain species, the Sea of Marmara is an intermediate buffer zone between the basins of the Mediterranean and Black Sea . The adjacent narrow and shallow straits create a bottle neck for pelagic and bottom dweller species. The organisms that manage to pass the Bosphorus Strait undergo the process of adaptation in the south-eastern shelf zone. Despite the physical and physiological barriers, some Mediterranean species penetrate into the Black Sea, although the process is slow and often unsuccessful. It is highly probable that current climatic changes also influence this process. However, this hypothesis requires a detailed study without which it is impossible to observe natural processes in the Black Sea and processes caused by human impact.

One thing is obvious: despite their comparatively small, Black Sea species are unique in their adaptation ability. Development in difficult and relatively isolated conditions has led to the formation of specific adaptations which distinguish Black Sea species from their relatives in the Mediterranean.

3. Georgian Black Sea Coast

The Georgian stretch of the Black Sea coast is located in the south-eastern and eastern parts of the Black Sea, between the mouths of the rivers Sarpi and Psou. The Caucasus chain protects it from North winds. The average speed of the wind is lowest in Batumi. The amplitude of the tide at the Georgian coast is insignificant; for example at Poti it is 8-9 centimeters and is of a semi-diurnal character. As compared to oceans, the Black Sea, as an internal continental sea, is characterized by the low force of its waves. Stormy phenomena occur in case of cyclone impact: south and south-east winds are related to Mediterranean cyclones; Atlantic cyclones cause westward winds and waves that reach the Georgian coast.

The bottom of the Black Sea is shelves steeply at the Georgian coast and the underwater relief is widened by former gorges and deltas that are continuations of the landward gorges of large rivers. The relief of the bottom consists of shelf, continental slopes and sea caves.

The water temperature in the Georgian part of the Black Sea ranges from 9 to 11 ^{0}C in winter southward. In contrast at 60 km from the coast the water temperature increases northward: from 19.4 to 20.7 degrees.

In January the average air temperature on the Georgian coast of the Black Sea is 4-7 ^{0}C, the average temperature in July is 22-23 ^{0}C. Precipitation is high in all seasons but varies from one part of the coast to another: the south receives over 2,500 mm precipitation per year, the north from 1,650 mm (in the central part) to 1,400 mm (in the north-western part).

The geomorphology of the Georgian coast is influenced by the many rivers that rise or flow through the region. The total annual flow is 50 km^3. The inflow of Georgian rivers comprises 16% of the total continental inflow of the sea. Georgian rivers that flow into the Black Sea are: Bzipi, Kodori, Enguri, Rioni, Khobi, Supsa, Natanebi, Chorokhi and other minor rivers.

The river with the highest rate of flow into the Georgian part of the Black Sea is the Rioni, the longest river that flows entirely on the Georgian territory. Its length is 327 km, the area of its basin is 13,400 km². Annually, the Rioni fills the Black Sea with a large mass of solid substances – an average of 4.7 million tonnes per year.

The flow rates of some rivers into the Black Sea (based on the assessment of 2005) are as follows:

- Rioni 406 m^3/s
- Supsa 46.0 m^3/s
- Chorokhi 300.0 m^3/s
- Natanebi 24.5 m^3/s
- Khobi 50.5 m^3/s

4. The Socio- Economic Situation on the Georgian Black Sea Coast

In 2010 the population of the Georgian part of the Black Sea coast and its adjacent territories was approximately 450,000.

Until the crisis of the 1990s the Georgian coast of the Black Sea was an industrial-agricultural region with well-developed sectors of industry (machine industry, fuel and chemical industry, electrical energy, light industry, food industry, building materials industry etc.). In 1988-2002 industrial production and the number of employed people decreased significantly. Agriculture also declined.

In the 1990s a large portion of the region's population emigrated (over 50,000 people emigrated from Adjara - 13.1% of Adjara's population).

From 2004 the economy began to be rehabilitated and integrated into national and global economic systems and started to develop rapidly, especially the textiles, food, building materials, processing of

secondary metals and pharmaceutical sectors. Agriculture is still in crisis, prevented from developing by the lack of agricultural lands and the small size of farms.

Georgia has two major ports on the Black Sea: Poti and Batumi ports:

Poti port is located on 49 hectares and functions all the year round. Currently it owns a cargo complex consisting of 14 harbours and 2,650 meters in length. 11 harbours are equipped with portable cranes of 6-40 tonnes capacity. Transportation conditions are suitable for all kinds of cargo and liquid products. The port's turnover is growing year on year. Seven terminals are leased on a long-term basis. There are direct train ferry connections from Poti port to Ilichevsk (Ukraine), Varna (Bulgaria) and Caucasia (Russia), and direct car ferry connections to Novosibirsk (Russia), Burgas (Bulgaria) and Rize (Turkey).

Batumi port is located on 8 hectares. It has four harbours of 755 metres length. Dry cargo is loaded on two harbours embracing 17.5 hectares and 1590 meters in length. Oil and oil products are loaded in Batumi Port The port has a capacity to transport 15-18 million tonnes of oil products and 2.3-2.5 million tonnes of dry cargo annually. The turnover of the container transportation terminal is 47-50 thousand containers per year.

One of the most rapidly growing fields of economy on the Georgian part of the Black Sea coast is tourism. According to the concept of development of tourism in the region, rapid growth of investments and number of tourists is planned for the nearest future.

5. The Biodiversity of Georgia's Black Sea Coast

5.1. Habitats

Open Sea and Circulation Zone

1110. Sand coasts thinly covered with the sea water

PAL.CLASS.: 11.125, 11.22, 11.31, 11.333

The water level from the sand surface does not exceed 20 metres. It consists of sedimentary sand but also contains larger stones and pebbles or smaller granules that form mud on the coastline. The sandy-rocky line stretches from Abkhazian coast to Guria and Achara (including). The biotic elements are chiefly represented by algae, invertebrate sea animals and plankton. Various species of fish either inhabit or pass these places; all three Black Sea dolphin species are frequent.

1130. Deltas (estuaries)

PAL.CLASS.: 13.2, 11.2

A delta is the end of the river-bed where it joins the sea and is influenced by the tides. The delta of the river forms part of the coastline, where the bay contains mixed fresh and salty water. This zone is characterized by a large amount of sedimantary rocks brought to the coastline by the river. It constantly changes the type of tide and causes the formation of mud, decomposed rocks and other sediments. The largest delta is formed by the Rioni river. Other significant deltas are those of the Enguri and Chorokhi rivers. Other rivers join the sea in the form of a narrower line.

21150. Coastal Lagoon

PAL.CLASS.: 21

A lagoon is a part of the salty water of the sea. It has cut into land and is separated from the sea so that during the tide in the sea and the lagoon are connected and their waters are mixed. The lagoon is often separated from the coast by means of rocks or sandy hills. The salinity of water depends on the volume of precipitation. During hard rains, salinity is decreased. Such a formation is found near Grigoleti Village.

1160. Shallow water and bay

PAL.CLASS.: 12

A bay and shallow water occupy certain places on the coast. Unlike delta, here fresh water is not mixed with the sea water. It is affected only by the movement of the sea waves, which brings sedimentary rocks from the bottom of the sea and constantly changes the structure of the bottom. This, in its turn, affects the biotic content of benthos.

1210GE –Georgian code - Sea rocks and stony coast

With regard to this habitat, literature makes mention of surface plant species. The flora of water-covered sea rocks and stony bottom has not been described yet.

It should be mentioned that no specific research has been carried out on Georgian territory with regard to the precise description of the structure of the Black Sea habitats, which would cover the shelf, continental slopes and sea caves, their distribution and assessment of their state. There is little information regarding the habitats of the entire Black Sea.

5.2. Fauna and flora

5.2.1. Phytoplankton

The diversity of phytoplankton largely depends on the salinity, temperature, amount of nutrients and turbidity of water. The waters of the Black Sea coast and continental shelf are eutrophic, i.e. rich in organic substances (nutrients). The concentration of food substances determines the biomass species composition of phytoplankton. The content of species of phytoplankton along the entire Georgian coastline was evaluated in the 1980s. 116 species were identified:

- Bacilariophyta - 62 species
- Pyrrophyta - 40 species
- Euglenophyta - 3 species
- Chryzophyta - 6 species
- Cyanophyta - 3 species
- Chlorophyta - 2 species

The most frequent among phytoplankton species were diatomic sea algae, out of which the most dominant were:

- Thalassiosira parva
- Nitzschia seriata
- Nitzschia longissima
- Rhizosolenia alata
- Rhizosolenia calcar-avis

Northern forms were also frequent:

- Sceletonema costatum
- Cyclotella caspia
- Cerataulina bergonii

Only episodic research has been implemented since the evalution in the 1980s. Current data should be obtained on the species composition of phytoplankton, its seasonal change, distribution by habitats etc. This research should be based on modern methodology.

5.2.2. Zooplankton

Micro-zooplankton in the Black Sea are dominated by *Cladocera* and *Copepoda*. Zooplankton populations of the entire Black Sea have declined in recent years. This might be due to the increase in the mass of phytoplankton species that are unsuitable food for zooplankton coenoses. On certain territories of the Black Sea the density and biomass of *Noctiluca* has increased. Some scientists consider it part of phytoplankton, but due to its heterotrophy and comparatively large size, it is used for the monitoring of zooplankton. The growth of *Noctiluca* is stimulated by the accumulation of organic and other food substances (nutrients) in the water, which is a result of pollution. In periods of abundance it comprises 90% of zooplankton at certain shores of the Black Sea.

The invasive spread of *Mnemiopsis leidyi* was an important reason for the decrease of the biomass and change of its structure. This hermaphrodite, capable of rapid reproduction, penetrated the Black Sea in the beginning of the 1980s and multiplied so fast that in the 1990s its total mass reached a billion tonnes in the Black and Asov seas; zooplankton formed a gel-like mass due to the high content of *Mnemiopsis leidyi.* In the same period *Mnemiopsis leidyi* annihilated the spawn and larvae of certain fish. In 1997 another invasive species was discovered in the Black Sea - the predator *Beroe ovate*, which feeds solely on *Mnemiopsis leidyi.* Since then the zooplankton feeding on phytoplankton has increased. However, due to its seasonal propagation, it is unlikely that *Beroe ovate* will entirely annihilate *Mnemiopsis leidyi*. In general, in conditions of eutrophication, a large amount of gel-like plankton organisms (consisting of 98-99% water) is characteristic of sea zooplankton.

Out of medusa species (*Scyphozoa*) the most widespread in the Black Sea are *Rhizostoma pulmo* and *Aurelia aurita.* In the larval stage they form an important component of zooplankton.

The largest organisms of zooplankton are fish larvae, including the larvae of anchovy (*Engraulis*). Their amount is especially high in the samples of plankton taken in May.

A large proportion of Black Sea organisms spend at least one stage of their life cycle in the plankton content. Thus, research on zooplankton, including the content of species, seasonal change, biomass and density, is extremely important for the assessment of the state of the entire ecosystem.

No research on zooplankton of the entire Black Sea coastline based on modern methodology has been implemented recently .

5.2.3. Zoobenthos

The macro zoobenthos of the Black Sea includes over 800 species. Their number decreases rapidly with increasing depth. The viability of zoobenthos depends on several key benthic habitats of transboundary importance: favourable habitat for *Mytilus galloprovincialis* (mussels), *Cystoseria* (algae) habitats, *Zostera* beds and sublittoral sands.

In the 1990s the study of bottom samples at the Georgian coast revealed 128 zoobenthic species:

- *Polychaeta* - 60 species
- *Mollusca* - 42 species
- *Crustacea* - 19 species
- Other -7 species

Assessment of the current state of zoobenthos should be based on the following indices: species richness, biomass, seasonal change. None of these indices have been studied at the Georgian coast of the Black Sea.

Polychaeta

Some species of Polychaeta, widespread in the Atlantic Ocean and the Mediterranean Sea, have been found at the Georgian coast.

Magellona papilicornis is found in the Atlantic Ocean and the Mediterranean Sea. At the Georgian coastline this species was found at a depth of 5-25 metres. At a depth of 5-15 meters *Eteone siphonodonta* was discovered. One more Atlantic species - *Ancistrosyllis tentaculata* – was discovered in the Red Sea and the north Caucasian coast of the Black Sea at a depth of 16-28 metres. On the Georgian coast this species was abundant at a depth of 5-40 metres.

Streblospio shrubsolii is also found in the Atlantic Ocean. It was first discovered in the Black Sea at the Bulgarian coast. As for the Georgian coast, this species is found in two places near the Abkhazian shore at a depth of 20-30 metres.

Giycera capitata is widespread in the Atlantic and Pacific oceans as well as in the Arctic and Antarctic seas. In the Black Sea it was discovered in the sublittoral area above the sand in the region of Evpatoria. This species is found along the entire Georgian coast.

The existence of the Atlantic species of *Polychaeta* in the Black Sea shows that the layered flows of water into and out of the Black Sea and the significant difference in salinity and temperature gradient between the Black Sea and Mediterranean Sea do not represent a problem for this group of animals.

Crustaceans

In the 1980s research revealed two species of *Callianass* - *C. pestai* and *C. truncata*. *C. Pestai* is widespread in the Adriatic, Mediterranean and Black seas. At the Georgian coast it was found everywhere at a depth of 5-50 metres.

5.2.4. Molluscs

The following species are found at the Georgian coast:

Venus gallina	Venus gallina <4 cm. One of the dominant species on sandy bottoms. Its density has declined in the Black Sea in recent years.
Scapharca inaequivalis	Scapharca inaequivalis <8 cm. Evolutionary old bivalve of Indo-Pacific origin, invaded the Black Sea in 1960s. One of the dominant species on sandy bottoms to 40m depth. Edible bivalve with orange-yellow flesh
Donax trunculus	Donax trunculus <4 cm. Dominant bivalve species of Black Sea sandy shallows
Calyptraea chinensis	Calyptraea chinensis - Chinese hat <4 cm, one of few gastropods living on the soft sediment bottom.
Moerella (Tellina) donacina	<2 cm, lives in soft sediments depths of more than 10m.
Lucinella divaricata	<0.5 cm, one of dominant annual species of the Black Sea's shallow sandy bottoms.
Modiolus phaseolinus	Modiolus phaseolinus <4 cm. Most abundant bivalve in the Black Sea. Dominant species at depths of more than 40m. Most of the bottom sediments at those depths originate from Modiolus shells
Rapana venosa	Veined rapa whelk <15 cm, the largest marine

	gastropod, and one of most ruthless predators in the Black Sea; it eats bivalves so efficiently that bivalve diversity in the Black Sea fell by half after the Rapana invasion in 1947. Small-sized *Rapana* drill bivalve shells with its radula, inject digestive enzymes inside, and then suck the digested flesh out; they do the same to crabs. Adult *Rapana* just open bivalves with their large versatile leg. There are no predators for adult *Rapana venosa* in the Black Sea; the starfish that normally preys on this gastropod cannot tolerate the low salinity of the Black Sea.
Mytilus galloprovincialis	Blue mussel <12 cm, attaches to underwater rocks with a bunch super-strong bissus threads, at greater depths it lives on soft sediments where several mussels make a bunch attaching themselves to each other and putting bissus into sand or silt - like roots. The mussel is cultured at marine farms where its planktonic larvae settle on the special collecting ropes. Inhabits rocky shores where comparatively large waves are formed. It is also found on sandy bottoms. It plays an important role in the ecosystem as a filter. 10-70 mm mollusks filter 6-70 litres of water per day. Numbers are falling due to predation by *Rapana venosa*.

In the summer of 2010 numerous empty shells of mussel were found near Tsikhisdziri at a depth of 10-12 metres. There were no rapa whelks on this territory, but their concentration was high near Kvariati. In summer 2011 small live mussels were found attached to rocks near Tsikhisdziri. It is highly probable that rapa whelks annihilated large-size mussels near Tsikhisdziri and moved southwards to Kvariati to get food.

Along the entire Georgian coast there are mollusc species that are widespread on the European coast of the Atlantic ocean, the Mediterranean, Aegean and Marmara Seas. One such molluscs is *Cylichnina strigella,* which lives at a depth of 40 metres. Aegean *Proneritula westerlundi* was found at the Georgian coast, by the estuary of the Supsa river, at a depth of 30 metres.

Hypanis anqusticostata, found in still waters and the delta of the Danube, was discovered on the Georgian coast by the estuary of river Supsa.

5.2.5. Fish

According to 2002 data there are 171 fish species in the Black Sea; the most threatened are sturgeon species: *Acipenser gueldenstaedtii, Acipenser stellatus, Acipenser sturio, Acipenser nudiventris, Huso huso* and *Acipenser persicus* are listed as endangered in the IUCN Red List; *Acipenser ruthenus* is listed as a vulnerable.

Endangered species protected under the Black Sea Red List are *Belone belone euxini, Mullus barbatus*.

The Red List of Georgia includes the Black Sea herring *(Alosa pontica)* as well as the sturgeon species on the IUCN Red List.

It is necessary to compile an inventory of ichthyofauna species along the entire Georgian coastline. The inventory should be based on modern methodology, harmonized with the methodology used in other Black Sea countries. It is especially important to monitor commercial species and compile a database that will enable trends in the populations of species to be monitored.

5.2.6. Birds

The Caucasus, at the border of Europe and Asia, is important for two life cycle stages of wild water birds (migration and wintering) and three migration routes converge in the Caucasus region (the Central Asian, East Africa-West Asia and Mediterranean/Black Sea). The eastern Black Sea shore, Kolkheti lowlands and adjacent foothills of the Meskheti mountain range are important sites for migrating birds. Tens of thousands of migratory waterbirds use the marshes and lakes in the Kolkheti lowlands and river deltas and the sea for stopover and wintering.

Kolkheti lowlands and coastal areas are important for autumn and spring migration of waders and other shorebirds. Thousands of plovers (*Calidris* spp., *Pluvialis* spp.), lapwings (*Vanellus* spp.), red knot (*Calidris canutus*), sanderling (*C. alba*), curlew sandpiper (*C. ferruginea*), turnstone (*Arenaria interpres*), dunlin (*Calidris alpina*), broad-billed sandpiper (*Limicola falcinellus*), Temminck's stint (*Calidris temminckii*), little stint (*Calidris minuta*), sandpipers (*Tringa spp*.), godwits (*Limosa spp*.), curlews (*Numenius spp.*), snipes (*Gallinago spp*.), woodcock (*Scolopax rusticola*), ruff (*Philomachus pugnax*), gulls *(Larus* spp.), terns (*Sterna spp., Chlidonias spp*.), crakes (*Rallus* spp.), moorhen (*Gellinula chloropus*), coot (*Fulica atra*), purple swamp hen (*Porphyrio porphyrio*) and herons (*Botaurus* spp., *Egretta* spp., *Ardea* spp.) migrate through Kolkheti lowland (Maps 11.1 and 11.2). Disturbance from grazing animals, motorboat activities, reed burning, seashore development, uncontrolled hunting and poaching are major threats affecting wader and shorebird populations during migration.

