Project: Sustainable Management of Biodiversity, South Caucasus

NBSAP N#10 Thematic direction:

“

Biodiversity of Internal waters“

Situation Analysis Report

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Resume

Internal waters was adopted as a CBD thematic area at the fourth meeting of the Conference of the Parties (COP) 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 is a signatory country to many international conventions and agreements, which obliges the country the responsibility for the biodiversity of internal waters, however, today there are many shortcomings in the implementation of international agreements in the field of internal waters biodiversity.

Georgia (and the whole Caucasus) is one of the biodiversity hotspots (from 34), which means that its biodiversity is of global importance, is very rich, unique and under the threat of degradation. It applies to both terrestrial and aquatic ecosystems. Georgia is rich in internal water resources; there are more than 26 thousand rivers, about 860 lakes, 12 water reservoirs and many fish farming ponds in the country. The internal waters of Georgia inhabit more than 80 species of fish, 100 species of crustaceans and 58 species of mollusks (data on other group of aquatic invertebrates is inaccurate and unreliable). Internal waters of Georgia are home to more than 2 600 taxa of algae. Wetland ecosystems of both the Kolkheti lowlands and the Javakheti plateau are important habitats for migratory birds with up to 300 species of birds have been registered in the Kolkheti protected territories and adjacent areas. A further 91 species have been registered at Javakheti lakes.

Problems of the protection and preservation of the environment are particularly acute and important in the modern age. To solve the issue of environmental protection successfully, to conduct sustainable management of natural resources and to make timely steps using the experience and proven modern technologies the general will of the State and civil society is necessary.

Georgian internal water bodies and biodiversity management is regulated by the Constitution of Georgia (Article 37) and number of laws, such as: Georgian Law on

Environment Protection (1996), Georgian Law on Water (1999), Law on Fauna (1996), Law on Red List and Red Book of Georgia (2003), Law on Permits of Environmental Impact Assessment (2007), Law on Ecological Expertise (2007) and other. In addition, there are adopted numerous bylaws, resolutions and decrees regulating the issues out of the scopes of the regulation sphere of the key laws.

Despite the fact that the Georgian Government has developed the existing legal framework and constantly conducts its improvement, it is still very far from perfect. There are a lot of shortcomings and a law enforcement issue still remains a major problem.

Apart from the basic legal framework there are very important Documents approved by the Government where some of the actions aimed at solving environmental problems are outlined. One of the most important documents is " Biodiversity Strategy and Action Plan of Georgia (NBSAP)".

In NBSAP which was adopted by the Cabinet of Ministers of Georgia on February 2, 2005 (Resolution #27, 19.2.05), there was not special action concerning to biodiversity of internal waters, although several action plans include the issues related to biodiversity of internal waters, such as: Protected areas, Species and Habitats, Hunting and Fishing. Action plans of this document, such as: Biodiversity monitoring, Environmental education, public awareness and public participation, Finance and economics; and Legislation and institutional development, include the actions related to internal waters biodiversity question, thought regarding to internal waters biodiversity almost nothing was implemented. Only the action: Establish protected areas on the Javakheti Plateau (A 3), from the strategic goal A was realized.

Lakes of Georgia are complied with long term licensing. The condition of ichthyofauna is assessed for licensing and specific conditions for fishing are defined. For the renovation 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 and 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). 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). The administrative organ issuing fishing licenses is the Agency of Natural Resources - the legal entity of the Ministry of Energy and Natural Resources. Internal water reservoir

licenses will be issued by auction. The basis for conducting an auction is: the statement of the license applicant, or the decision of the Administrative agency.

The agency with the help of the hired experts conducts preliminary studies of the reservoirs of the license issuance, carries out the study of ichthyological characteristic and determination of fish stocks and quotes. Hence, for today licenses have been issued on 6 reservoirs: Tabatskuri Lake, Nadarbazevi Lake, Jandari Lake, Tsalka reservoir, Santa Lake and Suldi Lake.

During the evaluation of the water reservoir condition very outdated methods are used, while methodological approaches are improved every year. Analyses of the methods used during the assessment of the water reservoir prejudice the quality of the present assessment and need to be overviewed, because it is impossible to carry out correct management by using wrong basic information.

It must be noted that there is a great inaccuracy in connection with quotes and stocks of the licensed water reservoirs, in most cases quotes and stocks coincide, which confirms once again the necessity of serious works to be carried out in this field.

For owners of licensed reservoirs is hard to find experts to carry out preliminary research of water reservoirs, they demand government support for the reservoir infrastructure development, the issue of poachers is unsolved as well, which is a serious problem for all interviewed. For this their demand is to intensify government control in regions and increase the staff of the environmental inspectorate who will regularly and seasonally control reservoirs.

Statistics of total scientific researches shows two very important problems. The first is the decrease of hydrobiological studies since 60-70 -ies which reached nearly to zero for the last years and it happened against the background of the exponential increase of the research intensity in any developed countries. It means the critical decrease of resources and government interests in this direction from one side and the small number of the professional staff to the other side.

The second important problem figured from the scientific literature analysis is that the 100% of publications are directed to the faunistic, floristic and ecological researches. Practically there are no researches based on the results of monitoring that means that there is no reliable data, no information to go by, on the bases of which figuring any kind of tendencies and making the long-term plans are possible from the point of view of the internal water stabile development.

If we take into consideration that foreign project-grant financing has been reasonably increased for the recent 10-20 years (according to the data of 2000-2012 the total budget dealing with the different aspects of inland water projects exceeded of several million dollars), then the small number of the fundamental researches or monitoring results (implying the results reviewed by international societies) will reveal the ineffective use of appropriate project amount.

There have been no inventorying or ecological assessments of the country's freshwater systems or wetlands. Many freshwater and wetland ecosystems remain completely unprotected and are prone to anthropogenic modification (water pollution, illegal fishin, dams), those threats in addition to alien invasive species leads to fragmentation of wetland ecosystems, resulted violated environment for bird and other species.

Fish resources are significantly decreased in internal waters of Georgia. Condition of the species of internal water ichthyofauna (accept sturgeon and the Black Sea salmon) among them endemic forms of the Caucasus ecoregion is unknown.

Main threats to the biodiversity of internal waters are: illegal fishery, the construction of the dams on the rivers, invaded species, efficiency of monitoring system, lack of qualified staff, water pollution etc.