Map 11.1. Important migration sites for water birds, from North to East: river Churia, lake Partottskali, Rioni delta, Paliastomi lake

Map 11.2. Important migration site for water birds: Chorokhi delta

Thousands of water birds of more than 25 species use Kolkheti wetlands and coastal areas for migration and wintering. Swans (*Cygnus spp*.), geese (*Anser spp*.), ducks (*Tadorna spp., Anas spp., Aythya spp.*) and mergansers (*Mergus spp*.) winter and migrate on the Eastern Black Sea shore (Maps 11.1 and 11.2). Disturbance from motorboat activities, reed burning, seashore development, unmanaged hunting and poaching are major threats effecting wader and shorebird populations during migration and wintering.

Full autumn raptor migration counts were conducted in 2008 near Batumi. Since then about 900,000 migrating raptors of 34 species have been counted annually. Such an amazing number of migrating raptors makes the eastern Black Sea bottleneck the most important raptor migration site of the Western Palearctic and third largest raptor migration site on the planet after Veracruz, Mexico (4-6 mln. raptors) and Eilat, Israel(2 mln. raptors).

In 2010 and 2011 an international bird ringing camp trapped and ringed passerine birds in Chorokhi river delta near Batumi. 6,000 birds of 84 different species were ringed during a three week period in the august of 2010 and 16,000 birds of over 80 species during august-september of 2011. The two ringing attempts showed the importance of the eastern Black Sea migration corridor for passerine migration. Habitat degradation and coastal tourism infrastructure development as well as illegal shooting are major threats for migrating passerines.

5.3. Mammals

There are four mammal species in the Black Sea: Black Sea seal (*Monachus monachus),* critically endangered according to the IUCN Red List, bottlenose dolphin (*Tursiops truncatus ponticus*), common dolphin (*Delphinus delphis ponticus*) and harbour porpoise (*Phocaena phocaena relicta*). The Black Sea seal is not found on the Georgian coast because there are almost no habitats suitable for this animal. Only once, in the 1930s, has a seal been recorded in the Georgian Black Sea area.

In 2009-2011 observation of dolphins along the Georgian coast showed that all the three species are found in all seasons. However, their frequency (except bottlenose dolphin) differs by seasons. According to the 2009-2011 assessment, the most widespread dolphin species in Georgian territorial waters is the common dolphin (6,000 individuals in summer), next comes harbour porpoise (4,000 individuals in spring), whereas bottlenose dolphin is much less in number (about 60 individuals in all seasons, including spring 2011).

Feeding areas of dolphins are identified based on the data of 2010-2011 distribution and behaviour (see Map 11.3).

All the three species of dolphin are on the IUCN Red List (see Table 11.1).

The issue of adding common dolphin and harbour porpoise to the Red List of Georgia should be considered. Harbour porpoise frequently fall victim to by-catching and there are frequent cases when they strand themselves on the shore; research should be undertaken to identify the reasons for stranding. A system of monitoring of dolphin species should be elaborated and genetic research should be undertaken to identify the site-specificity of different groups of the species (i.e. the attachment of groups to certain territories seasonally or all the year round).

Map 11.3. Dolphin food territories: 1-Khobi riv. delta; 2-Delta of the Northern Branch of the Rioni riv.; 3 –Delta of the Southern branch of the Rioni riv.; 4-Supsa riv. Delta

Table 11.1. Conservation Status for the three Black Sea dolphin species

Dolphin species	Conservation status according to IUCN Red List	Conservation status according to the Black Sea Red Book	Conservation status according to Georgian Red List
Tursiops truncatus ssp. ponticus	EN	DD	EN

	Endangered	Data Deficient	Endangered
Delphinus delphis ssp. ponticus	VU Vulnerable	DD Data Deficient	Not on the list
Phocoena phocoena ssp. relicta	EN endangered	DD Data Deficient	Not on the list

6. Main Threats Affecting the Black Sea's Biodiversity

6.1. Eutrophication

The reason for the increasing eutrophication of the Black Sea is the large quantity of nutrients brought by the rivers into the sea. The water-collecting basin of the Black Sea embraces 2 million square kilometers, which is five times more than the sea's area. The largest quantity of substances is brought into the north-eastern part of the sea, as in this place the river with the highest water flow - the Danube – joins the sea (8,695 m^3/second).

Eutrophication of the Black Sea is a threat for the remaining 10-13% of water that is rich in oxygen. Pollution of water by various organic compounds leads to an abundance of phytoplankton, namely flagellates. When they die a significant amount of oxygen is used in the process of oxidation of organic substances. On an area of approximately 40,000 square kilometers the waters of the north-west shelf of the Black Sea become hypoxic. The layer of hydrogen sulphide also increases in volume. At a depth of 10-30 metres in the north-western part there is high concentration of hydrogen sulphide: 1.5 - 2.25 ml/l. The hypoxia of certain layers leads to mass lethality of animals and the formation of "dead zones".

Sewage, mineral salts and different organic compounds of anthropogenic origin brought by rivers and mass deaths of animals in the anoxic zones enhance the process of bacterial sulphate reduction. As a result, hydrogen sulphide is formed in the water and sediments. Analysis of highly polluted water at the estuaries of the Danube and the Dniester has shown that the water contains a large amount of hydrogen sulphide. This is caused by the activation of bacterial sulphate reduction. The increase of dead zones with hydrogen sulphidecoincides with the development of industry and agriculture in the Black Sea countries. Besides hydrogen sulphide there is high content of methane in the water at the estuaries of the Danube and the Dniester: methane coming up from the depths of the sea is unable to be oxidized by aerobic microorganisms in the dense water and is released into the atmosphere, increasing the concentration of greenhouse gases. In the past century there were several sites in the Black Sea where underwater gas was released: the north-western area of the Black Sea at 60-650 metres depth, the Caucasian coast**,** the strait of Kerch and the coast of Bulgaria.

In 1996-2005 the process of eutrophication was slightly reduced as a result of the economic crisis in some countries which caused a decline in industrial and agricultural production (in 2004 the volume of goods produced in the Black Sea countries was one third 1998 production). As a result of the disintegration of the Soviet Union numerous factories stopped functioning, agricultural production also decreased considerably and pPollution of rivers and the sea was reduced. However, rehabilitation of ecosystems, especially that of the benthos, is a longterm process.

Eutrophication of the Black Sea is a result of anthropogenic and natural processes. Pollution of rivers and seas from anthropogenic sources stimulates the growth of bacteria that produce hydrogen sulphide and methane. This leads to an increase in dead zones rich in hydrogen sulphide. Lack of oxygen leads to the death of live organisms and more organic pollution, which in turn increases the content of hydrogen sulphide. According to one pessimistic forecast, by 2020 the Black Sea will be dead.

Excessive fishing also contributes to eutrophication. According to official data, in the 1970s the amount of fish taken from the Black Sea was 300,000-400,000 tonnes a year. By the 1980s amount had increased to 700,000- 800,000 tonnes. Some commercial species feed on phytoplankton and a decrease in their number leads to a mass increase in the amount of phytoplankton.

The main cause of eutrophication of the entire Black Sea, including its Georgian coast, is sewage and substances brought by rivers. In order to identify the degree of eutrophication at the Georgian coast it is necessary to implement annual seasonal monitoring. A diagnostic analysis of the Black Sea, implemented in 2007 underlines the necessity of such monitoring, using a unified methodology and comparing the data of Bulgaria, Georgia and Ukraine.

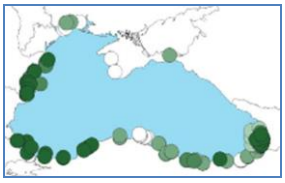
6.2. Chemical pollution

In the 1990s the Black Sea Institute studied various types of pollution at the Georgian coast in collaboration with the Asov Sea Fishing Research Institute. In order to identify metals, atomic emission spectrometry was used. In order to identify pesticides, gas mass spectrometry was used. Pollution by oil products was studied using high performance liquid chromatography and gas chromatographic mass spectrometry.

Substances were found in the water and in fish (polycyclic aromatic hydrocarbon, benzpyrene) confirming pollution by oil. The highest concentration of carcenogenic benzpyrene was observed in benthos *Platichthys flesus*, followed by benthopelagic *Mullus barbatus*, *Spicara smaris*, Black Sea anchovy *(Engraulis encrasicholus)* and mackerel (*Trachurus mediterraneus ponticus*).

Concentration of benzpyrine was extremely high in mussel tissues. It is well known that this water-filtering mollusc accumulates substances in the environment, including toxins. Mussels are important for the monitoring of the state of water. Pollution by oil products not only accumulates toxins in mussels but also hampers the filtration of water. In case of oil pollution, the speed of filtration by bivalve molluscs falls and this affects the quality of water.

As a result of an analysis carried out in 2005 pollution by benzene hydrocarbons was observed at the Georgian coast (see Map 11.4)



Map 11.4. Pollution of the Black Sea Coast by benzene hydrocarbon. (The dark green colour denotes concentration exceeding 0.18 mg/l (according to BSERP-TDA2))

As for pollution by metals, research in the 1990s identified pollution of Georgian territorial waters by mercury, iron, copper, arsenic. Six elements - cobalt, lead, nickel, copper, zinc and bismuth were found in fish tissues. Some samples also contained cadmium and chromium. 25 pesticides were found in the water: chiefly α, β, γ - HCH, DDT metabolites and isomers were found in fish, accumulated mostly in liver, also in gonads, less in gills and even less in the muscles.

In 2003 research was carried out to identify the content of heavy metals in the bivalve species *Mytilaster lineatus.* The research found that the indices for various metals did not exceed the permissible concentration limits.

An analysis of heavy metals in in 2010 found that the content of zinc varied from 0.005 to 0.016 mg/l; the concentration of cadmium was less than 0.001 mg/l and that of mercury was less than 0.0001 mg/l. These indices do not exceed the permissible limit. However, conclusions cannot be based solely on water analysis. Heavy metals are capable of sedimentation, therefore their

concentration must be higher on the bottom. It is also necessary to analyse the tissues of live organisms. All the above-mentioned tests will enable us make conclusions concerning the quality of water.

According to official data, from 2006 to 2011 the key sources of pollution from ships were discharge of faecal waste and oil products (See Figure 11.1. In the given period there were 42 cases of pollution by discharge of faecal waste and 27 cases of pollution by oil products. In December 2011 pyrolysis tar was spilt near Poti port. There were also 6 cases of spilling of hydraulic oil.

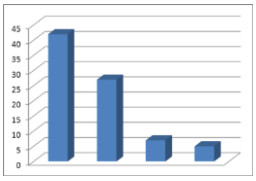


Figure 11.1.*Key sources of pollution from ships:* discharge of faecal waste (1), oil products (2), hydraulic oil (3), sea ballast(4)

It was impossible to obtain data on the discharge of sewage into the Black Sea, therefore no data are presented here.

Kulevi oil terminal and Supsa terminal are potential sources of pollution. Kulevi oil terminal is located at the estuary of Khobistskali river. Supsa terminal, the final spot of Baku-Supsa pipeline, is located on the right bank of the Supsa river and contains four reservoirs, each of 40 000 tonnes capacity. These terminals are located near important dolphin feeding sites and are frequently used by migrating birds. In the event of a spillage, damage to biodiversity would be irrevocable. Therefore the impact of these terminals on biodiversity should be monitored and the results of monitoring should be transparent.

It is important to work out a programme of monitoring of chemical pollution of Georgian territorial waters. With this aim, a list of polluting substances should be compiled and used for the assessment of the state of water. The substances and pollution standards should be harmonized with those of the Black Sea countries and international norms in order to obtain a complete picture of the state of the Black Sea.

6.3. Overfishing

According to various sources overfishing in the Black Sea was especially high in the 1970-80s (800,000-900,000 tons per year). Excessive exploitation of the fishing territories, expansion of fishing and development of fishing technologies, combined with other threats, caused significant damage to numerous fish species in the entire Black Sea. The most affected were predator species (bonito, horse mackerel, bluefish etc.). There was strong pressure on sprats (*Sprattus sprattus)* and anchovy *(Engraulis encrasicolus)*. The number of commercial species of fish decreased from 20 to five in the entire Black Sea. It should also be mentioned that recently the number of large fishing boats has increased in the Black Sea.

By 2005, 1,200 kilotonnes of fish were caught in the Black Sea. In this period at least 1,300 fishing boats of more than 12 metres in length, were engaged in fishing. This increased pressure on commercial and occasionally caught species of fish.

In 2011-2012 the main commercial Black Sea fish species for Georgia were anchovy (*Engraulis encrasicolus*) sprat (*Sprattus sprattus*), whiting (*Merlangius merlangus*), horse mackerel (*Trachurus mediterraneus ponticus*), goatfish (*Mullus barbatus*), mullet (*Mugil spp.*), spurdog (*Squalus acanthias*), bonito (*Sarda sarda*), stargazer (*Uranoscopus scaber anostomus*), bullhead, flounder (*Platichthys flesus*), turbot (*Psetta spp*) and herring (*Alosa immaculate*).

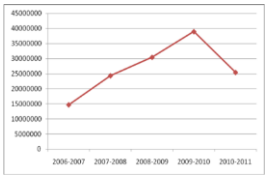
Besides fish there are permitted quotas on the rapa whelk (1,000 tons per year) (see Table 11.2)

Table 11.2. Quotas permitted on Georgian territory in 2011-2012 (in tons)

anchovy	sprat	whiting	horse mackerel	goatfish	mullet	spurdog	stargazer
80 000	840	780	700	680	100	80	56
bonito	gobies	turbot	herring	pickerel	bluefish	garfish	scat
38	36	32	28	24	12	12	12

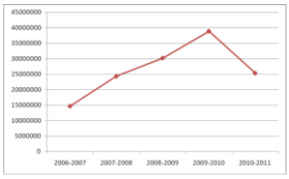
In the period 2006-2011 the highest fish catch was in 2009-2010 (see Figure 11.2) - about 40,000 tonnes. The highest pressure was on anchovy. It is likely that excessive obtaining is one of the main reasons for the decrease in the number of anchovy at the Georgian coast (see Figure 11.3)

Figure 11.2. Amount of fish caught in 2006-2011 (in kg)



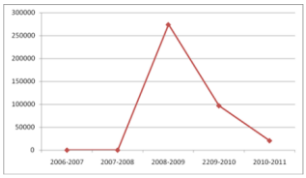
In February 2012 a survey of fishermen owning seiners and smaller vessels revealed a decrease in the number of anchovy as compared to the previous years. Anchovy is found at the Georgian coast in winter and spring. It is caught in winter. Spring and summer are the reproduction seasons. The fishermen explained that anchovy had decreased in number due to climatic conditions (low temperature during the season), spilling of pyrolysis tar and increase in the number of seiners. Yet, the key reason is overfishing.

Figure 11.3.the amount of anchovy caught in 2006-2011 (in kg)



The catch of mackerel was highest in 2008-2009. As is seen from Figure 11.4, later it decreased according to the information provided by fishermen.

Figure 11.4. The amount of mackerel obtained in 2006-2011 (in kg)



The catch of mullet was limited in 2006 -2009, whereas in 2010-2011, 15 000 kg were obtained (Figure 11.5)

The catching of whiting also increased rapidly in 2010-2011 (Figure 11.6)

Figure 11.5. The amount of mullet caught in 2006-2011 (in kg)

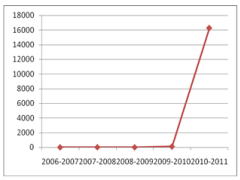
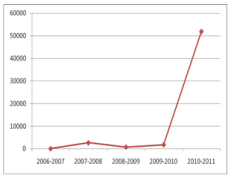


Figure 11.6. The amount of whiting caught in 2006-2011 (in kg)



The data for the amount of fish caught annually by the same companies shows how the catch decreases when species is taken in large quantities the previous year. This has a negative impact on fishermen, especially those who own a license. They pay taxes but are unable to meet the quotas; e.g. one licensed fisherman whose license envisaged 20,000 tons of anchovy had caught only 7,000 tonnes by February; the anchovy season ends in March so it is highly unlikely that the owner of the license would have met the quota.

Owners of smaller fishing boats also report a decrease in fish stocks: whereas five to seven years ago they were catching half a tonne of fish within one kilometre of the shore, in 2011 they caught only 50 kg.

The decrease in the anchovy, herring and shi drum catch caused prices to increase, which in turn affected the consumer. Therefore, protection of fish species is important not only for the preservation of biodiversity but also for the fishing industry. For this purpose, it is necessary to establish quotas on a scientific basis using modern methodology. It is necessary to implement permanent monitoring of the status of populations of commercial fish species.

Pressure on commercial and occasionally obtained species and benthic and pelagic communities was caused by amendments in the decree of April 6, 2011 on “the List of Objects of Fauna, Obtaining of Species, Terms and Allowed Weapons and Tools”. The amendments involved permission to use bottom trawls and a decrease in the size of net loops. Bottom trawls are especially dangerous for benthic communities. According to the legislation, bottom trawl is a trawl in which the total share of typical bottom fish and other hydrobionts such as skates, flounders, gobies, bullfish, scorpionfish, weever, stargazer, mullet, ophidian, crowner, crabs, molluscs and other benthic species exceeds 5%. Disturbance caused by the use of bottom trawl affects benthos habitats and the structure of the communities.

There had been a widespread opinion that trawl is favourable for the propagation of minor benthos organisms with short life cycle, as trawl frees them from the pressure of predation and competition. Numerous research studies showed that trawls cause a significant decrease in the biomass of species of benthos communities. There is an inversely proportional relationship between the size of animals and the frequency of trawl. Frequent use of trawl leads to a degraded ecosystem consisting of minor

organisms and a small number of species. Increase in the productivity of some organisms does not compensate the significant decrease in total productivity, because there is rapid decrease in the number of large-sized animals (Jennings et al. 2001; Cryer, Hartill, O'Shea 2002). The use of bottom trawl annihilates filtering molluscs that are a food source for numerous benthos fish, including sturgeon. Sites suitable for feeding and spawning are also destroyed. Apart from affecting cenoses of living organisms, long-term use of bottom trawls (for several subsequent days) affects water turbidity and bottom structure: corpuscles rising from the bottom spread over several kilometres and reduce the transparency of water; the bottom remains a "ploughland" for a long time. (Palanquet al. 2001). These traces are visible even on photos taken from the satellite. The width of the "ploughlands" is about 30 metres and the depth is 50 cm. Reduction of water transparency affects the process of photosynthesis and the concentration of oxygen is reduced in the thin layer of the Black Sea inhabited by living organisms. Research carried out in 2011 showed that bottom trawl affects the quality of benthos fish (quality means the ratio of weight to length) (Hiddink, Johnson, Kingham, Hinzam; 2011). Bottom trawl also affects top predators such as dolphins. Due to the availability of food, dolphins often follow seiners in groups and are entangled in trawls, i.e. the probability of by-catching increases (Rayment, 2009).

In the Georgian part of the Black Sea the use of bottom trawl is permitted almost on the entire territory (see Map 11.5). This territory embraces the estuaries of large rivers, spawning sites for numerous fish species, rich benthos cenoses and feeding territories for all three dolphin species. Bottom trawls may cause additional problems in Georgian territorial waters. The depth of water rich in hydrogen sulphide and its spatial and seasonal change is not yet studied. Therefore, trawls may lead to the mixing of this water with the aerobic layer. This will lead to deterioration in the quality of water.

One of the threats affecting numerous species is using dynamite. Despite prohibition, dynamite is often used by the estuaries of the rivers Kintrishi and Dekhva and other rivers too. One hundred kg of fish is sometimes obtained with one shot. Poachers select only large fish, leaving the smaller dead ones in the river. Dynamite is used even in the fish reproduction season.

Map 11.5 – Georgian Black Sea coastal waters where bottom trawling is permitted

6.4. Invasive species

Anthropogenic introduction of alien species in the Black Sea, whether intentional or accidental, started in the 19th century. The impact of introduction of alien species on the ecosystem was highest in the 20th century. Until the mid 1970s the Black Sea was characterized as a highly productive ecosystem at all trophic levels but by the 1990s it had degraded to an ecosystem with a low biodiversity dominated by a 'dead-end' gelatinous food web. A number of factors have resulted in great structural changes in the food web of the Black Sea: climate change; natural annual fluctuations; anthropogenic impacts including changes in river discharge quality resulting in a rise in eutrophication and pollution; overfishing; and the accidental introduction of exotic species from aquaculture projects,

Out of 26 invasive species six have significantly affected the Black Sea's ecosystems: these are comb jelly (*Mnemiopsis leidyi),* white-tipped mud crab (*Rhithopanopeus harrisi*)*,* the molluscs veined rapa whelk (*Rapana thomasiana* or *Rapana venosa)*, soft-shell clam (*Mya arenaria*) and *Cunearca cornea*, and the fish species so-iuy nullet (*Liza haematocheilus*). The highest negative impact is caused by

Mnemiopsis leidyi. The species was introduced into the Black Sea in the early 1980s, possibly in ballast water of ships from the north-western Atlantic coastal region. Being a rapidly reproducing, self-fertilizing hermaphrodite, it possessed the ideal reproductive strategy for rapid colonization. As a generalized feeder, it is not prey specific and occurs over a wide range of inshore, hydrographic conditions. This enabled *Mnemiopsis leidyi* to quickly invade its new habitat. By 1989 its density reached its peak. The following year its number started to decrease until 1993. Then it increased again. The second peak was registered in 1994. The number decreased again until 1995. The seasonal changes in the population of *Mnemiopsis leidyi* are given in Table 11.3 below.

Table 11.3. Seasonal change of the population of Mnemiopsis leidyi according to Shiganova[78]

February-June	*June-beginning of July*	*Second half of July-August*	*October-November*	*December-February*
Middle-sized individuals are found chiefly in the open sea. **Due to somatic growth, the size of wintered individuals increases.**	The population consists solely of adult individuals. The number and biomass are low. Chiefly found at the coastline.	Reproduction starts (t≥23^{0}C) first at the coastline, later in the open sea. There is a large number of small individuals.	The number of the population reaches its peak. Beginning from the middle of November there is only somatic growth.	Only middle-sized individuals are found in the open sea, below the surface layer, in comparatively warm water t≥4^{0}C

Degradation of the Black Sea ecosystem had started before the invasion of *Mnemiopsis leidyi*. Among the causes were strong eutrophication, changes in the hydrological regime of adjoining rivers caused by the construction of irrigation systems and hydroelectric power stations and overfishing. As a result of excessive fishing, the density of numerous commercial fish species decreased. Eutrophication led to a change in the structure of zooplankton and phytoplankton. The change in the hydrological regime weakened the surface currents of the Black Sea. The greatest effects occurred in the north, where the infuence of rivers such as the Danube, Dnieper, Dniester, Don and Kuban determined the hydrochemical regime. The surface currents in the Black Sea are generated by inflow from these rivers and inflow through the Strait of Kerch from the Sea of Azov. These inflows also affect the velocity of the rim current in the west (Rumelian current) and central Black Sea, which is directed towards the Bosphorus, particularly during the spring flood. These currents determine the extent of migration of pelagic species (*Scomber scomber*, *Sarda sarda*, *Pomatomus saltatrix* and *Trachurus trachurus*) in the spring from the Sea of Marmara to the northern Black Sea .

A decrease in current velocity resulted in the extent of migration of these species being limited to the north and a decrease in the number of migrating fish. A simultaneous input of nutrients and toxic substances from a large catchment basin caused changes in the hydrochemical regime with consequent eutrophication.

The changes in benthic communities caused by eutrophication decreased the number of the following species: *Psetta maxima, Solea lascaris nasuta, Platichthys flesus* and *Arnoglossus kessleri*. In the beginning of the 1980s the number of the jellyfish *Aurelia aurita* increased, chiefly due to eutrophication. Accumulation of nutrients created a favourable environment for this species.

The above-mentioned problems were componded by the appearance of *Mnemiopsis leidyi.* The increase in its number decreased the number of ichthyoplankton and mesozooplankton and reduced the diversity of species. Some zooplankton crustaceans disappeared altogether. *Mnemiopsis* had an especially large impact on fish spawning in the summer, e.g. anchovy. There was a negative

[78] Shiganova T. A. 1998. Invasion of the Black Sea by the ctenophore Mnemiopsis leidyi and recent changes in pelagic community structure. FISHERIES OCEANOGRAPHY 7:3/4, 305-310, 1998

correlation between the density of fish spawning in winter and the density of *Mnemiopsis. Mnemiopsis* also affected the density of sprats.

Since 1999 the biomass of *Mnemiopsis* has decreased due to the appearance of a new invasive species *Beroe ovata* which feeds almost exclusively on *Mnemiopsis*. Since this time, it appears that the trend of decreasing numbers of phytoplankton-eating zooplankton has begun to reverse, possibly as a consequence of *Beroe*'s appearence, but the data are so variable that this is not possible to be certain. The highly seasonal reproductive pattern of *Beroe ovata* means that long-term *Mnemiopsis* eradication due to the introduction of *Beroe ovata* is unlikely. Assessment of the *Mnemiopsis* situation over the past decade is also complicated by the natural 3-4 year cycle of *Mnemiopsis* abundance and biomass, which occurs in both the north east Atlantic (from where *Mnemiopsis* originates) and the Black Sea.

Severe winter also affects the number of *Mnemiopsis*. In years when winter temperature is extremely low, the number of *Mnemiopsis* decreases significantly in spring. However, in conditions of higher temperature and abundance of nutrients, the biomass of *Mnemiopsis* increases rapidly.

It should be mentioned that in Georgian territorial waters *Mnemiopsis* was found in autumn 2009 in the open sea. In spring 2010 about ten individuals were found near Poti port. In spring 2011 six individuals were found near Grigoleti. The size of the latter individuals was about 8 centimeters. In the same period middle-sized and large *Mnemiopsis* were found in shallow water near a sandy coast. This was a period of spawning of various fish species. The existence of *Mnemiopsis* in spawning grounds is a significant threat for spawns and larvae.

Another invasive species affecting the Black Sea ecosystem is veined rapa whelk (*Rapana venosa*). It has decreased bivalve populations. As these molluscs filter the water, a decrease in their number leads to the deterioration of the quality of water. Besides, bivalves and mussels are significant food for fish, including rare species (e.g. sturgeon); a decrease in food resources naturally leads to a decrease in the number of fish.

The invasive species of the Black Sea are divided into three groups: North European, Atlantic, and Pacific. The main sources of invasion are ships, ballast waters and aquaculture. The list of invasive species of the Black Sea is given in Annex 11.6.

6.5. Natural system modifications

In 2012 the government of Georgia announced plans to build a new city for half a million people on the Black Sea coast. The city – Lazika - will be the second largest city in Georgia after Tbilisi; the government intends that it will become the economic centre of western Georgia. The construction process will involve reclamation of relict bogs. Protection of humid territories, including these marshes, is the obligation of Georgia under RAMSAR Convention[79]. The territory is also protected under Georgian legislation as part of Kolkheti National Park. Bog reclamation will lead to annihilation of numerous plant and animal species.

The territory is a migration site for thousands of water birds. About 900 000 migrating raptors of 34 species and 84 species of 16000 passerine birds are counted annually. Such an amazing number of migrating raptors makes the eastern Black Sea bottleneck the most important raptor migration site of the Western Palearctic and the third largest on the planet. Destruction of this already affected natural ecosystem may be considered a threat of global scale.

The government has also announced construction of a new port at Anaklia. This is the location of one of the deepest canyons on the Black Sea coast, so it is convenient for the construction of a sea port. Numerous fish species spawn on this territory. The place is also favourable for the sturgeon species

[79] In 1997 Kolkheti National Park and Kobuleti Protected Area were attached the status of humid territories of international significance.

on the IUCN Red List and Red List of Georgia. The coastal waters off Anaklia are feeding grounds for all the three dolphin species, which are on the IUCN Red List.

Besides the above-mentioned, the process of active urbanization will increase the amount of sewage and other types of pollution. This will enhance eutrophication and decrease oxygen levels in the Black Sea. Eutrophication will be aggravated by the change in the hydrological regime caused by bog reclamation. As a result, instead of a tourism development zone, this place may turn into an environment unsuitable for life.

7. Protected Areas

Kolkheti National Park is located in western Georgia. It covers the eastern zone of the Black Sea coast and the basin of the Paliastomi Lake. The Park was established with the purpose of protecting and maintaining wetland ecosystems. The Kolkheti lowland became the subject of international interest first in 1996, when Georgia joined the Ramsar Convention. In 2000 Kolkheti National Park became fully operational. The national park is divided into the following natural geographical districts: Anaklia-Churia (between the coastline sections of gorges of the Churia River and the Khobistskali River), Nabada (between the western sections of the gorges of the Khobistskali River and the Rioni River) and Imnati (between the western sections of the gorges of the Rioni River and the Supsa River). These are the places where the ecosystems of wetlands are best preserved. Besides, the National Park includes the sea water area located between the estuaries of the rivers Rioni and Churia. The area of Anaklia-Churia embraces 13,713 hectares; Nabada district covers 10,697 hectare area, and Imnati district area embraces 19,903 hectares. In total, the land area of the National Park is 28,571 hectares, and the sea water area is 15,742 hectares.

Marine mammals are represented by the three species of Black Sea dolphins. Ichtyofauna of the national park is represented by 88 species, out of which 23 species are migratory, 21 species live in fresh water and 44 species live in the Black Sea. Among the cartilaginous fish the Atlantic sturgeon and beluga can be distinguished, and among the bony fish – the Black Sea salmon, herring, striped mullet, pike and bonito.

Six species of fish in the Red List of Georgia are widespread in the water ecosystems of Kolkheti National Park: beluga (*Huso huso*), sea sturgeon (*Acipenser sturio*), Sevruga sturgeon (*Acipenser stelatus*), sea trout (*Salmo fario (truta) morpha*), sand goby (*Gobius (Neogobius) fluvatilis*), roach (*Rutilus frisii*).

8. Key instruments of protection of the Black Sea

8.1. International instruments

The Convention on Biological Diversity was signed by Georgia in 1994. It regulates the protection of biodiversity on the entire Georgian territory, including the Black Sea.

Appendix 2 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora) (CITES) protects Black Sea bottlenose dolphin (*Tursiops truncatus*), all sturgeon species except Atlantic sturgeon (*Acipenser sturio*), which is included in Appendix 1. Georgia became a party to this Convention in 1996.

The Convention on Migratory Species of Wild Animals (CMS; Bonn Convention) was joined by Georgia in 2000. It underlines the protection of Black Sea bottlenose (*Tursiops truncatus*) and Atlantic sturgeon (*Acipenser sturio*) (Appendix 1). Harbour porpoise (*Phocoena phocoena*) and other species of sturgeon are listed in Appendix 2.

Protection of the Black Sea is also an issue of the **Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)**, joined by Georgia in 2008. The convention regulates the protection of European species and habitats. Common dolphin (*Delphinus delphis*),

bottlenose dolphin (*Tursiops truncatus*), harbor porpoise (*Phocoena phocoena*), Atlantic sturgeon (*Acipenser sturio*) and beluga (*Huso huso*) are listed in Appendix 2 of the Bern Convention. These species are found on the Georgian coast of the Black Sea.

Since 1993 Georgia has been a member of the UN **International Maritime Organisation (**IMO). The regulations of this organization refer to ballast waters, as they are an important source of invasion of alien species. In 2002 a joint decree of the Georgian Minister of Environmental Protection and Natural Resources and Georgian Minister of Transport and Communications №83-№53 was issued concerning "The Procedures of Ballast Water Management in Georgia". This decree regulates the management of ballast waters in Georgia. Spilling of ballast waters in the open sea is prohibited. The ships in Georgian ports should change ballast waters before entering the second sanitary district (50-mile zone), at least at 25 nautical miles from the nearest shore, on the territory of 100 metres' depth.

On July 20-22 2011 a training was held in Batumi aimed at preparing the employees of the marine administration and the port for elementary biological research in the port. The training was held within a joint programme GloBallast (GEF/UNDP/IMO). The aim of the programme is to assist developing countries in the reduction of the invasion of pathogenic water organisms and elaboration of a convention on the management of ballast waters.

In 1993 Georgia joined the **MARPOL Convention on the Prevention of Pollution from Ships** (London, 1973). The MARPOL Convention is aimed at the prevention of pollution from ships, which in its turn reduces the threats caused by pollution.

Georgia joined the **Bucharest Convention on the Protection of the Black Sea Against Pollution** in 1992. According to the convention, the parties are obliged to pay special attention to the protection of living marine resources, change of their habitat due to fishing and other legal use of the sea. Georgia is obliged to fulfill the following protocols of the Convention: "Protocol On Protection Of The Black Sea Marine Environment Against Pollution From Land Based Sources"; "Protocol On Cooperation In Combating Pollution Of The Black Sea Marine Environment By Oil And Other Harmful Substances In Emergency Situations"*;* "Protocol On The Protection Of The Black Sea Marine Environment Against Pollution By Dumping".

In 2009 Georgia signed the **Black Sea Biodiversity and Landscape Conservation Protocol** to the Convention on the Protection of the Black Sea Against Pollution; the protocol was adopted in Sofia, Bulgaria in 2002. The protocol establishes that all signatories should join their efforts to protect the biological and landscape diversity of the Black Sea, preserve and, where possible, improve its ecological health, historical, cultural and aesthetic values.

T**he Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS).** Agreement under the Bonn Convention on the Conservation of Migratory Species of Wild Animals . Georgia signed this Agreement in 2001. The Agreement envisages the protection of all the three species of Black Sea dolphins and their habitats.

The Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea. On April 17, 2009, in Sofia (Bulgaria) an updated plan of strategic actions for the protection and rehabilitation of the Black Sea was adopted. The TDA 2007 reconfirmed four priority transboundary environmental problems requiring coordinated efforts by all Black Sea coastal States. It was determined that these areas of concern, and their causes, could be most effectively and appropriately addressed through the aims of four Ecosystem Quality Objectives (EcoQOs). The four EcoQOs and associated Sub EcoQOs are:

- *EcoQO 1: Preserve commercial marine living resources*

  EcoQO 1a: Sustainable use of commercial fish stocks and other marine living resources.

  EcoQO 1b: Restore/rehabilitate stocks of commercial marine living resources.
- *EcoQO 2: Conservation of Black Sea Biodiversity and Habitats*.

EcoQO 2a: Reduce the risk of extinction of threatened species.

EcoQO 2b: Conserve coastal and marine habitats and landscapes.

- EcoQO 3 – Reduce eutrophication
- *EcoQO 4 - Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota*.

EcoQO 4a: Reduce pollutants originating from land based sources, including atmospheric emissions.

EcoQO 4b: Reduce pollutants originating from shipping activities and offshore installations

Georgia, as a party to the action plan, is obliged to fulfill and implement the recommendations given in the document. However, recent amendments in the Georgian legislation are contrary to the objectives of the action plan**.** According to activity EcoQO 1b (4), non-selective methods of fishing, including the use of dredges and bottom trawls, was prohibited. The activity also embraced reduction of by-catching and obtaining of juvenile fish (EcoQO 1b activities (7,8)). The Decree of April 6**,** 2011 "*on Amendments to the List of Weapons and Equipment Permitted for Obtaining Objects and Species of Wildlife*" envisages permission for the use of dredges and bottom trawls, reduction of the size of net loops and obtaining of non-adult fish. All these changes contradict the recommendations given in the above-mentioned document.

8.2. Georgian legislation

This section describes recent amendments Georgian legislation that contradict Georgia's obligations toward the international community with regard to the protection of the Black Sea's biodiversity and habitats.

There were several amendments in the Decree of April 6, 2011 on the rules and terms of use of wildlife resources, the list of tools and equipment permitted for catching wildspecies:

Sub-Paragraph (b) of paragraph 3, article 7:

> Fishing is prohibited "b) all the year round at the estuaries of rivers suitable for sturgeon and salmon and at the estuary space of the Black Sea – at the distance of 300 metres around the estuary". As compared to the earlier permitted 500 metres, the distance was reduced by 200 metres. This is a threat to the already endangered fish species.