Among violationsrevealed in environmental protection must be mentioned 272 cases in fishery in 1980, 494 cases - in 2009, 427 cases - in 2010, and in 2011 were revealed 231 ones. The pressure from the side of poachers on the Georgian internal water resources is obvious. While fishing the local poachers often use electric devices, poisoning and explosive substances that cause irreparable damages to the life of Georgian internal waters.

One of main threat for biodiversity of internal waters is dam construction. Big dams destroy fish and fishery. The reduction of fish species in head water dam (riverbed located in the upper of the dam, which coincide the reservoir as well) is invoked by blocking migration routes of fish with dams. As a result fish reproduction reduces on the one part, but on the other part fish movement in tail-water is broken off. In addition the water flow and quality is significantly changed in the water-tail, which negatively influence on fish species. As a result of above mentioned fish species in rivers are reduce or generally disappeared. The water ecosystem undergoes degradation. The present year is the year of the construction of huge dams, impact assessment of these objects environment requires much attention in order to avoid deplorable outcomes instead of improve economic situation.

Invasive species and the lack of their control are the threat to the biodiversity of internal waters. Monitoring of species such as crucian carp (*Carassius carassius*) is necessary. Crucian carp has appeared in Georgia as an invaded species in recent 30 years and at present it is widely spread in the internal waters of Georgia. Though its influence on the ichthyofauna of various reservoirs is unknown, accordingly types of taking measures couldn't be defined.

According to the present condition the problem is lack of monitoring system and qualified staff in this field. Old data and their small quantity, must be separately noted which considerably decreases setting of specific activities, which are necessary to be carried out for the sustainable fishery management.

Pollution of surface waters in Georgia by such organic substances as: phenol, hydrocarbon, copper, manganese, zinc and nitrates significantly exceed the permissible level. Until recent years surface waters of Georgia in lowland areas were strongly polluted by chemical fertilizers, industrial waste and sewage waters. The first two factors were considerably reduced because of the agricultural and industrial activity reductions. Though it is likely that there is still great much quantity of dangerous elements' (heavy metals) concentration at the bottom of the water reservoirs. At present the main sources of surface waters pollution are municipal sewage systems, medical institutions and industrial facilities. It is necessary to study the composition of different substances in the inland water animal organs together with the water quality chemical composition studies.

Approved by the Government of Georgia Resolution N127 (24.01.20012) on "the Second National Environmental Action Plan ",is scheduled on the following 5 years and foresees many aspects of the protection of biodiversity and sustainable use of internal waters, however many important questions still remain out of focus.

Taking into account the above-mentioned 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 is the first interested party in the protection and conservation of biodiversity in the country. So it should be the main contributor of scientific research programs, which will be carried out in the country. It is very important to find a donor 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 the group of organisms associated with water (invertebrate animals). 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 Goergia there is a catastrophic shortage of professionals in this field. Research institutions which are the only centre for the preparation of such staff should be motivated to intensify efforts in this direction. On the one hand the state support is reflected in the financing of the research project and on the other hand in integration of the 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 the influence on the environment**: Associated with aquatic ecosystem potentially harmful activities such as 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 those migratory species which were damaged during such construction.

4. **Regular and systematic monitoring of internal waters biodiversity**: 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 new 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**: Water quality assessment is important both for the management of freshwater resources and aquatic biodiversity.

7. **Enhancement and activation of the inspection of the environmental protection**: Increase staff members.

8. **Improve the system of evaluation and determine the resources of fishery facilities and quotes**: it is important to establish standards and methods for sustainable use of biodiversity.

9. **Reveal the endangered species and plan the mechanisms of their protection**: to review the Red List to assess the conservation status of the protected species and carry out the appropriate protective measures.

10. **The qualification of specialists (experts)**: 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 the effective management it is necessary to draw public attention to internal waters and to understand their function.

Internal waters was adopted as a CBD thematic area at the fourth meeting of the Conference of the Parties (COP) 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 the 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 watlands, 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 – on a volume of habitat basis.

In general, information on species important for conservation pursuant to Annex I of the Convention, 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.

The Caucasus is one of the most important regions of the world. Its biodiversity counts millions of years, which often played major role for the shelter of organisms' during the ice age and is called the refugium of the ice age. According to international environmental organizations, the Caucasus is one of the hotspots of biodiversity.

It is obvious that the preservation and protection of biodiversity in the Caucasus should be the first target for the local population and not just for them. Unfortunately, in Georgia there is no case that will be a successful example in the protection and restoration of inland waters biodiversity. Despite the fact that in recent decades the country has made significant strides in the development of legislation on water and its resources, much remains to be done to improve the legislative framework and raise public awareness and education.

Biodiversity Strategy and Action Plan (NBSAP) of Georgia which approved by government Decree N27, February 19, 2005 was step forward in the protection of biodiversity. Despite that the document does not include issues related to internal waters biodiversity and many actions which were planned could not be completed, document played an important role in improvement and formation of views on envrironmental protection in Georgia. It became the leading document in planning the conservation projects and govermental decision making. In 2011, the Biodiversity Protection Service (BPS) under the Ministry of Environment Protection initiated the updating process of the NBSAP with assistance of GIZ and an Integrated CIM Expert, working for the BPS. The updated NBSAP will be valid for the period of 2013 – 2020. The identified 11 key issues (thematic fields) for new NBSAP are the following:

1. Conservation of Species and Habitats
2. Protected Areas

3. Agricultural Biodiversity
4. Assessment and Sustainable Use of Biological Resources
5. Biosafety
6. Public Participation and Education
7. Biodiversity and Climate Change
8. Management/Governance of Biodiversity
9. Biodiversity of Forests
10. Biodiversity of Internal Waters
11. Biodiversity of the Black Sea

Taking into account experience of last five years in updated NBSAP must be added vast amount of actions related to biodiversity protection of internal waters.

I.1. Internal waters of Georgia

Georgia is rich in water resources. There are 26060 rivers within the country; their total length reaches 59000 km. length. 99.4% of the rivers length are less than 25 km, 121 rivers -25-100 km and 16 rivers - 100-599 km. Rivers of Georgia belong to two major basins divided by 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 Kakheti region. Other rivers in the east of the country arethe Liakhvi, Ksani, Aragvi, Paravani, Algeti, Ktsia-Khrami. Among the rivers of Weast Georgia the largest is Rioni. Its whole length ley on the teritory of Georgia, takes start from mountains of Great Caucasus and throught Kutaisi and Poty flow into the Black Sea. Other important rivers of West Georgia are: Inguri, Chorokhi, Kodori, Bzipi, Tskhenistskali.