The terms of prohibition of obtaining certain fish species also changed:

Sub-paragraph (e) of Article 8:

> Turbot – "e) European turbot –From May 1 to July 1, instead of earlier defined February 15-July 1; which means that prohibition terms were reduced by 2.5 months. This increases pressure on one of the most important representatives of benthos communities. Reproduction of this species starts in April and reaches its peak in May, lasting until the middle of July.

Sub-Paragraphs (g) and (h), concerning prohibitions, were withdrawn.

> "g) By means of dredges of all constructions, including Khizhnyak construction";
>
> "h) Bottom trawls (bottom trawl is a trawl in which the total share of typical bottom fish and other hydrobionts, scats, flounders, gobies, scorpionfish, stargazer, mullet, ophidion, crowner, crabs, mullusks and other inhabitants of the bottom, exceeds 5% (when counted)".

Sub-paragraph (d) of Article 10 was also withdrawn. This sub-paragraph prohibited the use of nets the length of which exceeded 300 metres in the sea and 120 metres in internal waters, whereas the length of pulling ropes exceeded 20 metres; thus, currently the parameters of nets are not regulated".

Paragraph 5 was added to Article 10: "Fishing is prohibited using dredges of all constructions and bottom trawls outside the limits of certain zones defined by geographical coordinates". These limits embrace a huge territory (see Map 11.5 above). It should be stressed that before the adoption of this amendment, the above-mentioned types of equipment were prohibited altogether.

As a result of updating paragraph 12, the size of anchovy permitted to be taken was reduced. At the same time, according to Paragraph 2 of Article 13, the permitted number of fish with minimum length was increased to 40%. This has increased pressure on anchovy and affected its number. According to the same amendment (Appendix #1) the size of loops of fishing nets was reduced: the size of loops of casting nets used for catching mullet-like fishes was reduced from 20 mm to 12 mm, the size of loops in tangling nets was reduced from 28 mm to 18 mm. Therefore, a greater amount of juvenile fish is found is nets, which affects the total number of fish.

The fee determined by the Georgian legislation for the catching of sturgeon species is 3,000 GEL, for the salmon species 525 GEL. This law contradicts other laws. Meanwhile, according to Article 8 of the regulations "on Terms and the List of Weapons and Equipment Permitted for Obtaining Objects and Species of Wildlife, catching of the following species is prohibited:

a) sturgeon species – all the year round;

c) Black Sea salmon – all the year round.

Thus, the two above-mentioned laws contradict each other.

The Ministry of Environmental Protection explained the above-mentioned contradiction as follows: fees are specified for sturgeon and salmon species in order to define the amount of fine in case of illegal fishing.

9. Projects Implemented in Georgia in the Field of Protection of the Black Sea

Restoration of the Black Sea ecosystems II Phase – Pilot monitoring on the Black Sea 2006-2007:

Donor Organization: United Nations Development Programme, Global Environmental Facility

Project Goal: Participation of laboratories/organizations in pilot exercises concerning the analysis and control of sediments (organic and inorganic), water column (nutrients), zooplankton, benthos and phytoplankton.

A Supporting Programme for Capacity Building in the Black Sea Region towards operational status of Oceanographic Services- ASCABOS. 2005-2008:

Donor Organization: EU Sixth Framework Programme

Project Goal: Improvement of Black Sea forecasting and operative observation systems for all basin countries. Development of oceanographic services in order to ensure transport security on the Black Sea

Black Sea Scientific Network, SCENE 2005-2008:

Donor Organization: EU Sixth Framework Programme

Project Goal: Creation of scientific network in the Black Sea and coastal zones of Black Sea countries. Integration and harmonization with relevant EU networks.

Control of pollutants, regarding rehabilitation of the Black Sea ecosystem 2005-2007

Donor Organization:UNDP - GEF

Study of Vibrio physiological group in the Black Sea coastal zone in Georgia

Donor Organization: US Defence Threat Reduction Agency (DTRA)

Integrated Coastal Zone Management Project:

Donor Organization: World Bank and Global Environment Facility

Annexes

Annex 11.1. Plants by Habitats

1110 Sandy coast thinly covered with sea water

Green algae of the sea	*Green algae.: Chaetomorpha linum*, *Ch. aerea, Ch.crassa, Cladophora cristallina*, *C. dalmatica, C. laetevirens, Enteromorpha intestinalis*, *E.linza, E. prolifera, Ulva rigida, Urospora penicilliformis* etc.; Brown algae: *Cystoseira barbata*; Red alage: *Bangia fuscopurpurea*, *Ceramium rubrum* da *Callithamnion corymbosum* Phytoplankton: The moast widespread diatoms are ***(****Nitzschia longissima, N. seriata, Rhizosoleniaalata, Rh. calcar-avis, Thalassiosira parva)*
Sea plants	*Bangia fuscopurpurea*, *Callithamnion corymbosum*, *Ceramium rubrum, Chaetomorpha linum*, *Ch. aerea, Ch. crassa, Cladophora cristallina*, *C. dalmatica, C. laetevirens,* *Cystoseira barbata*, *Enteromorpha intestinalis*, *E. linza, E. prolifera, Nitzschia* *longissima, N. seriata, Rhizosolenia alata, Rh. calcar-avis, Thalassiosira parva, Ulva* *rigida, Urospora penicilliformis*,

1130 Delta (Estuary)

Sea plants
Lemna minor, Spirodela polyrhiza, Salvinia natans, Hydrocharis morsus- ranae, *Myriophyllum spicatum, Potamogeton pusillus, P. natans, P. crispus, P. perfoliatus,* *Nymphaea candida, Nuphar luteum, Trapa colchica*, *Zostera* spp., *Chara* spp., *Eleocharis* spp., *Euphorbia peplis, Cakile maritima, Salsola tragus, Eringium maritimum.*

21150 Coastal lagoon

Sea algae	*Chaetomorpha linum*, *Ch. aerea, Ch. crassa, Cladophora cristallina*, *C. dalmatica, C.laetevirens, Enteromorpha intestinalis*, *E. linza, E. prolifera, Ulva rigida, Urospora penicilliformis* etc. Brown algae - *Cystoseira barbata*; Red algae - *Bangia fuscopurpurea*, *Ceramium rubrum* da *Callithamnion corymbosum*. FPhytoplankton: diatoms (*Thalassiosira parva, Nitzschia seriata, Nitzschia longissima, Rhizosolenia alata, Rhizosolenia calcar-avis)*
Still water algae	LBlue-green algae Cyanophyta : *Anabaena flos-awuae, Anabaena variabilia, Gloeocapsa turgida,* *Merismopedia glauca, Microcystis grevillei, Microcystis pulverea, Oscillatoria brevis, Oscillatoria limosa, Oscillatoria tenuis, Spirulina subtilissima.* flint algae – Cillariophyta - diatoms: *Cyclotella kuetzingiana, Cyclotella meneghiniana, Caloneis bacillum, Cocconeis placentula, Cymbella ventricosa,* *Gomphonema acuminatum, Navicula cryptocephala, Nitzschia amphibia, Nitzschia dissipata, Pinuularia viridis, Synedra ulna.* green algae: Chlorophyta *Cladophora glomerata, Oedogonium* sp., *Pediastrum boryanum, Scenedesmus acuminatus,* *Scenedesmus obliquus, Scenedesmus quadricauda, Spirogyra* sp., *Ulotrix zonata*

Caliciform plants	*Euphorbia peplis, E. paralias,* *Cakile maritima, Salsola tragus, Silene euxina, Digitaria ciliaris, Polygonum littorale, Calystegia soldanella, Satchys maritima, Eringium maritimum,* etc. On the coast of Guria there is *Convolvulus persicus.* Near Grigoleti there is - *Trapa colchica,* *Lemna minor, Salvinia natans, Utricularia vulgaris, Myriophyllum spicatum, Potamogeton pectinatus, etc*.

1160. Shallow water and bay

Algae	Green algae of the sea: *Enteromorpha intestinalis*, *Urospora penicilliformis*, *Ulva rigida, Enteromorpha linza, E.prolifera, Cladophora laetevirens, Chaetomorpha linum*, *Ch. aerea, Ch. crassa, Cladophora cristallina*, *C. dalmatica,* etc. Brown algae - *Cystoseira barbata*; Red algae - *Bangia fuscopurpurea*, *Ceramium rubrum* and *Callithamnion corymbosum*. FPhytoplankton is broadly represented by diatoms: *Thalassiosira parva, Nitzschia seriata, Nitzschia longissima, Rhizosolenia alata, Rhizosolenia calcar-avis.*
Plant species	*Enteromorpha intestinalis*, *Urospora penicilliformis*, *Ulva rigida, Enteromorpha linza, E.prolifera, Cladophora laetevirens, Chaetomorpha linum*, *Ch. aerea, Ch. crassa, Cladophora cristallina*, *C. dalmatica, Bangia fuscopurpurea*, *Ceramium rubrum, Callithamnion corymbosum*. *Thalassiosira parva, Nitzschia seriata, Nitzschia longissima, Rhizosolenia alata, Rhizosolenia calcar-avis.*

Annex 11.2. Seasonal change of phytoplankton

Season	*Dominant species and genera*	*Average portion of total number* *0-10-25m per layer*	*Biomass*
Spring	*Rhizosolenia alata* *Rhizosolenia calcar avis* *Exuviella* *Peridinium* *Amphydinium* *Goniaulax* *Prorocentrum*	0-10-25 m in layers comprises $115*10^6$ $kl.m^{-3}$	648 $mg.m^{-3}$.
Summer	*Chaetoceros affinis* *Chaetoceros borgei* *Chaetoceros compressus* *Chaetoceros curvisetus* *Chaetoceros danicus* *Chaetoceros gracillis* *Rhizosolenia calcar* *Cyclotella caspia* *Exuviella cordata* *Exuviella compressa* *Goniaulax cochlea* *Amphydinium lanceolatum* *Peridinium subinerme* *Peridinium trochoideum* *Peridinium decipiens* *Prorocentrum micans* *Prorocentrum scutelum*	For dinoflagellates- $93*10^6$ $kl.m^{-3}$ For diatoms- $381*10^6$ $kl.m^{-3}$ For the entire phytoplankton- $282*10^6$ $kl.m^{-3}$	For dinoflagellates- 833 $mg.m^{-3}$ For diatoms- 294$mg.m^{-3}$ For the entire phytoplankton - 1,832 $mg.m^3$.
Autumn	*Chaetoceros socialis* *Chaetoceros curvisetus* *Chaetoceros affinis* *Chaetoceros borgei* *Coscinodiscus jonesianus* *Cyclotella caspia*	For diatoms- $429*10^6$ $kl.m^{-3}$ For peridium- $38.6*10^6$ $kl.m^{-3}$	For diatoms - 4,043 $mg.m^{-3}$ For peridium- 312$mg.m^{-3}$

Annex 11.3. Zoobenthos species, based on research of the 1990s

Animal groups	*Species*	*Animal groups*	*Species*
CNIDARIA	*Actinothoe clavata*	***Phoronidea***	*Actinotrocha metschnikoffi*
	Actinia equina		*Phoronie euxinicola*
Polychaeta	*Aricidea jeffreysii*	***Crustacea***	
	Ancistrosyllis tentaculata	***Cirripodia***	*Balanus improvisus*
	Aonides paucibranchiata		*Balanus eburneus*
	Aonides sp.	***Decapoda***	*Athanas nitescens*
	Amphitrite gracilis		*Brachynotus sexdentatus*
	Capitella capitata		*Grangon grangon*
	Capitomastus minimus		*Diogenus pugilator*
	Eteone picta		*Hippolyte longirostris*
	Eteone siphonodonta		*Callianassa truncate*
	Exogone gemmifera		*Callianassa pestai*
	Fabricia sabella		*Clibanarius erythropus*
	Glycera alba		*Palaemon elegans*
	Glycera capitata		*Palaemon adspersus*
	Glycera tridactula		*Pilumnus hirtellus*
	Heteromastus filiformis		*Potamon potamios*
	Harmothoe imbricata	***Castropoda***	*Bela nebula*
	Harmothoe reticulata		*Calyptraea chinensis*
	Laonice cirrata		*Cerithidium pusillum*
	Mellinna palmata		*Cerithium vulgatum*
	Magolona resea		*Clathrus turtonin*
	Magelona papillicornis		*Cyclope donovani*
	Mystides limbata		*Cylichnina strigella*
	Nephthys longicornis		*Cylichnina variabilis*
	Nephthys cirrosa		*Cylichnina robagliana*
	Nephthys hombergii		*Gibbulla albida*
	Nereis succinea		*Hydrobia sp.*
	Nereis diversicolor		*Mohrensternia parva*
	Nereis longissima		*Nana donovani*
	Nereis zonata		*Nana neritea*
	Nainereis laevigata		*Ostrea edulis*

	Nerine cirratulus		*Proneritula westerlundi*
	Nerinides tridentata		*Rapana thomasiana*
	Oridia armandi		*Retuca truncatella*
	Prionospio cirrifere		*Tritia reticulata*
	Prionospio malmgreni	***Bivalvia***	*Abra nitida milachewichi*
	Paraonis fulgens		*Chamelea gallina*
	Paraonis gracilis		*Donacilla cornea*
	Paraonis sp		*Donax semisstriatus*
	Phyllodoce lineate		*Donax trunculus*
	Phyllodoce mucosa		*Fabula fabula*
	Phyllodoce maculata		*Couldia minima*
	Pholoe synophthalmica		*Hypanis anqusticostata anqusticostata*
	Phyllodoce nana		*Hypanis pontica*
	Polydora ciliaata		*Hypanis colorata*
	Polycirrus sp.		*Lucinella divaricata*
			Moerella donacina
			Moerella tenuis
			Modiolus phaseolinus
			Mytilus galloprovincialis
			Mytilaster lineatus
			Pitar rudis
			Pitar mediterranea
			Polititapes aurea
			Plagiocardium simili
			Spisula trianqula

Annex 11.4. Certain fish species of the Black Sea and their conservation status

Latin name	Habitat	Conservation status	Document
Sprattus sprattus sprattus (Linnaeus, 1758)	Pelagic	LR	FB
Sardinella aurita (Valenciennes 1847)	Pelagic	LR	FB
Sardina pilchardus (Walbaum 1792)	Pelagic	VU	FB
Engraulis encrasicolus ponticus (Alesandrov, 1927)	Pelagic	LR	FB
Trachurus mediterraneus ponticus (Aleev, 1956	Pelagic	LR	FB
Salmo labrax (Pallas, 1814) (Salmo trutta labrax Pallas, 1814)	Demersal-anadromous	EN	FB
Mugil cephalus (Linnaeus, 1758)	Pelagic –neritic	LR	FB
Liza aurata (Risso,1810)	Pelagic –neritic	LR	FB
Liza saliens (Risso, 1810)	Pelagic -neritic	LR	FB
Atherina boyeri (Risso, 1810) (Atherina mochon pontica Eichwald, 1831)	Demersal, Pelagic – neritic	LR	FB
Mullus barbatus (linnaeus 1758)	Denersal, bentho-Pelagic	LR	RBS
Sarda sarda (Bloch, 1793)	Pelagic	LR	RBS
Scomber scombrus Linnaeus, 1758	Pelagic	LR	FB
Platichthys flesus (Linnaeus, 1758) (=Platichthys flesus lussus (Pallas, 1814)	Demersal, Benthos	LR	FB
Merlangius merlangus (Linnaeus 1758)	Demersal,bentho-Pelagic	LR	FB
Raja clavata (Linnaeus, 1758)	Demersal, bentho-Pelagic	LR	IUCN
Belone belone (Linnaeus, 1761) (Belone belone euxini Gunther, 1866)	Pelagic	LR	RBC
Umbrina cirrosa (Linnaeus, 1758)	Demersal, bentho-Pelagic	LR	FB
Alosa immaculata (Bennett 1835)	Pelagic,Neritic	LR	IUCN
Sciaena umbra (Linnaeus, 1758)	Demersal, bentho-Pelagic	LR	FB
Diplodus annularis (Linnaeus, 1758)	Demersal, bentho-Pelagic	VU	RBS
Spicara smaris (Linnaeus, 1758)	Demersal, Pelagic – neritic	LR	RBS
Symphodus tinca (Linnaeus, 1758)	Demersal, bentho-pelagic	LR	RBS
Acipenser nudiventris (Lovetsky 1828)	Demersal, anadromous	CR	IUCN
Symphodus ocellatus (Linnaeus, 1758)	Demersal, bentho-Pelagic	VU	RBS
Acipenser gueldenstaedtii (Brandt & Ratzeburg, 1833)	Demersal, anadromous	CR	IUCN RBS
Acipenser stellatus (Pallas, 1771)	Demersal, anadromous	EN	IUCN RBS
Acipenser sturio (Linnaeus, 1758)	Demersal, anadromous		IUCN
Huso huso (Linnaeus, 1758)	Demersal, anadromous	EN	IUCN
Acipenser persicus (Borodin, 1897)	Demersal, anadromous	EN	FB
Acipenser persicus colchicus (Marti, 1940)	Demersal, anadromous	EN	FB
Acipenser ruthenus (Linnaeus, 1758)	Demersal, potamodromous	CR	IUCN
Squalus acanthias (Linnaeus, 1758)	Bentho- Pelagic	LR	IUCN
Uranoscopus scaber (Linnaeus, 1758)	Demersal –Benthos	LR	RBS
Neogobius melanostomus (Pallas, 1814)	Demersal –benthos	LR	IUC

			N
Knipowitschia caucasica (Berg, 1916) (Pomatoschistus caucasicus)	*Demersal –benthos*	*EN*	*FB*
Mesogobius batrachocephalus (Pallas, 1814)	*Demersal –benthos*	*LR*	*IUCN RBS*
Thunnus thynnus (Linnaeus, 1758)	*Pelagic*	*DD*	*RBS*
Hippocampus guttulatus (Cuvier, 1829)	*Demersal –bentho Pelagic*	*VU*	*IUCN RBS*
Scorpaena porcus (Linnaeus, 1758)	*Demersal –benthos*	*LR*	*RBS*
Eutrigla gurnardus Linnaeus, 1758 (Trigla gurnardus Linne)	*Demersal –benthos*		
Pegusa nasuta Pallas, 1814 (Solea lascaris nasuta (pallas, 1814)	*Demersal –benthos*	*LR*	*RBS*
Conger conger (Linnaeus, 1758)	*Demersal, bentho-Pelagic*	*EN*	*RBS*
Chromogobius quadrivittatus (Steindachner,1863)	*Demersal, benthos*		*RBS*
Liza ramada (Risso, 1827)	*Pelagic-neritic*		*RBS*
Arnoglossus kessleri (Schmidt, 1915)	*Demersal, Benthos*	*CR*	FB
Scophthalmus maeoticus (Pallas, 1814)(Psetta maxima maeotica)	*Demersal, benthos*	*LR*	*FB*
Pomatomus saltatrix (Linnaeus, 1766)	*Pelagic*		

Definitions

IUCN- The Red List of the International Union of Conservation of Nature

FB - fish database
CR-critically endangered **EN**-endangered **VU**-vulnerable **LR** – at low risk

Annex 11.5. Place of origin and period of propagation of certain Black Sea fish

Latin name	*Origin*	Propagation period
Sprattus sprattus sprattus (Linnaeus, 1758)	*A*	November – middle of May
Sardinella aurita (Valenciennes 1847)	*A*	June-September
Sardina pilchardus (Walbaum 1792)	*A*	July-August
Engraulis encrasicolus ponticus (Alesandrov, 1927)	*E(B)*	May – end of September
Trachurus mediterraneus ponticus (Aleev, 1956	*A*	June-August
Salmo labrax (Pallas, 1814) (Salmo trutta labrax Pallas, 1814)	*E(M)*	October-January
Mugil cephalus (Linnaeus, 1758)	*A*	June-middle of August (June 15 – July 15)
Liza aurata (Risso,1810)	*A*	June-October
Liza saliens (Risso, 1810)	*A*	July-end of September
Atherina boyeri (Risso, 1810) (Atherina mochon pontica Eichwald, 1831)	*A*	March-September
Mullus barbatus (linnaeus 1758)	*A*	End of May-end of July
Sarda sarda (Bloch, 1793)	*A*	End of May-end of August (chiefly June)
Scomber scombrus Linnaeus, 1758		January-May in the Seaof Marmara
Platichthys flesus (Linnaeus, 1758) (=Platichthys flesus lussus (Pallas, 1814)	*A*	January-March (January-April)
Merlangius merlangus (Linnaeus 1758)	*E(M)*	September-May
Raja clavata (Linnaeus, 1758)	*C*	March-end of July
Belone belone (Linnaeus, 1761) (Belone belone euxini Gunther, 1866)	*E(M)*	End of April-middle of October
Umbrina cirrosa (Linnaeus, 1758)	*A*	March-April (March-September)
Alosa immaculata (Bennett 1835)	E(B)	May-middle of August
Sciaena umbra (Linnaeus, 1758)	*A*	May-September
Diplodus annularis (Linnaeus, 1758)	*A*	June-middle of September
Spicara smaris (Linnaeus, 1758)	*A*	June-September
Symphodus tinca (Linnaeus, 1758)	*A*	May-June
Acipenser nudiventris (Lovetsky 1828)	*E(B)*	May-June
Symphodus ocellatus (Linnaeus, 1758)	*E(M)*	April-beginning of July
Acipenser gueldenstaedtii (Brandt & Ratzeburg, 1833)	*E(B)*	March-April (for spawning moves to the Rioni river)
Acipenser stellatus (Pallas, 1771)	*E(B)*	May-September
Acipenser sturio (Linnaeus, 1758)	*A*	May-July
Huso huso (Linnaeus, 1758)	*E(B)*	spring or summer
Acipenser persicus (Borodin, 1897)		July-August
Acipenser persicus colchicus (Marti, 1940)		July-September
Acipenser ruthenus (Linnaeus, 1758)	*Eu W*	April-June
Squalus acanthias (Linnaeus, 1758)	*C*	winter or spring
Uranoscopus scaber (Linnaeus, 1758)	A	June-September
Neogobius melanostomus (Pallas, 1814)	*E(B)*	April-May (sometimes end of June)
Knipowitschia caucasica (Berg, 1916) (Pomatoschistus caucasicus)	*E(B)*	April
Mesogobius batrachocephalus (Pallas, 1814)	*E(B)*	March-June
Thunnus thynnus (Linnaeus, 1758)	*A*	July-August
Hippocampus guttulatus (Cuvier, 1829)	*A*	Middle of June-middle of September
Scorpaena porcus (Linnaeus, 1758)	*A*	May-August
Eutrigla gurnardus Linnaeus, 1758 (Trigla gurnardus Linne)	*A*	All summer
Pegusa nasuta Pallas, 1814 (Solea lascaris nasuta (pallas, 1814)	*E(M)*	April-June
Conger conger (Linnaeus, 1758)	*A*	Not defined
Chromogobius quadrivittatus (Steindachner,1863)	*A*	May-June
Liza ramada (Risso, 1827)	*A*	Autumn
Arnoglossus kessleri (Schmidt, 1915)	*E(M)*	May-August
Scophthalmus maeoticus (Pallas, 1814)(Psetta maxima maeotica)	*A*	End of March-end of July
Pomatomus saltatrix (Linnaeus, 1766)	*C*	Summer

A-Atlantic; E(B)- Black Sea endemic species; E(M)- Mediterranean endemic species

Annex 11.6. Invasive Species in the Black Sea

	Latin name	Origin	Intentional occasional introduction	Probable time of introduction
1.	*Balanus improvisus*	AT	Occasional	19th century
2.	*Balanus eburneus*	AT	Occasional	19 th century
3.	*Blackfordia virginica*	AT	Occasional	1925
4.	*Mercierella enigmatica*	NEU	Occasional	1929
5.	*Bourgainvillia megas*	AT	Occasional	1933
6.	*Rhithropanopeus harrisi tridentata*	NEU	Occasional	1937
7.	*Rapana venosa (thomasiana)*	PC	Occasional	1946
8.	*Mia arenaria*	AT	Occasional	1966
9.	Callinectes sapidus	NEU	Occasional	1967
10.	Doridella obscura	AT	Occasional	1980
11.	Cunearca cornea	PC	Occasional	1982
12.	*Mnemiopsis leidyi*	AT	Occasional	1982
13.	*Desmarestia viridis*	NEU	Occasional	1990
14.	*Gambusia affinis*	AT	Intentional	1925
15.	*Lepomis gibbosum*	Still water (North America)	Intentional	1930
16.	*Pandallus kessleri*	PC	Intentional	1959
17.	*Plecoglossus altivellis*	PC also still water	Intentional	1963
18.	*Roccus saxatilis*	AT	Intentional	1965
19.	*Salmo gairdneri*	PC	Intentional	1965
20.	*Oryzias latipes*	Still water South-Eastern Asia	Intentional	1970
21.	*Penaeus japonicus*	PC	Intentional	1970
22.	*Oncorhynchus keta*	PC	Intentional	1972
23.	*Mugil soiuy (Liza haematocheilus)*	PC	Intentional	1972
24.	*Dicentrarchus labrax*	EU	Intentional	1977
25.	*Lateolabrax japonicus*	PC	Intentional	1978
26.	*Crassostrea gigas*	PC	Intentional	1980
	NEU- North European; **AT** – Atlantic; **PC** - Pacific			

APPENDIX 1. STATE OF IMPLEMENTATION OF NBSAP-1

Strategic Goal A: To develop a protected areas system to ensure conservation and sustainable use of biological resources.

Specific Objectives	Progress
To establish an effective protected areas network	Currently Georgia does not have a protected area network; nor does it have a PA spatial development plan that would provide for the development of the existing protected areas and their transformation into a network. It is critical to transform the isolated protected areas into an interconnected protected area network. Although transformation of existing PAs into a PA network has not been initiated, some steps have been made. New protected areas have been established: Mtirala and Machakehla National Parks, Javakheti Protected Areas (including Javakheti National Park and 5 Managed Reserves) and 21 Natural Monuments. As a result the area of protected areas increased from 431 028.98 ha (6.16% of Georgia's territory) to 519 053,75 ha (7,42% of Georgia's territory). There are still some critical gaps, in particular in the central Caucasus mountain range (the regions of Svaneti, Raja, Lechkhumi and Khevsureti). In the context of the PA network, initiation of the Emerald Network was a significant step forward. However, the so far identified and nominated eight conservation areas, are located within the borders of existing PAs. The political situation, lack of respective legislation and respective capacity is preventing establishment of a comprehensive protected area network in Georgia. There are indications of increased pressures on the PAs because of economic developments. In Kolkheti NP part of a Ramsar site was allotted for construction of the Kulevi terminal; part of Kazbegi PAs were allocated for construction of hydro-electric power station. The country's drive for economic development, in particular the country's hydro-electricity generation and regional development strategies, are preventing progress towards development of the network.
To improve the process of protected areas planning and management	The Ministry of Environment Protection adopted new regulations on the content and process for elaborating PA management plans. However the appropriateness of the document is still under debate by various national and international institutions. Revision of the regulation is needed and is planned. Management plans for four PAs have been prepared

	in accordance with the guidelines; one of them has been formally approved. The APA and its territorial administrations still lack capacity in PA management planning and are overly dependent on international consultants and donor financing.
To improve and/or develop financial mechanisms for protected areas	Georgian budget spending for protected areas has increased in recent years. Establishment of the Agency of Protected Areas as a legal entity under the public law in 2008 facilitated additional fund raising, namely from entry fees from National Parks as well as from concessions. Today APA's revenues make up about 12-13 per cent of its annual budget. Current legislation does not significantly restrict protected areas in terms of diversification of funding sources and implementation of effective revenue mechanisms. However, the legislation should be improved to enhance financial sustainability of the protected areas by giving a clear definition of the PA funding diversification and mechanisms and opportunities of additional revenues for APA. At present contribution of donor organizations in the existing funding is about 50 per cent. The Caucasus Nature Fund is co-financing the running costs of four PAs and plans, together with the APA, increase the number of supported PAs to 2 over the next five years. Some other donors supporting APA are BMU/KfW, UNDP/GEF. The gap between the funding needs of the PA network and actual funding is still substantial and more steps need to be taken to close the gap. The UNDP/GEF project "Catalysing Financial Sustainability of Georgia's Protected Areas" developed a ten-year investment plan for 2012–2022 that should assist APA in identification and attraction of necessary investments in protected areas.
To set up a data base of Georgia's protected areas	The Agency of Protected Area has a database of sorts. The website of APA, particularly the interactive map provides information on PAs. However, there is still no unified electronic database.
To increase the level of political support and develop cross-sectoral cooperation within the Government	Although there have been some notable successes in terms of new and extended PAs since 2005, Georgia's development strategy has increasingly prioritised economic development over the conservation and sustainable use of biodiversity. There is less overall political support for completing a fully representative PA network; cross-sectoral cooperation exists but with the proponents of PAs in a weakened position.
To increase international and transboundary	There has been significant progress in bilateral cross-border cooperation between Georgian and the other

cooperation	countries of the southern Caucasus. The Ministry of Environment Protection of Georgia has signed a formal agreement with the Ministry of Environment and Forestry of Turkey to develop cross-border cooperation between protected areas in western Georgia and eastern Turkey. The Agency of Protected Areas of Georgia and Ministry of Ecology and Natural Resources of Azerbaijan are developing cooperation between Lagodekhi PAs and Zakatala State Nature Reserve with the support of the Transboundary Joint Secretariat for the Southern Caucasus (TJS). Since 2007 the Georgia has been collaborating with Azerbaijan and Armenia in the framework of the TJS; activities have included joint study tours to PAs in EU countries, joint participation in international fairs and exhibitions.
To improve education and interpretation for visitors to protected areas	Infrastructure of many PAs has significantly improved since 2005. Many PAs have well established visitors centre's with exhibition halls providing information on PAs. The visitors are given lectures on PAs. APA together with appropriate PAs has different programmes for visitor. They provide different tours, activities, eco-camps, festivals. The programmes are developed for different target and age groups. Interpretation desks are installed on the touristic trails in PAs providing specific information to visitors.
To develop ecotourism potential within protected areas	Tourism infrastructure has been significantly improved in a number of protected areas that supported increase of ecotourism potential. Since 2005 number of tourists in protected areas has increased 50 times.
To increase the involvement of local communities in the planning and management of protected areas	With regard to cooperation and involvement of local population the PA Law gives the right yet not an obligation to APA to cooperate with local population in making divisions on PA establishment, development, changes in the PA territory and status, management planning, consideration and amendment of administrative acts and other documents. Yet the PA Law does not define respective cooperation mechanisms. Additionally, local community representatives are not represented in the Scientific-Advisory Councils existing at PAs. However, some progress has been made in involving local communities in planning and managing protected areas. The commissions established by the Ministry of Environment Protection to prepare proposals for new PAs (e.g. Khevsureti, Mtirala, Javakheti) include consultations with local communities; the external boundaries and zonation of

	the new Javakheti PAs were planned with the full involvement of local communities, whose representatives participated in the various working groups set up by the planning team. The regulations governing the structure and process of preparing PA management plans include participation by local communities as an essential part of the process; all management plans prepared recently (2010-12) were elaborated with the participation of representatives of the local population.

#	Activity	Indicator	State of Implementation
A1	Prepare a project to develop Georgia's protected area system	Systems plan approved by the Government	Significant steps taken but indicator not achieved. A National Protected Areas System Development Strategy and Action Plan was developed in 2009 and included a ten-year strategy and a five-year action plan. The document was never formally approved.
A2	Establish protected areas in the central Caucasus	Protected areas set up in the central Caucasus Management plans for the protected areas developed and officially approved.	Significant steps taken but indicators not achieved. Two new protected areas - in Racha and Svaneti regions - were identified and planned under the World Bank Protected Areas Development Project in 2008 but no further steps have been taken. Creation of Zemo Svaneti Glacier National Park and protected areas in Pshav-Khevsureti is being planned.
A3	Establish protected areas on the Javakheti Plateau	Protected areas set up on the Javakheti plateau Management plans for the protected areas developed and officially approved.	Significant steps taken but indicators not achieved. Javakheti Protected Areas – consisting of a national park and five management reserves – were legally established in 2011. The management plan was prepared but not approved yet.
A4	Designate new Ramsar sites in Javakheti Plateau (lakes Khanchali, Madatapa, Bugdasheni)	Javakheti wetlands included in the List of Wetlands of International Importance	Significant steps taken but indicator not achieved. Priority wetland areas (Khanchali, Madtapha, Bughdasheni and Paravani lakes and Kartsakhi and Sulda swamps) were identified and respective documents prepared for their inscription on the list of

			wetlands of international importance (Ramsar Sites), and recognized by the Ramsar Secretariat as meeting 3-4 criteria for inscription on the Ramsar site list. The sites are not recognized by the national government yet. Potentially, the reason was some misunderstanding with regard to Lake Paravani that was misinterpreted for the Paravani River, which is an energy resource.
A5	Reorganise existing reserves (including expansion and up-grading into national parks, as appropriate) to improve their effectiveness	At least 3 reserves reorganised	Fully implemented. Saguramo State Reserve became part of the Tbilisi National Park; Kazbegi State Reserve was re-categorised as a national park; a protected landscape was established in part of the Kintrishi State Reserve that had been under traditional agricultural use; Ajameti State Reserve became a Managed Reserve and was expanded. The legal status of the Ktsia-Tabatskuri, Nedzvi and Tetrobi Managed Reserves was redefined in accordance with the 2007 The Law on the Status of Protected Areas, and the status of five hunting farms established prior to independence were reviewed and changed to managed reserves and their areas changed
A6	Improve the effectiveness and management of existing protected areas	Results of evaluation by governmental and public organisations	Significant steps taken. Increases in APA and PAs staff capacity (trainings, workshops, site visits, etc) and investments in infrastructure and equipment helped to improve the management effectiveness of some protected areas.
A7	Identify potential Ramsar sites, and prepare necessary designation proposals	At least one Ramsar site proposal submitted for designation	Significant steps taken See A4.
A8	Develop a list of potential Natural Monument Sites. Draft and adopt laws in support of these sites. Develop management plans for these sites	List of potential sites developed. Relevant laws adopted, and management plans approved	Significant steps taken but not all of the indicators achieved Since 2005 21 New Natural Monuments have been established. A draft law On Natural Monuments was prepared and submitted to the Parliament with the purpose of defining the criteria for a site to be declared a natural monument and to

			harmonise Georgian criteria with IUCN criteria. Together with draft law the list of proposed natural monuments were also submitted.
A9	Designate biosphere reserves	Official designation of biosphere reserves in Georgia	Significant steps taken but indicator not achieved. A study was carried out into the feasibility of establishing a biosphere reserve in Stepantsminda municipality. The study concluded that strengthening the existing Kazbegi National Park was a more appropriate and feasible option. No further steps were taken towards establishing biosphere reserves in Georgia
A10	Compile a list of potential world heritage sites and prepare documentation for their submission to UNESCO	Relevant documents submitted to UNESCO	Significant steps taken but indicator not achieved. A consulting and planning workshop on World Heritage Sites was carried out in Georgia but so far no applications have been made to UNESCO to inscribe natural sites on the list of World Heritage Sites.
A11	Identify potential transboundary protected areas and initiate their establishment	Official agreement with neighbouring countries on the establishment of transboundary protected area	Significant steps taken but indicator not achieved. Formal transboundary cooperation with protected areas in neighbouring countries has not been established so far, though important first steps have been made: there are protected areas on both sides of Georgia's borders with Azerbaijan, Turkey and Armenia (the current political situation precludes transboundary cooperation with Russia) and negotiations about cooperation are underway. The results that have been achieved so far fall short of an agreement to establish transboundary protected areas.
A12	Set up biodiversity monitoring schemes in protected areas	Biodiversity monitoring schemes established in protected areas, and integrated into the national biodiversity monitoring system.	Significant steps taken but indicator only partially achieved. The biodiversity monitoring conducted in protected areas is still not as comprehensive as it needs to be.