About 860 lakes are located in Georgia but the majority are very small and the total area of lakes does not exceed 170 km^2 (0.24% of total area).

Despite the small number lakes in Georgia are notable for variety of genesis. There are tectonic, glacier (the largest number), riverine, coastal, karstic, suphosic, dammed, combined and anthropogenic lakes. In Georgia dominate freshwater lakes; some of which 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, chloride and sulfate. The most common are Hydro-carbonate lakes, less- chloride and sulfate lakes even less. 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 km2), Tabatskuri (14, 2 km^2).Bazaleti (1,). Lake Takatsuki is the largest lake by volume -221mln.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 $km^{2.}$. 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), from this point, in Georgia the potential of lakes and reservoirs is high and requires the development.

Marshes are a typical component of the Georgian landscape. It is particularly well expressed in Colchis plain and on the volcanic plateau of South 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 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. These areas are also covered by Kolkheti national park and Kobuleti nature reserve and managed reserve that includes coastal peat bogs that are especially important for their unique floristic composition, 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 22 of March, 2011, the Law on creation and managament of Javakheti protected areas was approved, by this law as a protceted areas of Javakheti was announced: Marshes of Karstakhi and Suldi and Lakes Khanchali, Bugdasheni and Madatapa.

I.2. Biodiversity of Internal waters of Georgia

Fish

In fresh waters of Georgia 91 of fish species are distributed, among them 61 are freshwater inhabitants and 30 - migrant species, including lots of emdemic species to Gaucasus and Georgia. On the Red List of Georgia 13 species of fishes are listed, those are: Atlantic sturgeon (*Acipenser sturio*), Colchic sturgeon (*Acipenser colchicus*), Fringebarbel

sturgeon (*Acipenser nudiventris*), Starry sturgeon (*Acipenser stellatus*), Russin 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 the local forms in Georgia is distributed 9 introduced/invasive species, among them Crucian carp (*Carassius carassius*) is most widely distributed. All Sturgeons (*Accipenseridae*) are near extinction in Georgia. Real conservation status for endemic species to Mtkvari River and Kolkheti lowlend needs urgent investigation. In this respect, following habitats are most important: upstreams of Mtkvari River, Chorokhi basin, Lake Paliastomi, downstrams of river Rioni (spawning areas of sturgeons), Lake Bebesiri, and lakes on Javakheti Plateau. Depend on country region following economically important species are distinguidhed: Javakheti Plateau – Whiterfishes (*Coregonus spp.*) and Common Carp (*Cyprinus carpio*); river Kura (Mtkvari) – Transcaucasian barb, Khramulya (*Capoeta capoeta*) 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 Bleak Sea basin – Mulets (*Mugil spp.*), Fringebarbel sturgeon (*Acipenser nudiventris*), Shads (*Alosa spp.*), Common Carp (*Cyprinus carpio*) and Common bream (*Abramis brama*). Last fiew decads waters in Georgia widely invided by Crucian Carp (*Carassius carassius*). It is not important stock fish but it is now common invasive species in almost every water bodies in Georgia because, of its high adaptability and good dispersal ability.

Other vertebrates related to internal waters

13 species of amphibians are known for Georgia. Two of them are included on the Red List of Georgia: Caucasian Salamnder (*Mertensiella caucasica*) and Syrian Spadefoot (*Pelobates syriacus*).

50 species of reptiles are distributed in Georgia, four of them are associated to 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 have 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 (*Pelecanus onocrotalus, Pelecanus crispus, Ciconia ciconia, Coconia nigra, Anser erythropus, Tadorna ferriginea, Marmaronetta angustirostris, Oxyura leucocephala,Grus grus and other*).

Kolketi lowland (lake Paliastomi and Blak 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 on convention of migratory species (CMS - Bonn Convention) and AEWA (Africa-Eurasia agreement for protetction of migratory water birds). To protect migratory birds, special efforts are needed (included ex-situ conservation and reintroduction). But there is no official programs aimed monitoring water birds.

Small vertebrates associated 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*).

Onvertebrates

Data about invertebrate animals inhabiting internal waters of Georgia are fragmented and incomplete. With organization of existed data, it is needed to collect new up-to-date information about them. General review of the researches of about Georgian bentic and planctonic fauna are presented in forth chapter in this document. Comparative to ather 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*) are known for Georgian internal waters. However this data are quite old and systematically usefulness and needs serious re evaluatuion to determine species status.

Flora

Plants of internal waters of Georgia are quite diverse which accounts at least 2,605 taxa of algae. Mostly bentic plant species are presented in the running waters where 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 stand waters (lakes, reservoirs, ponds and marshes) planktonic complexes are most diverse, frequently occurred and widely distributed species are - *Merismopedia tenuissima*, *Microcystis aeruginosa*, *Gomphosphaeria lacustris*, *Ceratium*

hirundinella, *Gloeococcus schroeteri*, *Pediastrum tetras* და *Scenedesmus arcuatu*. There are distributed north-alpine complex in lakes of Javakheti plateau - *Melosira distans*, *Meridion circulare*, *Diatoma anceps*, *D. hiemale*, *Eunotia alpina*.

Many relic and endemic species are distributed in Kolkheti lowland – in peat bogs: *Drosera rotundifolia*, *Rhinhospora alba*, *Rhododendron luteum*, *Rhododendron ponticum*, *Osmunda regalis*, *Soligado turfosa*, *Drosera rotundifolia*, *Trapa colchica*.

Freshwater fungi, mosses and lichen are not well studied. 17 species of Hypomices are recorded for Georgian fresh waters.

A collection of data taken from a variety national biodiversity studies (GEF/UNEP, NACRES) was published in 1996 and this represented the countries first attempt at collating and assessing these assessments of the status of on various components of the national biodiversity. An updated analysis was prepared in 2009 by ECODIT, by USAID financial support. Both of above mentioned documents included the aspects related to interanl waters biodiversity, although it is fur from complete data, even more, during those 13 years (1996-2009) information and knowledge on Biodiversity of Internal waters of Georgia does not changed.

Chapter II. Biodiveristy Strategy and action of of Georgia, related activites to the internal waters biodiverity, achivments and shortcomings

Biodiversity Strategy and Action Plan (NBSAP) of Georgia was approved by government Decree N27, February 19, 2005. The (NBSAP) defined ten-year strategy for the conservation and sustainable use of biodiversity, concrete steps have been 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, these are: Protected areas; Species and habitats; Agrobiodiversity; Hunting and fishing; Monitoring; Biotechnology and biosafety; Environmental education, public awareness and public participation; Finance and economics; and Legislation and institutional development.

The issues related to the internal waters biodiversity include below mentioned strategic goals: Protected areas (A), Species and habitats (B), Hunting and fishing (D).

In the situational analysis of "Hunting and fishing" was noted that the reproductive work of fish stocks have decreased significantly since 1991 year and some reproductive facilities have been destroyed. Use of chemicals and electric shock during fishing was frequent. Poaching (with forks) as well as dams on the migration spawning routes of anadromous fish (such as sturgeon) has been found an insurmountable barrier to the fish that migrates to spawning area. It was noted that the ecological condition of water reservoirs in the country has become much worse in recent years. Valuable fish species stock was significantly decreased, near to extinction was population of Atlantic sturgeon, Black Sea Salmon and others. The potenatial resource of Georgian internal waters was low. As a result of the analyses outlined the poor condition of internal waters of Georgia, however aims and objectives and actions not include specific activites for improveing 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 in Javakheti Plateau (lakes Khanchali, Madatapa, Bugdasheni) (A4), Identify potential Ramsar sites, and prepare necessary designation proposals (A7). At present only the action A3 is performed, the law on Establishment and management of Javakheti protected area completed and in force (22.03.2011), it is adopted and approved the management plans.

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 an 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).

It was entioned that: Conservation status to at least 75% of estimated threatened species sould be assigned, database of threatened species should be available on the internet; At least for 20 % of key species conservation programs should be initiated; The waterbirds Conservation Action Plan (CAP) should be published and approved by the government; At least 2 bird ringing centres should be set up and integrated in international bird ringing schemes; Major invasive species should be assessed and management plans developed; Should be published database on wetlands of Georgia and elaborated ecosystem maps, should be adopted and approved the strategy for wetlands of Georgia by the government. None of these actions are performed. It should be noted that in Colchis National Park was established bird ringin center but it does not operate yet.

Strategic Goal D: To promote sustainable hunting and fishing through adequate planning, restoration and protection of key biological resources. Following actions can be considered as associated issues to the 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).

Changes in the relevant legislation, hunting quotas and list of sites should be officially approved, numbers of government officers and hunting farm employees should be improved skills and knowledge as a result of training, fully equipped hatcheries using

modern fish breeding techniques should be established. It should be noted that the implementation of those actions failed during the predefined period unfortunately.

Following stargetic goals: Biodiversity monitoring (E), Environmental education, public awareness and public participation (G), Finance and economics (H) and Legislation and institutional development (I) consisted general concepts on biodiversity, which includes the issues on internal waters biodiversity, however within the frame of those actions nothing was done regarding to biodiversity of internal waters.

Chapter III. Effective Legal Documents Regulating Biodiversity of Internal Waters and International Agreements

National Policies and Legislation

Georgian internal water bodies and biodiversity management is regulated by the Constitution of Georgia (Article 37) and number of laws, such as: Georgian Law on Environment Protection (1996), Georgian Law on Water (1999), Law on Fauna (1996), Law on Red List and Red Book of Georgia (2003), Law on permits of environmental impact assessment (2007), Law on ecological expertise (2007) and other. In addition, there are adopted numerous bylaws, resolutions and decrees regulating the issues out of the scopes of the regulation sphere of the key laws.

Georgian Law on Environment Protection (1996)

Law on Environment Protection is the most significant document providing basis for sectoral legislative documents. Georgian Law on Environment Protection sets the policies for environment protection and use of natural resources (including the internal waters and its biodiversity) and regulates all key aspects thereof, related to protection of environment and biodiversity, sustainable use of natural resources. Georgian Law on Environment Protection is the framework law and other laws and legislative acts regulating environmental issues are (should be) adopted and implemented in strict compliance therewith.

The mentioned Law (Article 5) provides the following principles of environment protection:

1. The bodies of the state authority, physical persons or legal entities (without distinction of the kinds of property or of organizational legal form) in the course of planning and implementing the activity must be guided by the basic principles of environmental protection.

2. The basic principles of environmental protection are:

a) “The Principle of Mitigation of the Risk”- in the course of planning and implementing the activity, the subject of the activity is obliged to take appropriate measures in order to reduce or prevent all adverse effects on the health of humans and on the environment;

b) “Principle of Stability”- the use of the environment and natural resources, when the development and natural resources and the environment and natural resources are protection against the changes in quantity and quality of the environment;

c) “Principle of Priority”- the action, which is likely to have adverse effects on the environment and health of humans may be replaced by other, less risky action (even if this is more expensive). Priority is given to the latter, in order to compensate ecological damage, resulting from the less expensive action;

d) “Principle of the Use of Nature, Requiring Payment”-the subject of the activity is obliged to pay for the use of land, water, forest, flora, fauna and subsoil resources;

e) Principle “Contaminator shall pay” – subject of activities, as well as physical persons / individuals or legal entities shall compensate the damages caused to environment;

f) “Principle of Preservation of Biological Diversity”- the activity must not lead to the irreversible degradation of biological diversity;

g) “Principle of Minimization of waste”- in the implementation of the activity priority is given to such technology, which ensure the minimization of waste;

i) “Principle of Recycling”- in the implementation of the activity priority is given to such materials, substances and chemical compounds, which may be reused, reprocessed, decomposed or degraded biologically without damaging the environment;

j) “Principle of Restitution”- the environment degraded as a result of the implementation of the activity, must be restored in a from, which must be as close to its initial state as possible (restitution in integrum).

k) “Principle of the Environmental impact assessment”- in the course of planning and projecting the activity, the subject of the activity is, under the established order, obliged to take into consideration and evaluate the possible effects on the environment, which may be caused by the activity;

l) “Principle of Participation of the Public in the Decision-Making Process” participation of the public in taking important decisions, related to the implementation of the activity is ensured;

m) “Principle of Availability of the Information”-information on the state of the environment is transparent and available to the public.

Article 10 of the same Law is of great significance, it provides for development of the projects and programmes in the scope of ecology and environmental protection to meet the requirements of the laws on environmental protection, as well as to form and fulfill the state

policy for environmental protection. According to this Article the state undertakes to ensure training of the professionals, provide support to planning and implementation of the scientific-research components and further, rely upon obtained results in implementation of the environmental policies. It should be noted that involvement of the state, in this respect, in the sphere of internal water resources management is equal to zero.