A13	Set up protected areas information centre and a database at the Department of Protected Areas	Widely available database of protected areas Various publications on protected areas produced	Significant steps taken but indicators not fully achieved. The Agency of Protected Area created a database, though there is still no information system and no unified electronic database. The APA prepared publications for many PAs and provides detailed information about PAs on its web site.
A14	Prepare an action plan for the protection of large mammal migration corridors and birds flyways	Identified migration corridors designated as protected areas of appropriate category	No significant steps taken. Although no significant steps have been taken towards preparing and action plan the creation and development of the Kolkheti National Park, creation of the Mtirala National Park and Javakheti Protected Areas as well as initiated establishment of the Machakhela National Park should be considered a significant step towards protection of bird migration routes.
A15	Implement pilot projects in buffer (support) zones of protected areas	At least one pilot project implemented at each national park	Some significant steps taken but indicator not fully achieved. A pilot project on sustainable use of natural resources in the support zones of protected areas was initiated. However, the measures that have been implemented so far are not sufficient.
A16	Develop compensation schemes for local people living in or at protected areas	Relevant legal instrument developed to provide compensation	No significant steps taken. Compensation mechanisms for local people living in or around protected areas have not been developed due to problems with relevant legislation and funding.
A17	Improve funding of protected areas by ensuring any funds generated from fines and damage reimbursement are allocated to the protected area budget	Improved (i) financial situation and (ii) infrastructure of protected areas	No significant steps taken. The legal basis for using protected areas' budget revenues received from damage compensations for reinvestment has not been improved. Today the issue should be considered in a broader context of the existing state biodiversity policy and in the context of new regulations; this requires a serious study
A18	Ensure that the income from visitors is allocated to the protected area budget	Improved (i) financial situation and (ii) infrastructure of protected	Fully implemented. Changes were made to legislation to allow payments made by visitors to

		areas	PA administrations to be retained by APA and reinvested in the PA network.
A19	Carry out an inventory of known paleontological sites (Dmanisi, Taribana, Dzegvtahevi, Udabno, Ialguja,etc).	Published database of Georgia's paleontological sites	No significant steps taken.
A20	Develop management plans for paleontological sites that are expected to remain outside protected areas	Officially approved management plan(s)	No significant steps taken.

Strategic Goal B: To maintain and restore Georgia's habitats, species and genetic diversity through *in-situ, ex-situ* and *inter- situ* conservation measures, and through sustainable use of biological resources.

Specific Objectives	**Progress**
To assess the status of species and habitats	The status of rare plant and animal species has been assessed in accordance with IUCN categories and the results have been incorporated in the new Red List of Georgia. There has been insignificant progress with assessing the status of habitats.
To ensure the conservation of the most threatened species and reintroduce extinct species as appropriate and feasible	Some progress has been made towards the objective. Conservation action plans for some of Georgia's most critically threatened species have been developed and implementation of some of the plans has started. A national plan for reintroducing the goitered gazelle into the wild Georgia developed in 2012. The challenge now is to sustain the implementation of the conservation action plans and reintroduction plans that have been developed and to develop conservation action plans for other endangered species. The list of species for which conservation plans need to be prepared should be reviewed taking into account the most up-to-date information available about a species conservation status in the country.
To ensure conservation and sustainable use of biodiversity hot spots located outside protected areas	Some "hot spots" have been identified in the framework of the joint CoE / EU "Programme for the development of the Emerald Network in Central and Eastern Europe and the South Caucasus". However, in Georgia most of the identified hotspots are inside existing PAs. Further studies need to be carried out to identify all

	hot spots outside PAs. No strategies or action plans have been developed for the conservation and sustainable of hotspots outside PAs.
To promote ex-situ and inter-situ conservation	No significant steps taken.

#	Activity	Indicators	State of Implementation
B1	Conduct an inventory of plant and animal species and assess their status using IUCN categories of threat	Conservation status is assigned to at least 75% of estimated threatened species A database of threatened species available on the internet	Significant steps taken but indicator not achieved. The status of rare plant and animal species has been assessed in accordance with IUCN categories and the results have been incorporated in the new Red List; The list of endemic species of the Caucasus Ecoregion (2,950 taxa) has been prepared; out of total species 1,200 have been assessed in accordance with IUCN criteria; Endemic flora of Adjara-Shavsheti has been studied, conservation status of 48 endemic species has been determined and recommendations for their in-situ conservation elaborated
B2	Create a new red list of threatened species and publish a new red data book	Law on red list of threatened species adopted New Georgian red data book produced	Fully implemented. Under the auspices of the Academy of Science of Georgia the National Commission on Endangered Species has been established, which elaborated new Georgian Red List in 2005. The list consists of 197 species, of which 141 are animal species and 56 – plant species; Furthermore, The Caucasus plants "Red List" has been elaborated
B3	Identify threatened plant communities (rare, relic, primary and near primary, globally important, and sensitive communities)	At least 80% of known threatened plant communities assessed and documented	Significant steps taken but indicator not achieved. A draft version of the Regional Strategy on Plant Protection has been elaborated.
B4	Implement conservation programmes for endangered, rare, endemic and relic species	Conservation programmes initiated for at least 20% of key species	Significant steps taken but indicator not achieved. Conservation measures for the species under critical threat have been initiated.

B5	Develop a national recovery programme for goitered gazelles and start its implementation	National goitered gazelle recovery programme approved by the government Implementation started	Significant steps taken but indicator not achieved. In 2009 the goitered gazelle breeding programme in Vashlovani Protected Areas was started. In parallel a national programme for reintroduction of this species is under development.
B6	Develop a Striped Hyena Conservation Action Plan and initiate its implementation	Striped Hyena CAP published and approved by the government Activities started.	No significant steps taken. Faunistic researches conducted in East Georgia have not revealed any sign of the presence of Striped Hyena
B7	Prepare a Cervidae Conservation Action Plan and initiate its implementation	Cervidae CAP published and approved by the government Activities started	No significant steps taken.
B8	Prepare a Caprinae Conservation Action Plan and initiate its implementation	Caprinae CAP published and approved by the government Activities started	Significant steps taken but not all indicators achieved. Conservation plans for both species of Carpinae family (*Capra caucasica, Capra cylindricornis*) have been elaborated.
B9	Prepare a *Leopard Conservation Action Plan* and initiate its implementation.	The Leopard CAP published and approved by the government Activities started	Fully implemented. The conservation plan for leopard was prepared in 2010 and the implementation of its individual components was initiated
B10	Prepare a *Conservation Action Plan for Raptors* and initiate its implementation.	The Raptors CAP published and approved by the government Activities started	No significant steps taken
B11	Prepare a *Conservation Action Plan for Waterbirds* and initiate its implementation.	The Waterbirds CAP published and approved by the government Activities started	No significant steps taken
B12	Conduct a bat inventory and create a *Bat Conservation Action Plan*	Inventory completed for at least 75% of bat species thought to be present The Bat CAP published and approved by the government Activities started.	Fully implemented. A bat inventory has been carried out; Bat conservation plans have been prepared.
B13	Prepare a *Marine Mammal Conservation Action Plan* and initiate its implementation.	The Marine Mammals CAP published and approved by the government	No significant steps taken

		Activities started	
B14	Prepare a *Wolf Conservation Action Plan* and initiate its implementation.	The Wolf CAP published and approved by the government Activities started	No significant steps taken
B15	To develop conservation action plans for other key species (not mentioned above)	CAP's for various key species published and approved by the government Activities started	Significant steps taken but not all indicators achieved: • a conservation plan for the Caucasus Salamander (*Mertensiella caucasica*) has been prepared; • a conservation plan for the Brown Bear (*Ursus arctos*) inhabiting Surami range has been prepared; • conservation plans for the Lesser White-fronted Goose (*Anser erythropus*), the White-headed Duck *(Oxyura leucocephala*), the Eastern Imperial Eagle (*Aquila heliaca* [Savigny]), the Lesser Kestrel (*Falco naumanni Fleischer*) and the Red-breasted Goose (*Branta ruficollis [Pallas] / (=Rufibrenta ruficollis [Pallas])* have been prepared.
B16	Establish bird ringing centres	At least 2 bird ringing centres set up and integrated in international bird ringing schemes	Fully implemented. In 2010, the bird ringing centre was established, the national programme for ringing was prepared, rings produced and over 20,000 birds ringed.
B17	Assess the impact of invasive species and develop management strategies for these species.	Major invasive species assessed, and management plans developed	Significant steps taken but not all indicators achieved
B18	Identify biodiversity hot spots located outside protected areas and define tools for their conservation.	List of biodiversity hot spots published Recommendations for conservation and sustainable use outlined for most important sites	Fully implemented. The list for the Important Biodiversity Areas has been prepared and these areas grouped in accordance with habitats' types; 31 Important Bird Areas (IBA) have been identified in Georgia; 17 areas with the highest conservation value have been identified for inclusion into the Emerald Network (only a few of them are located outside existing PAs)
B19	Complete identification of	All Georgian IBAs approved and	Fully implemented.

	Important Bird Areas (IBAs) in Georgia (including transboundary IBAs) and define tools for their sustainable management	listed in international databases and publications. Management frameworks defined for most sites (including assigning protection status as appropriate) and activities started.	Important Bird Areas (IBAs) have been identified; The majority of IBAs are located within PAs
B20	Conduct a nationwide inventory of wetland ecosystems	Published database and ecosystem maps	No significant steps taken
B21	Develop a National Strategy for Wetlands	National Wetland Strategy	No significant steps taken
B22	Implement the existing Javakheti Wetlands Conservation Management Plan	Officially approved agreement between the neighbouring countries (Armenia, Georgia, Turkey) on a large-scale transboundary project achieved; Funds secured for the project; Implementation started.	Fully implemented. Javakheti Protected Areas is established. There is an official agreement between neighbouring countries on the large-scale transboundary project;
B23	Prepare a national programme on conservation of flood plain forests	National programme on flood plain forests conservation approved by the Government Concrete actions implemented	No significant steps taken
B24	Conduct pastureland inventory and assessment relative to carrying capacity, and out in place measures to promote rehabilitation of degraded pastures.	Most pasture lands categorised and mapped; Optimum grazing levels defined and enforced by relevant legal instruments Pilot pasture restoration activities underway	No significant steps taken
B25	Assess the Surami Range as a biological corridor and define management tools for its sustainable use.	Surami Range management plan published Activities initiated.	No significant steps taken
B26	Assess Gombori Range as a biological corridor and define management tools for its sustainable use.	Gombori Range management plan published Activities initiated.	No significant steps taken
B27	Continue the implementation of the Arid and Semi-arid Ecosystems Management Plan	At least 75% of the activities outlined in the Arid and Semi-arid Ecosystems Management Plan implemented.	Fully implemented. The Arid and Semi-arid Ecosystem Management Plan is being implemented.

B28	Establish a captive breeding conservation centre and strengthen existing botanic gardens.	Programmes to restore and/or strengthen botanic gardens approved At least one of the programmes implemented as a pilot project Captive breeding conservation centre established	Significant steps taken but not all indicators achieved. Seed bank has been created in Batumi Botanical garden to carry out ex-site conservation of endemic species
B29	Assess the plant species subject to international trade and define collection and export quotas for these species.	Internationally traded plant species assessed Quotas for collection and export are defined.	Significant steps taken but not all indicators achieved. Collection and export quotas for the plant species subject to international trade have been determined
B30	Determine harvest quotas for non-game species of wild animals.	Officially approved harvest and export quotas for non-game species of wild animals	No significant steps taken

Strategic Goal C: To conserve Georgian agricultural biodiversity through ensuring its sustainable use and by promoting of *ex-situ* and *in-situ* conservation measures.

Specific Objectives	Progress
To improve capacity for the recovery and preservation of, and research into, agricultural biodiversity	There has been some progress in terms of improving national expertise in agricultural biodiversity conservation and management and strengthening research institutions dealing with agricultural biodiversity research and conservation (see activities C7 and C8 below).
To create an agricultural biodiversity inventory and a red list of Georgian domestic plants and animals	No progress
To conduct research and conservation relating to the wild relatives of native domestic species and varieties	Some research has been implemented by various research groups, especially regarding crop wild relatives
To promote agricultural biodiversity, its products and associated traditions, as well as national and international knowledge of the use of agricultural biodiversity	Some promotional activities have been implemented by NGOs
To evaluate Georgian agricultural biodiversity as part of the national cultural heritage.	No progress

#	Activity	Indicator	State of Implementation
C1	Develop a national agricultural biodiversity conservation	National programme of agricultural biodiversity	No significant steps taken. The Ministry of Agriculture is

	programme with active participation of public organisations	conservation officially approved	not a responsible body for conservation activities
C2	Develop a legal basis for the conservation and wise use of agricultural biodiversity	Georgian biodiversity declared as national cultural heritage; Relevant legislation that ensures conservation of agricultural biodiversity developed	No significant steps taken.
C3	Strengthen the capacity of relevant governmental agencies through (among other mechanisms) provision of specialised training	Professionalism of relevant staff increased; An agricultural biodiversity division established at the Ministry of Food and Agriculture	No significant steps taken. The Ministry of Agriculture is not a responsible body for conservation activities
C4	Conduct an inventory of Georgian agricultural biodiversity, create a Red List of domestic plants and animals and develop concrete action plans for endangered species and varieties.	Red list of Georgian domestic plants and animals published; Action plans for endangered domestic species and varieties created	No significant steps taken. The methodology of the assessment of the vulnerability (need and emergency of conservation) of the CWRs is known by Georgian scientists; In the frame of international projects prioritization is determined for CWRs of field crops of Samtskhe-Javakheti region.
C5	Create a database of Georgian agricultural biodiversity	Easily accessible data base of Georgian agricultural biodiversity established	No significant steps taken. The Gene Bank of the Institute of Farming and the Institute of Horticulture, Viticulture and Oenology of the Agricultural University of Georgia have e-databases for the accessories maintained in their collections, however catalogues of these data basis are not published.
C6	Improve control of export and import of genetic resources, including through the strengthening the capacity of relevant agencies.	Capacity of Georgian customs to control export/import of genetic resources improved	Significant steps taken but indicator not achieved. Movement of living organisms and genetic material is controlled by State Revenue Service
C7	Improve national expertise in agricultural biodiversity conservation and management	Sufficient in-country expertise in agricultural biodiversity conservation and management in place	Significant steps taken but indicator not achieved. In the frame of the different international projects Georgian scientists attended various trainings

C8	Strengthen research institutions dealing with agricultural biodiversity research and conservation.	Capacity of research institutes related to agricultural biodiversity improved	Significant steps taken but indicator not achieved. Gene bank of field crops is operational since 2006 at the I. Lomauri Institute of Farming of the Agrarian University of Georgia
C9	Rehabilitate or improve existing collections, selection stations and seed farms	Availability of agricultural biodiversity genetic resources to farmers and research programmes improved	Significant steps taken but indicator not achieved. The collections of I. Lomauri Institute of Farming of the Agrarian University of Georgia, of Tbilisi, Kutaisi and Batumi Botanical Gardens as well as collections of microorganisms at various research institutes were enriched with new accessories (see above); A non-commercial legal entity "Agro – National Centre of Production of Grapevine and Fruit Planting Material" was established, with rich collection of local fruit and grapevine varieties. Since 2011 the Centre is multiplying and distributing the planting material of local varieties to interested farmers and organizations for free; In the frame of the GEF/UNDP financed project Conservation and Sustainable Use of Georgia's' Agricultural Biodiversity 6 landraces of different species of grain crops, 5 landraces of different species of legumes and as well as 1 landrace of oil producing crop were reintroduced in Samtskhe-Javakheti region. On the demonstration plot of the Project local varieties of grapevine and fruits were collected and are multiplied with the purpose of the distribution of them to the farmers. For legume crops marketing chain developed. In the frame of the project financed by BP and administered by Eurasia Foundation the seed material of

			the local landrace of wheat – Akhaltsikhis (Meskhuri) Tsiteli Doli was multiplied, distributed to the farmers of Samtskhe-Javakheti and marketing chain for the production developed.
C10	Establish a framework for the future development of a national Gene Bank	Framework for National Gene Bank established	Significant steps taken but indicator not achieved. Gene bank of field crops is operational since 2006 at the I. Lomauri Institute of Farming of the Agrarian University of Georgia
C11	Create a data base of endemic and native species and varieties in order to establish national ownership	Endemic and native species and varieties are protected from bio piracy.	Some steps taken. The information regarding the landraces of agricultural crops and domestic animals is scattered in various field survey and study documents
C12	Set up mini-reserves for the conservation of wild relatives of domestic species and medicinal plants	Several mini-reserves established in different areas	No significant steps taken. The area with valuable CWRs where mini-reserves can be established are not defined
C13	Encourage traditional and organic agriculture especially in buffer (support) zones of protected areas and in high mountain areas	Increased share of organic farming in Georgian agricultural production; Number of officially registered organic farmers increased (up to 500)	Significant steps taken but indicator not achieved. 71 producers were certified as organic according to international standards in Georgia in 2011; among them is company Hipp Ltd which is supplied with organic apple by 1103 smallholder farmers (however only one certificate is issued on the name of the organization); "Kula" Ltd one of the main producers of processed fruit and vegetables products in Georgia started to produce organic juices (the number of suppliers is not known); The Georgian NGO, Biological Farming Association Elkana is working on the development of organic farming since 1994 and serves about 600 farmers. Since 2006 organic certification body "Caucascert" Ltd is operational in Georgia. Since 2008

			"Caucascert" Ltd has European accreditation, issued by German accreditation body DAP, and thus is authorized to issue certificates valid in the EU.
C14	Establish a Georgian agricultural biodiversity foundation dedicated to the conservation of agricultural biodiversity, related research and information exchange	Georgian agricultural biodiversity foundation established and rehabilitation of traditional varieties launched on local farms.	No significant steps taken
C15	Promote on-farm conservation of agricultural biodiversity	Local farmers growing at least 10% of endangered varieties of domestic plants	Significant steps taken but indicator not achieved. In the frame of the Project – Conservation and Sustainable Use of Georgia's Agricultural Biodiversity number of legume and grain crops were reintroduced on farmers' fields.
C16	Improve existing legislation to provide access to genetic agricultural biodiversity resources in accordance to the provisions of CBD	Legislation in place to provide access to genetic resources in full accordance with the CBD.	No significant steps taken.
C17	Encourage seed production by local farmers and facilitate seed exchange among them	Relevant changes introduced to the Law on Seed Circulation; At least 3 seed production farms operational	No significant steps taken.
C18	Develop effective mechanisms for information exchange and experience sharing within the country and internationally	Easily accessible information network exists; Web page prepared and placed on internet	No significant steps taken.
C19	Integrate agricultural biodiversity issues into general education	Supplementary textbook on agricultural biodiversity (officially approved by the Ministry of Education) published, and included in the list of compulsory textbooks	No significant steps taken.
C20	Organise training courses and workshops on agricultural biodiversity for various target groups	Workshops and training courses held in at least 3 priority regions	Fully implemented. Various workshops and training were held in the frame of different international projects
C21	Publish scientific and popular literature on agricultural biodiversity	At least 2 publications prepared annually	Significant steps taken but indicator not achieved.
C22	To produce TV and radio programmes, documentaries and	At least 2 TV programmes, 5 radio programmes, 5	Significant steps taken but

	newspaper publications on agricultural biodiversity	newspaper articles, prepared annually; At least 2 documentaries produced within 5 years	indicator not achieved.