Chapter VIII, regulating the norms of environment protection ,Article 32 is of special significance, as it establishes the norms of environmental impact, implying identification of the permissible quotas for all types of natural resources. This should be done once per five years. It should be noted that in the developed countries quotation is provided using well justified and widely proven scientific-research methodologies. In this respect, this Article of the Law is not complied within Georgia as there is no consistent methodological description of establishment of the effective quotas (in this case with respect of internal waters biodiversity).

Georgian Law on Environment Protection, together with the other laws, regulates the issues of protection of the natural ecosystems, including wetlands and humid ecosystems (Article 45, Section 2) and protection of wild flora and fauna (Articles 46 and 47). The same Law clearly states that activities shall not cause irreversible quantitative and qualitative degradation of biodiversity.

Georgian Law on Water (1999)

Georgian law on Water is the basic law for regulation of Georgian territorial waters and biodiversity thereof. It provides for protection of the water bodies and efficient use of water resources, sustainable management of biodiversity;

According to the Law, set of all types of water bodies in the territory of Georgia comprises the state water fund. They include internal and transboundery rivers, lakes, ponds and other artificial surface water reservoirs, waters of the channels and pools, marshes and ground waters;

Key goals of the law are elucidated in Article 4 stating that the Law shall:

a) Ensure implementation of the unified state policies in the sphere of water protection and use;

b) Protect water bodies (including Georgian part of Black Sea) and efficient use of water resources taking into consideration the interests of the current and future generations and principles of sustainable development;

c) Stability of water fauna and their sustainable use;

d) Prevention of harmful impact of water and effective liquidation of the results.

The Law obligates the state (Articles 10, 11, 12) to establish the state standards (quotas, limits, normatives) for use of water and water resources, development of the methodology for establishment of standards and introduction thereof (1); creation of the unified state information fund of water and water resources (2); 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 (3).

The Law (Article 13) also allows the individuals and legal entities to receive complete, timely and unbiased information about water status from the governmental authorities. This is impossible in case of absence of complete state information fund.

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 by 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 the fish paths and technical measures for protection of anadromous fish are not provided for.

According to chapter three of the Law protection of the water bodies should be ensured: a) to prevent contamination, pollution, drying and such other negative impacts, which may harm 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 of special scientific, esthetic and recreation significance; c) to give the category of protected areas to certain water bodies; d) maintain 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 was not developed or is not available for public. The mentioned document should regulate the measures for protection of significant water bodies or species in the licensed or other farming ponds, together with the Law on Red List.

Chapter VIII of the same Law, obligates the state to provide state monitoring of water, comprising unified system for 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 condition of water and water bodies, their interaction with the environment (natural and anthropogenic), evaluation of energetic potential of the water resources and rivers, forecasting of harmful impact of water (floods, mudflows, landslides etc.). State monitoring of water is provided within the scopes of general state system of environment monitoring (Article 80) proper operation and funding of which should be ensured by the state.

Law on Fauna (1996)

Law on Fauna is one of the most significant documents based on which biodiversity maintenance and sustainable use should be provided in the country.

By the Law the state undertakes to fund and conduct research and conservation works serving to protection and maintenance of biodiversity (Article 16). Though, it does not provide exact and specific mechanisms and conditions for funding of the research and conservation works.

This Law, similar to the other legislation, related to biodiversity, in general, does not determine strictly the role of state in study of biodiversity (in result of which the number of decisions should be made). For example, in Article 17, section 4 states, that the state forbids and suspends all types of activities endangering stability of biodiversity. At the same time it does not specify how such dangers could be identified.

Law on Red List and Red Book of Georgia (2003)

The law regulates legal relations in the sphere of development of Red List and Red Book of Georgia, protection and use of the endangered species, with the exception of legal issues related to international trade in endangered wild animals and wild plants, regulated by the Convention of International Trade in Endangered Wild Flora and Fauna.

The main goal of the Law is stated in Article 4, according to which, regarding interests of current and future generations, protection and restoration of the endangered species spread in the territory of Georgia should be provided, as well as maintenance of the diversity of species and genetic resources, stability and creation of the conditions for their sustainable development.

Second chapter of the law, Article 5 obligates the state authorities to:

a) Set the state policies;

b) Coordinate activities of state authorities;

c) Implementation of unified scientific-technological policies, development and approval of normative-methodological documentation, organization of fundamental and applied scientific-research works and funding thereof.

Within the scopes of the Law Commission of Red List was established. Commission developed the list of endangered species and awarded to the special status. Though, Red List Commission worked on a voluntary basis. In addition, no scientific-research project oriented towards study and conservation of endangered species of internal waters was implemented with state funding (see Article 15, Section 7).

Funding, planning and implementation of the programs for monitoring and study & restoration of the varieties of Red List is the competence of the state (Articles 19, 20, 25, as well as Georgian Law on Fauna). In this respect the state has made no any actual steps.

Hence, the status and condition of the species in the Red List (including 13 fish species) is unclear and ungrounded.

Article 22 of the Law determines the regulations for withdrawal of the endangered species from the natural environment. This article states that withdrawal from the natural conditions is acceptable for rescuing or scientific purposes. In addition, withdrawal of the endangered species is allowed on the basis of individual administrative-legal act of the Minister, though it does not specify the rights of the Minister of Environment Protection in preparation of such act.

Law on Permits of Environmental impact assessment (2007)

Law provides full list of the activities subjected to obligatory environmental expertise and legal bases for participation of the public and for public information in the course of the issuance of an environmental permit for performance of such activities in 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.

Objectives of the Law include:

a) Formulation of the rights and obligations of implementers of the activities in the sphere of activities subject to environmental permit issuance, as well as the public and state;

b) Protection of the environment and natural resources from irreversible quantitative and qualitative changes, as well as promotion of their effective use;

Article 4 sets the activities subjected to environmental expertise. List of such activities includes: m) construction of hydropower stations (with 2 megawatt and greater capacities) and heat power plants (of 10 megawatt and greater output); o) construction of water reservoirs (of 10.000 m^3 and greater volume); p) construction of the water treatment facilities (over 1000 m^3 and greater per day capacity), as well as main sewage collectors; r) Construction of the dams, moorings and berths, piers and spur-dikes; s) arrangement of the reservoirs for toxic and other harmful substances.

According to Article 6, the implementer shall arrange public discussions of EIA, before its submission to the administrative body issuing the environmental permits. For the purpose of public discussion the implementer shall publish information about his planned activities. Information shall be published in the central periodical newspaper, as well as in the periodical edition (if any) within the administrative territory of self-governing unit, where the activities are planned.