Strategic Goal D: To promote sustainable hunting and fishing through adequate planning, restoration and protection of key biological resources

Specific Objectives	Progress
To ensure the maintenance of genetic diversity of game species	No progress
To maintain the populations of each game species at an optimal levels	No progress
To develop effective tools for protection of wild animals and control of poaching.	Some steps taken but then reversed. The establishment of the Environmental Protection Inspectorate under the MoEP in 2005 was a step forward but the inspectorate was abolished in 2011. Changes to legislation since 2005 have increased the pressure on commercial fish species in Georgia's Black Sea coastal waters and threaten to increase pressure on a number of species which are listed in the Red List of Georgia.

#	Activities	Indicator	State of Implementation
D1	Improve the licensing procedure for hunting of migratory birds	Changes in the relevant legislation officially approved	Fully implemented. According to the Law on Licenses and Permits, no licenses and permits on hunting of migratory birds have been issued since 2005. The interested persons are obliged to pay a tax on hunting of migratory birds to the relevant bank account. During hunting the hunters should have the relevant check, as well as the documents on firearms and ID card. These amendments helped avoid quite an inconvenient procedure of issuing a license on hunting of migratory birds that was triggering huge discontent among the hunters.

D2	Define hunting quotas for migratory birds and conduct studies on hunting (to identify sites where wildfowling will be permitted and those where all hunting should be banned, based on bird counts on these sites)	Hunting quotas and list of sites officially approved	No significant steps taken
D3	Define special (higher) fees for trophy kills	Relevant amendments introduced to legislation	No significant steps taken
D4	Identify the list of birds of prey which can be used in falconry and define quotas for these species.	Relevant amendments introduced to legislation.	No significant steps taken
D5	Restore the former Agency of Hunting Control and set up public inspection schemes.	Legal basis for these changes established	No significant steps taken
D6	Provide professional training to government officers and hunting farm employees.	Numbers of government officers and hunting farm employees show improved skills and knowledge as a result of training	No significant steps taken
D7	Publish leaflets and/or brochures that explain hunting seasons and quotas with special emphasis on rare game species.	Relevant publications prepared and distributed among hunters.	No significant steps taken
D8	Develop the concept of traditional hunting	Additions to the legislation concerning traditional hunting put in place	No significant steps taken
D9	Restore or establish hatcheries dedicated to the recovery of native fish species using modern technologies.	Fully equipped hatcheries using modern fish breeding techniques established.	No significant steps taken
D10	Ensure that income generated from the use of biological resources may be used for conservation and renewal of these resources.	Relevant amendments to legislation put in place	No significant steps taken

Strategic Goal E: To develop a biodiversity monitoring system and an active and integrated biodiversity database to ensure sustainable use and conservation of biological resources.

Specific Objectives	Progress
To enhance the legal base for biodiversity monitoring	Two Ministerial Orders on the National Biodiversity Monitoring System (NBMS) have been adopted so far: Ministerial Order (22.05.2009) on the approval of the indicators of the NBMS and their standard forms as well as on the NBMS Coordination

	Committee to ensure the establishment of the NBMS. Ministerial Order (20.12.2010) on the approval of the methodologies of 17 indicators of the NBMS. A draft of a new Ministerial Order, which should replace the above-mentioned Ministerial Orders, has been prepared and was agreed internally in the MoEP in September, 2012. The order should approve all 26 biodiversity indicators, their methodologies and the procedure and rules of the implementation of the NBMS in Georgia. Currently the formal procedures to finalize the adoption of this new order are stopped due to organizational changes.
To strengthen the role of the Environmental Ministry in the field of biodiversity monitoring	The MoEP employed a NBMS Coordinator, who is responsible for the coordination of all steps within the implementation of the NBMS. The NBMS Coordinator is supported by the staff of the Biodiversity Protection Service (BPS) and backstopped by an international expert. The MoEP established a NBMS Steering Committee, which consists of various representatives of governmental and non-governmental organizations as well as scientific and international organizations. On the basis of the monitoring results, the NBMS Steering Committee should develop recommendations for improving the policies and the legal framework of biodiversity protection. A Memorandum of Understanding (cooperation agreement) on sustainable cooperation in the field of biodiversity monitoring in Georgia was signed on 27.05.2011 between the MoEP and the following institutions: - Ilia State University - Ivane Javakhishvili Tbilisi State University - WWF Caucasus - IUCN Caucasus - The Greens Movement of Georgia
To create a regularly up-dated biodiversity data base	In the frame of the data evaluation, a database for each biodiversity indicator of the NBMS has been prepared. These databases are updated on a regular basis. However, not all indicators need to be measured on a yearly basis. Therefore, a specific Biodiversity Monitoring Plan, indicating the monitoring schedule for each biodiversity indicators, will be elaborated.
To provide systematic reports to the general public about the status of biodiversity	The public will be informed about the status of biodiversity through:

	- Annual reports on NBMS, - BioTrends (describing the monitoring results on the individual biodiversity indicators), - NBMS Webpage.
To designate an independent entity responsible for biodiversity data analysis and for the development of recommendations from monitoring.	The establishment of the NBMS is a governmental initiative under the guidance of the MoEP. Within the MoEP the BPS, is the division in charge of the NBMS. On behalf of the BPS, the NBMS Coordinator is coordinating all steps of the implementation of the NBMS. For the calculation of the biodiversity indicators various governmental and non-governmental organizations are providing raw data on a regular basis to the BPS. The cooperation with some of these organizations has been strengthened by concluding cooperation agreements with the MoEP. On the basis of the monitoring results the NBMS Steering Committee should elaborate recommendations for improving the policies and the legal framework of biodiversity protection in Georgia. In addition to that, the proposals of the NBMS Steering Committee should help to prepare the ground for the implementation of priority actions, e.g. through identification of governmental funds, national fund-raising and through the use of international technical and financial co-operation. Due to organizational changes the NBMS Steering Committee will be partly re-nominated.

#	Activity	Indicators	State of Implementation
E1	Improve legislation to provide for clear distribution of functions and responsibilities among relevant institutions;	(No indicator specified)	Fully implemented. Two Ministerial orders (2009, 2010) on biodiversity monitoring have been adopted so far. They will be replaced by a new Ministerial Order, which is currently under preparation. The new Ministerial order will approve all 26 biodiversity indicators, their methodologies as well as the general procedure and rules of the implementation of the NBMS in Georgia.
E2	Designate governmental and non-governmental agencies responsible for the coordination and/or implementation of biodiversity monitoring	(No indicator specified)	Fully implemented. Within the MoEP the BPS, is the division in charge of the NBMS. On behalf of the BPS, the NBMS Coordinator is coordinating all

			steps of the implementation of the NBMS. The position of the NBMS Coordinator was established in 2010. By signing a Cooperation Agreement (Memorandum of Understanding: 27.05.2011) with the MoEP, universities and NGO showed their willingness to contribute in the long-run to a successful implementation of the NBMS. In the frame of the German Technical Cooperation local grant contracts have been concluded to enable organizations to be involved into the NBMS (indicator S6).
E3	Establish (or designate a special entity that will act as) a biodiversity monitoring information centre	Fully equipped biodiversity monitoring information centre set up	No significant steps taken. Due to a lack of space in the MoEP, the first attempt on setting up a Biodiversity Information Centre failed in 2010.
E4	Develop methodological guidelines for biodiversity monitoring with (i) unified methods of data collection, storage and analysis and (ii) identified target components for monitoring	Information on (i) guidelines and approved methods of biodiversity monitoring and (ii) a list of key biodiversity components presented in an official publication of the Ministry of Environment	Fully implemented. For each biodiversity indicator an indicator sheet, including the definition and the significance of the indicator as well as the specific methodology for data collection and data evaluation has been elaborated. All technical and organizational aspects of the NBMS are summarized in detail in a NBMS Manual, which is continuously updated by the NBMS coordinator.
E5	Designate agency(s) with sufficient qualifications and capacity for analysing biodiversity data;	Official designation of agency(s) identified through a tender; Regular reports of biodiversity monitoring giving concrete recommendations.	Fully implemented. The NBMS coordinator is in charge of the analysis of the biodiversity data. In this task the Coordinator is supported by an Integrated CIM Expert and the staff of the BPS.
E6	Strengthen the capacity of responsible agencies with an emphasis on improving the	Qualifications of key personnel of different agencies improved as a result of specialised training;	Fully implemented. The NBMS coordinator is backstopped and supported by

	qualifications and skills of key personnel	Responsible agencies fully equipped to implement biodiversity monitoring activities within their responsibilities	an international expert (CIM expert). In addition to that, the NBMS Coordinator as well as some staff of the BPS participated in training on indicator calculation and evaluation provided by the company Hintermann&Weber, which is implementing the national biodiversity monitoring for Switzerland.
E7	Compile and organise in a single database all existing information on biodiversity gathered and stored by different agencies up to now	(No indicator specified)	Fully implemented. For all 26 biodiversity indicators a specific database, consisting of the raw data and the evaluated data, has been prepared. These databases are updated according to the monitoring schedule of each indicator.
E8	Ensure publicity of the results of biodiversity monitoring through systematic information exchange and reporting to the general public and interested parties	(No indicator specified)	Fully implemented. The results of the NBMS are published by: • BioTrends (BioTrends is a series published by the GIZ Biodiversity Program in close consultation and co-operation with the Biodiversity Protection Service. Through the BioTrends decision makers but also the public should be regularly informed about the indicator based monitoring results. • NBMS Webpage • Annual NBMS Reports
E9	Begin monitoring of key components using official guidelines and methods.	(No indicator specified)	Significant steps taken. The NBMS consists of 26 biodiversity indicators, which have been selected according to the internationally accepted OECD Pressure / State / Response model. The indicators have been identified during several Multi-Stakeholder Workshops which took place in 2007. So far 8 indicators have been calculated

			13 indicators are in process of calculation 2 indicators cannot be calculated as there are no data available at the moment. Due to a lack of personnel and financial resources the indicator S6 (Species Diversity in Landscapes) cannot be calculated in the near future. However, the methodology for this indicator has been elaborated and already tested on a pilot basis. As the indicators S3 (Population sizes of selected species) and S4 (Population sizes of common birds) are strongly connected with the indicator S6, the survey and the data evaluation also for these indicators currently cannot be ensured.

Strategic Goal F: To protect both the human population and biodiversity from potential threats from genetically modified organisms (biotechnology), through the strengthening the law and through increasing public involvement in decision making.

Specific Objectives	Progress
To a create a sufficiently strong legal basis to address biosafety issues in the country	Between 2005 and 2008 there was significant progress towards the adoption of legislation on biosafety but there activity has been frozen.
To develop effective official and public control mechanisms	No progress
To ensure the transparency of any initiatives involving GM organisms or products	No progress

#	Activity	Indicator	State of Implementation
F1	Prepare for ratification of the Biosafety protocol	Biosafety protocol ratified	Fully implemented. Georgia joined Cartagena Biosafety Protocol on September 26, 2008, by virtue of the Parliamentary Decree.
F2	Prepare a draft law on biosafety and organise public hearings on this	Law on biosafety adopted	Significant steps taken but indicator not achieved. In 2005 draft law On Genetically Modified Organisms has been

			prepared. Consultations have been conducted with international experts and local non-governmental organizations who supplied remarks and recommendations. Though, because of basic legislative and institutional changes that occurred shortly after elaboration of the draft law, certain regulations, procedures and competences of the draft law became incompliant with the legislation in force. In 2008 Ministry of Economic Development prepared draft Decree on Protection of Biodiversity in Georgia, establishing permit and license issuing procedures in accordance with legislation in force. In November 2009, by decree of the Minister of Environment Protection and Natural Resources working group has been established to pursue preparation of legislative framework related to genetically modified organisms (Decree of the Minister of Environment Protection and Natural Resources #i-587, 27/11/2009). By conditions of the decree, the working group should have elaborated draft law on Genetically Modified Organisms by May 1, 2010, though work on updated draft law hasn't yet been completed.
F3	Develop biosafety control mechanisms and designate or set up a responsible agency	Transparent control mechanisms in place; Agency responsible for controlling all risks associated with import, use and release of GM organisms designated or established	No significant steps taken.
F4	Strengthen the national capacity for enforcing biosafety	At least one laboratory capable of detecting content of GM organisms in raw materials as well as in products in existence	Significant steps taken but indicator not achieved. Following laboratories have appropriate GMO detection equipment: 1. Certification Body of the Institute for Horticulture, Viticulture and Wine Making -

			Testing Laboratory - laboratory being accredited with Legal Entity under Public Law - The Unified National Body of Accreditation - Accreditation Centre to carry out GMO analysis 2. Ivane Beritashvili Experimental Biomedicine Centre Genome Structure and Function Laboratory 3. Ivan Javakhishvili Tbilisi State University Exact and Natural Sciences Faculty Biology Department Laboratory However above mentioned laboratories are not fully equipped for quantity and quality detection of GMOs.
F5	Prepare education programmes and organise workshops for different target groups	At least 2 workshops held annually	Significant steps taken but indicator not achieved.
F6	Organise regular TV and radio programmes and press conferences on biosafety	At least 3 TV and 4 radio programmes produced and 2 press conferences held annually	Significant steps taken but indicator not achieved.
F7	Integrate biosafety principles into general education programmes	A supplementary textbook of biosafety produced which is officially approved by the Ministry of Education and is included in the list of compulsory textbooks	Significant steps taken but indicator not achieved. According to National Curriculum, approved of by the Minister of Education and Science Decree #36/B of March 11, 2011, to remain in force till 2016, subjects of modern biotechnology and genetic engineering have been introduced into biology curriculum for intermediary level (10th to 12th grades).
F8	Produce publications on biosafety in the Georgian language	At least 3 publications produced during 5 year period	Significant steps taken but indicator not achieved.
F9	Develop effective mechanisms for information exchange within the country and internationally	Easily accessible information network established; Web page prepared and placed on internet	No significant steps taken
F10	Set up a public biosafety monitoring system	A work plan for biosafety monitoring and relevant indicators prepared by the end of 2004; At least 2 public institutions	Significant steps taken but indicator not achieved. Since 2002 Greens movement of Georgia carries out surveys among food producers and

		working on biosafety issues.	importers in order to find out attitude of different companies towards use of genetically modified ingredients and inform the public upon the findings. Apart from that, the movement, with support of its foreign partners follows developments abroad and spreads information about any hazards through Georgian press. One of the indicators selected within the national system of bio monitoring under construction now, is changes in total amount of imported GMO seeding stock. It is necessary to define measure required to start collecting and processing data.

Strategic Goal G: To raise public awareness of biodiversity issues and to encourage public participation in the decision making process

Specific Objectives	**Progress**
To include biodiversity and sustainable use principles into school curricula.	Objective achieved (see activity G15). The challenge now is to ensure that school curricular are regularly updated in relation to biodiversity and sustainable development.
To increase the circulation of biodiversity information in rural areas.	There has been a significant increase in the circulation of biodiversity materials in rural areas since NBSAP 1 was adopted (see activities G2, G4 and G4a below). However there are many people in rural areas who have not been reached by the information which has been circulated and more needs to be done to communicate with those target groups.
To improve the use of international experience in environmental education.	International experience was used in the development of new school curricula (see activity G15) and is being used in the development of the environmental education programmes implemented by the Ministry of Environment Protection and Agency for Protected Areas.
To increase the role of the media in ecological education and strengthen conservation information dissemination.	Significant efforts have been made to strengthen the interest and capacity of the media in Georgia to report on environmental issues (see activity G5 below). However the coverage of environmental issues in broadcast and printed media is still limited.

To encourage the development of local NGOs focusing on conservation and environmental education.	The Biodiversity Protected Service of the Ministry of Environment Protection and the Agency for Protected Areas have carried various to encourage the development of local NGOs (see activity G2 below). "Friends associations" have been established to support a number of protected areas.