Within 45 days from the date of publication of information about planned action, the implementer shall accept and consider written comments and proposals received from the public and no earlier than in 50 days and no later than in 60 days after publication arrange public discussion of EIA in relation with the planned activities. Any representative of public may attend the public discussion of EIA report.

Article 10 provides EIA procedure:

1. EIA is the determination of the nature and degree of environmental impacts from all types of sources, as well as assessment of environmental social and economic outcomes of the planned activities in the processes of development of the justification documents for the planned activities and making decision on permitting of such activities.
2. The implementer shall be responsible for organization and implementation of EIA;
3. In result of EIA the EIA report is developed;
4. EIA procedure and requirements to the contents of EIA report are determined by Georgian legislation and decree (regulation) on "Environmental Impact Assessment" approved by the Minister with the normative act.
5. Costs of EIA procedure shall be covered by the implementer.
Environmental impact assessment documents is a very significant one, providing basis for such decisions, which could, in case of inadequate planning, cause large-scale irreversible negative processes in the environment (especially in case of construction of hydropower plants and dams). It should be noted that EIA document does not set the criteria for environmental expertise while this is decisive for prevention of the harmful and irreversible phenomena (see Law on Ecological Expertise).

Law on Ecological expertise (2007)

The objective of Ecological exoertise is to control the maintenance of ecological balance in conformity with environmental protection requirements and principles of efficient use of nature and sustainable development.
Law obligates the state to ensure identification of the items subject to assessment, selection of experts and implementation of expert examination. Implementation and effectiveness of the mentioned Law fully depends upon selection of experts who will ensure preparation of reliable expert report. Criteria for experts' selection are established by the document developed by Georgian government – "On Approval of the Decree on Registry of Independent Experts". (Order of the minister of environmental protection, # 24, 15.06.2011). The mentioned decree sets the following requirements for identification of the experts' qualification required for the registry:

a) Theoretical knowledge of the issues subject to consideration;
b) Work experience in the relevant field;
c) Ability of team work, integrated consideration of the issues and analysis;

And criteria for selection of the experts from registry, for specific tasks are as follows:

a) Education and specialty necessary for project review;
b) Knowledge of specifics of the activities to be reviewed within the project;
c) Experience of reviewing of similar projects;
d) Awareness in relevant norms and standards;
e) best experience in the issues related to the subjects under expert review;
f) Knowledge of location of activities subject to environmental review.

The above criteria, on the basis of which the experts are selected and hence, decision on the basis of documents developed by the said experts, are not unbiased. The above criteria (provided for by the law) are not the criteria for determination of the qualification of specialists in relevant field. Similar to any developed country, the main criterion determining qualification of the experts in the sphere of ecology are the international scientific publications within his/her specialty which, on their side, are published after independent international expert review (peer review for publication in international magazines is implied).

Decision of the Government of Georgia #138, 2005
On Approval of the Statute on Rules and Conditions of Issuance of Fishing License (17.03.2008 #65)

The document sets the conditions of fishing license issuance. In accordance therewith the licensee undertakes to be engaged in fishing and other economic and non-economic activities in full compliance with the law, like protection of the species provided for by the law and annual monitoring of the reserves and composition thereof in the license pond. This law states that the Ministry is the authority setting the fishing quotas and license conditions. The Ministry also approves the minimum 5-year management plan submitted by the licensee. It is significant that no standards are adopted for approval of the quotas license conditions and management plans to provide basis for decision making. Procedure of setting of the fishing quotas requires application of significant scientific methodology, detailed descriptions of which should be submitted and evaluated by the competent persons.

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

The Statute regulates the rules and terms for gaining the objects of fauna and its species, determines the list of equipments and appliances (devices) allowed for this purpose.

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." Of course, the legislators are aware that the crustacea and molluscs are invertebrates. This is for simplicity of the concepts provided for in the Law, as the Law regulates catching of the crustacea and molluscs. And still, separate definition would be better. Based on such judgment it is unclear, why the 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 the sea mammals were named. Thus, definition of the fish should be formulated differently, if it is intended to include the molluscs, crustacea, fish and sea mammals, clearly showing that this is a conditional name, or it would be better to separate the animals completely different from the fish, in this case the 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 wearing the shotgun, the bill (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 bill is effective for almost six months and there are no any regulating actions requiring from the hunter submission of the detailed information about varieties and quantities of killed birds. Respectively, the Agency of Natural Resources has no information about varieties and quantities of the birds withdrawn from the nature, at a time of hunting, and in addition, it is unclear, how the daily limit, specified in Annex 4, was established, while no counting of the bird varieties was provided (Annex 1, interview with Archil Adamia).

Third chapter of the statute deals with the rules of fishing and protection of the fish reserves. In new version of the Statute, Article 3, specifying fishing restrictions, with the exception of amateur and sports fishing, the changes (6.07.2011 # 114), Section b, in the river mouth and adjacent territories of the sturgeon and salmon rivers reduces the fishing

restriction distance in the mouth area from 500 to 300 meters, further aggravating threat to which the endangered species are subjected.

The specific requirements to fishing set by the Statute and the issues of licensing are elucidated in chapter 5 of the document. It would be good that the 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.

Second National Environmental Action Plan of Georgia (2012-2016)
Decree #127 of 24th January 2012 of the Government of Georgia

Second National Environmental Action Plan of Georgia (NEAP-2) is the official action plan approved by the government of Georgia for 2012-2016 period intended for implementation of sustainable development principles in the environmental sphere. The document is a wide-scale action plan and clearly reflects current situation and problems in the environmental sphere. It also sets the ways for problems resolution. 2 of 11 environmental priority directions provided by the document directly deal with the internal water bodies and their biodiversity and sustainable development. Among them the first thematic direction – "Water Resources" includes thorough situation and problem analysis and 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 programs are not considered at all. Monitoring of chemical elements is of significance and it is good that the number of objects of monitoring increased in this respect (polyaromatic hydrocarbons, pesticides and oil were added).

Though, it should be noted that biological monitoring is relatively low-budget and effective way for implementation of complex monitoring programs, both, for monitoring of degree of pollution and evaluation of the state of biodiversity. In this respect, it is desired that Georgian Biodiversity Strategy and Action Plan paid greater attention to this aspect. Second thematic direction – Biodiversity and Protected Areas clearly reflects extreme scarcity of data about water biodiversity and related problems. In particular, given absence of information, no correct decisions could be made. In this respect, actions provided for by NEAP-2 could help. According to NEAP-2 the priorities include development of biodiversity

(including that associated with water) databases, improvement and operation of the unified monitoring systems and networks of protected areas. Though it is significant to note that NEAP-2 can not provide full picture in evaluation of the measures provided for by Biodiversity National Strategy and Action Plan, in particular, the red List, developed and regarded as a main achievement and several types of management plans are not sufficient for effectiveness of biodiversity protection. Moreover, work of the Red List Commission, which in the recent years stopped, was limited to the consideration activities only and did not participate in identification of the species status through the research studies.

The applications submitted to the Commission, related to consideration of the status of species, as a rule, did not rely upon the results of scientific researches and thus, lacked proper substantiation. It should be noted that the developed management plans do not comprise the part of unified national environmental strategy rather these are the product of fragmented isolated scientific-conservation projects received by individual scientists or research organizations from the donors. In addition, response from the side of government for implementation of current management pans is minimal and this is vain wasting of the resources (regarding that 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 biodiversity of internal water bodies, development of the database, establishment of quotas and other problems are scheduled in NEAP-2 as the objectives for next 5 years though responsibilities for their funding and implementation are unclear. Water resources, description of biodiversity and permanent monitoring should be within the interests of the state as only by this way sustainable development is possible. NEAP-2 mentions, that strengthening of the scientific researches and use of their results for dealing with the environmental problems is decisive and needs strengthening in Georgia. For effective implementation of measures for protection of water biodiversity the state should apply 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).

Order # I-293 of the Minister of Environment Protection and Natural Resources of Georgia on Approval of Indicators of Biodiversity Monitoring System

According to this Order the methodology for biodiversity monitoring indicators should be prepared. In accordance with the mentioned order for one of the indicators – "Intensity of Fishery Intensity of fishery (Change in the total catches of fish stock)" (Pressure indicator – P4) the relevant methodology was developed. As the internal water bodies of Georgian currently are not used as significant commercial resource, with respect of fish production, the mentioned indicator is not used actively for monitoring of biodiversity of internal waters. Though such approach is absolutely unjustified and this indicator should be used for the internal water bodies as well.

International Agreements to Which Georgia is a Party

International agreements, if not in contradiction with the constitution, have preference to the internal normative acts (Constitution of Georgia, Article 6). Thus, about 50 international agreements related to environment protection to which Georgia is a party are significant action documents but Georgia, in many cases, could not succeed in implementation of them (NEAP-2).

Convention on Biological diversity (CBD)

Georgia signed the Convention on Biological diversity in 1994 and thus it undertook the obligation to protect rich diversity of flora, fauna and microorganisms and commence sustainable use of biological resources and ensure equal distribution of benefits gained from biodiversity.

Convention on Biological diversity is the first global agreement stating necessity of sustainable use of biological resources together with conservation of biodiversity based on international studies and assessments,

Georgia, as part of Caucasus, is recognized as:

one of 34 most biologically rich (diverse) and endangered land ecosystem (Conservation International);

One of 200 vulnerable ecological regions (WWF);

One of 221 endemic bird location (BirdLife International);

One of world centers of agro -biodiversity.

Goals of given Convention include maintenance of biodiversity, ecosystem and habitat in-situ conservation, protection of populations of viable species and recovery in natural habitats. The main goal of the convention is biodiversity conservation.

Convention provides for monitoring of biodiversity, covering biodiversity components significant for its maintenance and equal use. All signatories reasonably create the systems of protected districts or such districts, where the special measures are required for maintenance of biodiversity; regulates or effectively uses the biological resources significant for maintenance of biodiversity in the protected areas or beyond their borders to ensure their maintenance and uniform use; promotes protection of ecosystem, natural habitats and maintenance of viable populations of the species in natural conditions; implements measures for rehabilitation of degraded ecosystems and contributes to restoration of the endangered species, in particular, through development of plans, their implementation and other strategies of effective use states or promotes use of the live organisms changed in result of biotechnologies, which could have harmful environmental outcomes and on its side, impact and endanger human health.

Convention on Biological diveristy is the significant obligation for the state and it shall regularly submit reports on performed activities. National reports prepared within the framework of Convention do not contain information about fulfillment of obligations related to biodiversity of internal waters in Georgia.

Thus, the state should find the ways and develop relevant plans to commence implementation of the obligations undertaken within the scopes of Convention.

Convention on Migratory species (CMS) and African-Eurasian Waterbird Agreement (AEWA)

Goal of the Convention on Migratory Species and associated agreement (AEWA) is protection of land, water and migratory species (Bonn Convention). Georgia is a party to this Convention from 2000 and to the Agreement – from 2001. Subsections e and f of Article 5 of the Convention 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.

Ramsar Convention on Wetlands

Convention on Wetlands of International Significance, known as well as Ramsar Convention is intended for ensuring national actions and bases of international collaboration for maintaining of wetlands and sustainable use of their resources. Georgia joined the Convention in 1997. According to Section 2 of Article 2 of the Convention, 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.

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

Georgia is a party to Convention from 2010. According to the Convention, special attention should be paid to the endangered and vulnerable species and endangered and vulnerable migratory species among them. Each party undertakes to ensure training and awareness, what would serve to conservation of wild flora and fauna and habitats.

Chapter II, Protection of Habitats, According to Article 4, secton 1, 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.

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

CITES is an international agreement between governments. Goal of convention is to ensure, that the trade of species of animals and plants does not threatened them and corresponds to the different status of protection of more than 33.000 species of fauna and flora. Georgia is a party to Convention from 1996. Atlantic sturgeon is included in annex I, all other sturgeons of Georgia listed on Annex II.

Chapter IV. 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. Reservoirs are complied with long term licensing. The condition of ichthyofauna is assessed for licensing and specific conditions for fishing are defined. For the renovation 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 and 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). 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 Gaining the Objects of Fauna by the species (N 07, 6.04.2011).

The Law on Licenses and permissions of Georgia, the 18th and 19th articles control the procedures and conditions for issuing fishing licenses. The administrative organ issuing fishing licenses is the Agency of Natural Resources - the legal entity of the Ministry of Energy and Natural Resources. Internal water reservoir licenses will be issued by auction. The basis for conducting an auction is: the statement of the license applicant, or the decision of the Administrative agency.

The agency with the help of the hired experts conducts preliminary studies of the reservoirs of the license issuance, carries out the study of ichthyological characteristic and determination of fish stocks and quotes.