#	Activities	Indicator	State of Implementation
G1	Carry out a sociological survey of selected target groups to assess public awareness, understanding of biodiversity issues and knowledge of national and international legislation in the field	Results from sociological surveys indicating the scale and type of work needed to raise public awareness.	No significant steps taken.
G2	Organise an information campaign involving NGO's and local communities especially women and youth.	Information leaflets and brochures published; At least 2 campaigns conducted in each administrative region, all actively involving local volunteers.	Fully implemented. After the 2009 year, under the Biodiversity Protection Service of the Ministry of Environment is conducted awareness raising campaigns – "Garden Birdwatch" and "Species of Red List", which involved schoolchildren and teachers of public schools. In the minor zones of protected areas are conducted meetings with various stakeholders, lectures-seminars for different target and age groups, trainings and conferences for local community to raise their awareness by the Agency of Protected Areas. In the direction of public awareness it is important to conduct public awareness campaign in local and in national level and other activities for protecting and maintaining biodiversity by the non-governmental organization sector WWF the Caucasus representation, CENN, RECC, Nakresi, Georgian Green, Ecovision and other non-governmental organizations.
G4	Produce information materials (publications, videos, etc) on biodiversity and sustainable use.	Information materials (including scientific- popular publications) published;	Significant steps taken but indicators not achieved In recent years, under the

		At least two articles published in the press each year; Ten videos produced and shown on national and local television channels.	implemented programmes and projects had published the information and awareness raising materials on the Georgian biodiversity, including "Beautiful Georgia" the magazine, "Caucasus – Treasure of Nature" the book (CEPF). There have been regularly published different kinds of information and awareness raising material, which are promoted the Georgian protected areas. Movies were filmed on the national Park of Colchis (GEF/WORLD BANK), "Mountain Goat's Return" and a documentary film of the Georgian protected areas. However, the national and local TV-channels are rarely showing the film. And in general, to protect and preserve the biodiversity, the social and economic consequences of biodiversity lost is still less important issue for the media.
G4a	Produce a series of TV and radio conservation programmes with an emphasis on sustainable use of biological resources.	Series of conservation programmes on state TV and radio produced	No significant steps taken
G5	Organise media-tours and site-visits for increased engagement of journalists with local biodiversity issues.	At least two media-tours per year organised to each region for national and local media representatives	Significant steps taken but indicators not achieved Arrangement of media tours are mainly done by the Agency of Protected Areas. Under the support of CEPF the relevant consultations were made to the journalists who were interested in environmental issues by the Environment Protection Centre. There were conducted 11 trainings, in which were attended 120 journalist, 40 representatives of local government and 45 representatives of NGOs from Georgia and Azerbaijan. Also there were arranged the two

			transboundary media tours. CEPF has supported in Georgia the interesting initiative of Georgian Green Movement, which was directed at the development of cooperation between local government bodies and journalists. Under this Project a network of journalists was established in the two regions of Georgia, as well as there was conducted training for journalist and local authorities.
G6	Improve cooperation between local authorities and the public sector	Relevant facilities set up at the local offices of the Ministry of Environment for regular meetings with local public sector	No significant steps taken. In 2010 the regional branches of the Ministry of Environment Protection were abolished.
G7	Study traditional attitudes towards nature and prepare a popular publication on the subject	Results of desktop and field studies in all regions of the country; Publication on traditional attitudes towards nature in Georgia produced	Significant steps taken but indicators not achieved. Under the support of Georgian Protected Areas Development Project (GEF/World Bank) have been published the brochure about Tusheti traditional activities.
G8	Promote protected areas through a special publication dedicated to (1) the role and importance of protected areas and (2) existing protected areas and (3) future perspectives.	A special publication on the subject produced	Fully implemented. There is regularly published the various kinds of information and awareness-raising materials that are promoted the Georgian Protected Areas.
G9	Set up a nationwide network of fully equipped libraries offering information on biodiversity (publications and conservation films in the Georgian language).	At least 4 fully equipped libraries set up at Regional Offices of the Ministry of Environment	No significant steps taken. On the one hand, the regional divisions have been abolished since 2010, and on the other hand, there was no attempt to create such library in the central level.
G10	Organise environmental events and actions (including quiz shows, competitions, so called “alpiniads” (excursions) with substantial education components.	Environmental actions and events organised throughout the country.	Significant steps taken but indicators not achieved. Organizing spectacular events are made by the Ministry of Environment and as well as by the non-governmental sector and is mainly dedicated to the protection of biodiversity on the

			celebration of international days.
G11	Organise biodiversity workshops for the general public in different parts of the country	At least one workshop held in each region	No significant steps taken.
G12	Organise regular meetings with representatives of the Governmental, public and business sectors in order to encourage multilateral cooperation and identification of common interests	Meetings held annually	Significant steps taken but indicators not achieved. The Public Council is created by the Ministry of Environment Protection, which members are representatives of NGOs, Council meetings are hold regularly. By the initiative of the Ministry of Environment Protection there is also created the "Green Club", which brings together students from different universities. However, the protection of biodiversity-related issues is rarely discussed in these forums.
G13	Set up biodiversity management and conservation training facilities for a wide range of target groups	Facilities for professional training in biodiversity management and conservation established	Significant steps taken but indicators not achieved. At least 11 universities offer subjects that contain biodiversity issues in their various educational programmes.
G14	Provide special biodiversity training for school teachers in different regions of the country	At least 35% of local teachers have participated in the programme	Significant steps taken but indicators not achieved. Since 2009 the teacher training programmes have been going under the education reform. Under the reform there have been developed professional standards for teachers (additional detailed guidelines are currently under preparation) and the teachers were able to pass the trainings in order to improve as teachers as well as the technical skills. These trainings of teachers partially contain the environmental issues. In addition, The Ministry of Environment Protection (and its subordinated institutions – NNLP Agency of protected Areas and Biodiversity Service) carries out certain programmes on biodiversity issues and especially

			for awareness-raising about the protected areas. Their target groups generally are the school teachers of Biology and Geography under a different campaign. But now the size of that campaign is not large (about 120-500 teachers).
G15	Integrate biodiversity principles at all levels of education (pre-school, primary, secondary and higher).	Biodiversity principles integrated into training programmes at all levels of education	Fully implemented. Pre-school education advisory content is defined by the "Early learning and development standards" that was developed in 2010 with the support of UNICEF by the NNLP National Curriculum and Assessment Centre and include five areas of the learning and development (namely, health and physical development, cognitive development and general knowledge, approach to learning, speech development, social-emotional development) for 0-1, 1-3, 3-5 and 5-6 years age groups. The environmental issues are clearly laid out in the standards and include the results of study, which focuses on formation of children's environmental consciousness and positive attitude to the natural environment80. Pre-education programme is based on this standard as well 81, the achievable results under it include five areas of study (including "World Perception"), and the biodiversity issues take a huge place in it. The content of education and learning outcomes related to the environmental and biodiversity issues, on the one hand, are integrated into the national curriculum of competences (the National Education Plan 2011-

80 "Nature and Technologies" one of the sub-issues of the "Cognitive development and general knowledge" means that the Child's ability to understand and study physical environment, to observe, explore, conduct experiments on the processes, which have the visible result. In addition, by the taking knowledge about environment, the child receives the information, e.g. about "The Earth and Living Nature", and with the development of critical thinking the child use this knowledge in practice. (Early learning and development standards, 2010)

81 Pre-school Education Program ISBN 978-9941-0-1521-2 © National Curriculum and Assessment Center. 2011

			2015 came into force in 2010-2011 school year), and on the other hand, it is given and included interdisciplinary into the different subjects of curriculum at all three levels: primary, basic and secondary. The National Curriculum identifies nine priority areas which are integrated into the whole course of general education during teaching the different subjects, which includes "national objectives of general education and requirements of public" and "their knowledge is essential for self-realization and establishing the appropriate place in the modern world". An environmental literacy is one of the abovementioned competencies: " An environmental literacy means development the healthy attitude of person to the environment, which means that student must understand the personal responsibility to the processes going in environment, be able to participate in its protection and restoration"[82] Beyond the competencies environmental education and training courses are mainly consolidated in two blocks of subjects: in natural and social sciences. In the natural sciences block (Natural Science, Fundamentals of Natural Science, Biology, Chemistry, physics) are seven main areas: Living world at the primary stage (Biology introduction), the earth and outside the world (Geography and Astronomy), Man and Environment (fundamentals of Public Education), body and events (elements of the Physics and Chemistry), and as well as at the basic and secondary stages the scientific research, natural

[82] 2011-2016 Curriculum. Chapter VIII. Article 48.

			events (fundamentals of Physics) and chemical effects (fundamentals of Chemistry), the first three of them include information about the issues of biodiversity, threats to biodiversity and biodiversity conservation. Also, 3 of the 11 directions of the Social Sciences (Our Georgia, Geography, Civic Education, safety in emergency situations, etc.) include the biodiversity. The expected change in the national curriculum, in 2012 includes the addition of new subjects into the subject elective block of the national curriculum: "Environment and Sustainable Development", "Natural Monuments Monitoring" and "Conservation Biology". The first contains two modules (I module: "Environment and Sustainable Development", II module: "GeoEcology and Environmental Management"). In the elective courses the great importance has the teaching of biodiversity and conservation approaches (Eka Slovinski, 2012). In Georgia about 11 universities offer different levels of vocational and higher education (professional, bachelor's, master's and doctoral) in the neighbouring specialties of Biodiversity and Environment protection (These programmes have at least one mandatory module on the biodiversity issues).
G16	Develop supporting textbooks on biodiversity for all levels of education (pre- school, primary, secondary and higher).	At least one biodiversity textbook published and officially approved for each level of education.	The question is asked very general. it is difficult to evaluate whether the action is executed.
G17	Create visual education materials (illustrated literature, games, animated films) for the pre-school age group.	Existing materials translated into Georgian; Original materials developed as appropriate including publications, games, films, etc.	No significant steps taken
G18	Set up biodiversity societies (or	As a pilot project several schools	No significant steps taken

	clubs) at schools	with biodiversity societies and equipped rooms	
G19	Organise mobile biodiversity demonstration rooms for regional schools.	Special mobile biodiversity demonstration rooms established; A series of trips to regional schools launched	No significant steps taken
G20	Organise eco-camps for high school and university students.	At least 4 eco-camps organised	Fully implemented. The arrangement of Eco-Camps was supported by the programmes and projects that were implemented in Georgia in the last years, including "The Georgian Protected Ares Programme" (GEF/WB), CEPF. Eco-Camps are regularly organized by the Agency of Protected Areas of Georgia.
G22	Introduce changes into the law on advertisement of Georgia to facilitate greater allocation of TV and radio advertising time to biodiversity problems.	Relevant amendments to the legislation submitted to the Parliament	No significant steps taken
G23	Set up courses in eco-journalism	One major university running a special course in eco-journalism (as a pilot project)	No significant steps taken
G24	Set up courses in environmental law	One major university running a special course in environmental law (as a pilot project).	Significant steps taken but indicators not achieved. "Environmental Law" (elective courses) are taught at the Sukhumi State University (LLM Programme) and at Ilia State university (Bachelor's programme in Law), as well as "International Environmental Law" is taught at Iv. Javakhishvili Tbilisi State University (Bachelor's programme in international law). Also the study of international environment law is scheduled to teach at least at two other universities.
G25	Design a web page about the NBSAP for better publicity	NBSAP web page prepared and placed on the web.	Significant steps taken but indicators not achieved. The condition of the biodiversity strategy implementation is

			assessed in the 4th report of Georgia of biodiversity convention, its electronic version is placed on the following web-site: http://www.chm.moe.gov.ge/index.php?page=konvenciebis_daregva&lng=ge_ It is possible to place more detailed information on this web-site about the conditions of implementing documents obtained during the NBSAP updating process.

Strategic Goal H: To ensure appropriate financial and economic programmes are in place in order to support effective conservation of biodiversity, and to ensure the delivery of the BSAP	
Specific Objectives	**Progress**
To formulate an indicative economic plan for biodiversity conservation, based on international experience, and ensuring regional and local application	No progress.
To bring the budget law and tax law in line with environmental legislation of Georgia, to ensure economic mechanisms such as environmental insurance and eco-labelling are introduced, and that environmentally friendly technologies are promoted.	No progress.
To create additional financial mechanisms to promote biodiversity conservation (taking into account the risk factors facing protected areas, the need for insurance mechanisms to indemnify financial risks, and the opportunity for cross-sectoral debate between state crediting institutions and ministries.	No progress.
To take into consideration the main aspects of biodiversity conservation when formulating economic policies. To assess and value biodiversity in protected areas using new methods and techniques.	Valuations were carried out in two PAs (see activities H4 and H5 below).
To create sustainable economic mechanisms for the conservation of biodiversity.	No progress.
To provide economic incentives for low-waste production methods and for waste treatment.	No progress.

#	Activity	Indicator	State of Implementation
H1	Collect data necessary for the valuation of biodiversity *(including opinion surveys with key stakeholders, identification of primary risk factors and use of internationally accepted methods)*	Reliable, relevant and accessible information available	No significant steps taken
H2	Evaluate the economic structure using macroeconomic and sector-specific strategies	Macroeconomic assessment available	No significant steps taken
H3	Study the impact of economic policies and economic activities on biodiversity	The extent of impacts of economic policies and activities determined	No significant steps taken
H4	Identify and estimate the benefit to major sectors of products and services derived from biodiversity and analyse its use	Benefit derived from biodiversity conservation calculated	Economic valuations of ecosystem services were carried out in Tusheti Protected Areas and Borjomi-Kharagauli National Park in the framework of the TEEB pilot project.
H5	Conduct economic assessment of the consequences of the loss of biodiversity	Damaged caused by loss of biodiversity calculated	Economic valuations of ecosystem services were carried out in Tusheti Protected Areas and Borjomi-Kharagauli National Park in the framework of the TEEB pilot project.
H6	Estimate financial needs for biodiversity conservation based on valuation assessments	TEV calculation completed	No significant steps taken
H7	Plan for biodiversity conservation management based on economic indicators	An economic plan for the promotion of biodiversity developed	No significant steps taken

Strategic Goal I: To further improve national legislation (and associated institutions) relating to biodiversity conservation, through the creation of new, and elaboration of existing laws and regulations, and through ensuring harmonisation to international legal responsibilities.

Specific Objectives	Progress
To adopt new laws and regulations	Various new laws and regulations have been adopted and amendments made to existing legislation since the adoption of NBSAP 1. Some of the new legal acts and amendments have improved the governance of the conservation and use of biodiversity, others weakened governance (e.g. regulations related to bottom trawling and parameters of fishing nets;

	regulations related to hunting of Red List species).
To harmonise national legislation with international law	No significant steps taken
To improve the effectiveness of institutional systems through further elaboration of legal mechanisms (including normative acts on institutional issues)	No significant steps taken

#	Activity	Indicator	State of Implementation
I1	Develop a new law on Vegetation	(No indicator specified)	No significant steps taken
I2	Adopt a law on the Red List of Threatened Species	(No indicator specified)	Fully implemented. Under the auspices of the Academy of Science of Georgia the National Commission on Endangered Species has been established, which elaborated new Georgian Red List in 2005. The list consists of 197 species, of which 141 are animal species and 56 – plant species; Furthermore, The Caucasus plants "Red List" has been elaborated
I3	Develop a law on Agrobiodiversity	(No indicator specified)	No significant steps taken
I4	Develop a law on Ecological Insurance	(No indicator specified)	No significant steps taken
I5	Develop law on Ecological Auditing	(No indicator specified)	No significant steps taken
I6	Develop law on Biodiversity Monitoring	(No indicator specified)	See the tables for Strategic Goal E: (biodiversity monitoring) above.
I7	Prepare and adopt a new law on Forest Privatisation	(No indicator specified)	No significant steps taken
I8	Create legal mechanisms for economic incentives for sustainable use of biodiversity	Normative act the national biodiversity fund developed	No significant steps taken
I9	Create legal framework for the establishment of the national Taxon Advisory Group	Normative act to legally underpin the national Taxon Advisory Group established	No significant steps taken
I10	Create legal mechanisms for harmonisation of national legislation with international law	Presidential order based on which interdisciplinary group will be established at the Ministry of Justice to deal with these issues	No significant steps taken

Strategic Goal K: To conserve forest biodiversity through sustainable forest management

Note: There was no action plan for the conservation of forest biodiversity in NBSAP 1.

Specific Objectives	Progress
To develop sustainable forest policies and management strategy, based on an ecosystem approach	Several drafts of a forest policy and strategy have been prepared since 2005 in the framework of various projects and initiatives by the Government of Georgia; however, none has been formally adopted. Adoption of a forest policy and strategy with participation of all key stakeholders based on an ecosystem approach and sustainability principles remains a priority for the conservation of forest biodiversity.
To introduce forestry regulations and methodology that take into consideration biodiversity issues and the principles of sustainable use To elaborate standards, methods and rules on forest inventory, cadastre, management planning and use in line with sustainable development and biodiversity conservation requirements	Some regulations (for instance logging rules) have been introduced in legislation; however, this is not sufficient for adequate protection of biodiversity. A draft of a national sustainable forest management standard (with principles, criteria, indicators and verifiers) has been prepared for Georgia by a group of experts. Efforts have been made to adopt a new set of forestry regulations and standards that would address biodiversity-related concerns; however, no major progress has been made so far; the standard elaborated by the experts is voluntary and is based on FSC principles and criteria and addresses the needs of biodiversity conservation; it was prepared by a group of experts coordinated by WWF-CauPO and supported by GTZ (now GIZ). Elaboration and adoption of sustainability-based forestry legislation, standards (both mandatory and voluntary) and guidelines designed to safeguard biodiversity conservation remain a priority.
To develop indicators for sustainable forestry management that take into consideration local biodiversity conditions	See the progress reports against the specific objectives immediately above and below.
To establish a forest certification system for the sale of timber from sustainably managed sources	A draft of a national sustainable forest management standard (with principles, criteria, indicators and verifiers) has been prepared for Georgia by a group of experts. The standard is based on FSC principles and criteria and addresses the needs of biodiversity conservation; it was prepared by a group of experts coordinated by WWF-CauPO and supported by GTZ (now GIZ); however, no further steps have been made towards forest certification.

	The standard needs to be endorsed by FSC; in order to promote voluntary forest certification, it is important to formally establish a National Initiative; there is a good scope for cooperation with neighbouring countries in this issue.
To simplify and improve the organization of the timber licensing system and to regulate the forest use fees in a way to increase the financial income from forests, to help develop forest protection and management, and to attract increased financial investments	Based on the Forest Code (1999), long-term wood use licensing was launched in 2007; however, the private and public benefits from this system are still quite limited. The introduced licensing system includes several types of forest use by private companies, including the use of wood for 20, 10 and five years; this new system has experienced a number of difficulties and, as a result, only 5% of the forest fund is managed under the licenses; no progress has been achieved in terms of forest use fees, especially for non-wood products. Further steps that need to be taken are clearer specification of the rights and responsibilities of the license holders; adopting and implementing advanced forestry regulations and standards; to adopt new regulations on forest use fees, taking into consideration the interests of all stakeholders
To establish a moratorium of timber extraction from old growth forests, and those of high conservation value (HCVF) and to use the priority principle with respect to these forests	Although there exist some legal provisions on HCVFs, no detailed management prescriptions (including restrictions of logging in ecologically sensitive areas) have been elaborated and implemented. Further steps that need to be taken are identification and mapping of HCVF and elaborating management prescriptions for these forests; old-growth forests should be assigned a special protection regime; categorization system of Forests Europe could be interesting; this system encompasses protected and protective forests; for the first category, the purpose of management is biodiversity conservation, which is consistent with IUCN I, II and IV categories; the second category envisages the protection of landscapes and special natural features; management objective in the third category is maintenance of protective functions of forests.
To elaborate and implement programs on restoration of degraded forests and reforestation, in order to increase the forest cover and restore forest types, which had been degraded or destroyed.	Only a few reforestation projects have been implemented. In recent years, the state forest authorities could not conduct forest restoration due to the lack of funding; only a few projects on the restoration of natural forest landscapes have been implemented by WWF, GIZ, REC and other organizations on a pilot basis; the total area restored is just a few hundred hectares. Further steps that need to be taken are the elaboration and adoption of guidelines on reforestation and forest transformation (from

	monocultures to close to nature forests with higher biodiversity); adoption of a program on implementation of these measures; making joint efforts to identify funds for the implementation of these programmes.
To establish managed plantations using native species; to prohibit reforestation and afforestation with introduced species.	Practically no plantations comprised of native species and managed for timber production have been established. No adequate legal provisions exist for promoting managed tree plantations of native species (e.g. *Alnus, Populus, Salix etc*); financial resources of the state forestry authorities are limited; the private sector has not demonstrated any significant interests. As an immediate priority - creation of favourable legal and economic conditions to encourage private investments in this field; in the longer term, the establishment of plantations managed by the state