Licensing conditions for 26 water reservoirs were prepared by Service of biodiversity protection for 2010 (Table 1).

Table 1. Studied water bodies and their reserves

№	Name	Location	reserves (stock)
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

Hence, for today licenses have been issued on 6 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 has been determined using control catch method (costal siene nets, set nets). Size -weight and age composition were determined by Chugunova (1959), Pravdin (1966) methods, also the number, total and per hectare productivity was calculated during which the dynamics of artificial stocking were foreseen. While evaluation the fishery data collected through the survey of "qualified" poachers and 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 stoked fish viability. Biometric and statistic treatment of the collected material was carried out by Tyurin (1963), Ricker (1970) and Lakin (1980) methods. On the basis of the obtained data interpretation fishery quotes were determined and corrected. During the evaluation of the water reservoir condition very outdated methods were used, while methodological approaches are improved every year. Herewith, it is not outlined in detail how the assessment of the certain type has been carried out because, as a rule, there are several ways to fulfill one and the same objective and each of them has got its pros and cons. Analyses of the methods used during the assessment of the water reservoir prejudice the quality of the present assessment and need to be overviewed, because it is impossible to carry out correct management by using wrong basic information.

The legislation foresees the obligation of the licensee (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), the Order

of the Minister of Economics N 1-1/133, 28.01.2010 On Carrying out auctions for issuing internal water fishery license).

The owner of the license is obliged as follows:

- To inform the agency till the 5th day of each month about the resources obtained in the previous one
- To assist the agency 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 not less than 5year plan of water object and fishery management to the agency
- To use water facilities and their resources only within the frames and purposes specified in the license
- To comply with the fishery terms, 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 with the information about the fish yield and on other hydrobionts indicating species and quantities
- To submit the request annually to the agency for the approval of fish resource extraction and quotes
- 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 (20.02.2012, appendix 2) are given in the tables 2 and 3).

Table 2. Resources of licensed water reservoirs after years by preliminary calculation

Object	quota (t.)	stock at the tim of licence issue (t.)	stock afte 5-7 year (t.)	stock after 20 year (t.)

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 3. Stock and quiotas of licensed reservoirs by species

№	water body	Species	quiotas(in tonnes)	stock (i 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 quotes and stocks of the licensed water reservoirs, in most cases quotes and stocks coincide, which confirms once again the necessity of serious works 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 are fined for violation of license conditions which are important facts within the legal framework for conducting full-scale water management.

The survey of the owners of licensed reservoirs and the opinions expressed at the workshops (annex 3, annex 4) revealed that licensees face following problems: it's hard for them to find experts to carry out preliminary research of water reservoirs, they demand government support for the reservoir infrastructure development, the issue of poachers is unsolved as well, which is a serious problem for all interviewed. For this their demand is to intensify government control in regions and increase the staff of the environmental inspectorate who will regularly and seasonally control reservoirs.

Chapter V. The Scientific aspects of Georgian internal water biodiversity study

The information on internal waters of Georgia is fragmentary and unstable; however, because of the absence of new data the old ones are still widely used. Since 1930 until today results of studies of internal water reflected in more than 300 published works, obtained by us (article, book, summary, theses)(see appendix 5), included data on fish species living in lakes and rivers of Georgia, on other hydrobionts- constituent elements of plankton and benthos assemblages and plants.

Analysis of the collected sources identified intensity of different thematic researches in different years. 1960ies are distinguished by ichthyological studies, but1940ies 1950 and 1970ies by hydrobiological studies in general. In next decades researches carried out in all these directions were gradually decreased. In recent years they have been significantly low or haven't been carried out at all. The 70ies 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 (pic.1). IChthyological studies carried out on plants in sixties and nineties quantitatively exceeded the ones conducted on lakes. The other years displayed the opposite picture.

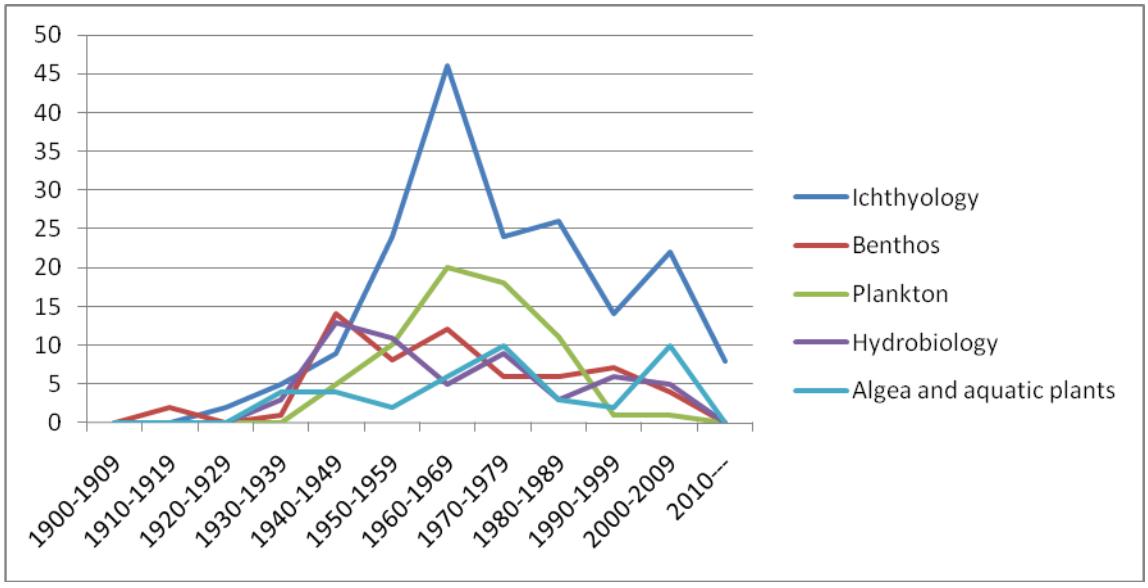

Fig. 1. Publications on biodiversity of internal waters of Georgia

Analysis of the collected sources identified intensity of different thematic researches in different years. 1960ies are distinguished by ichthyological studies, but1940ies 1950 and 1970ies by hydrobiological studies in general. In next decades researches carried out in all

these directions were gradually decreased. In recent years they have been significantly low or haven't been carried out at all. The 70ies 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 (Fig.1). Ichthyological studies carried out on rivers in sixties and nineties quantitatively exceeded the ones conducted on lakes. The other years displayed the opposite picture (Fig. 2).

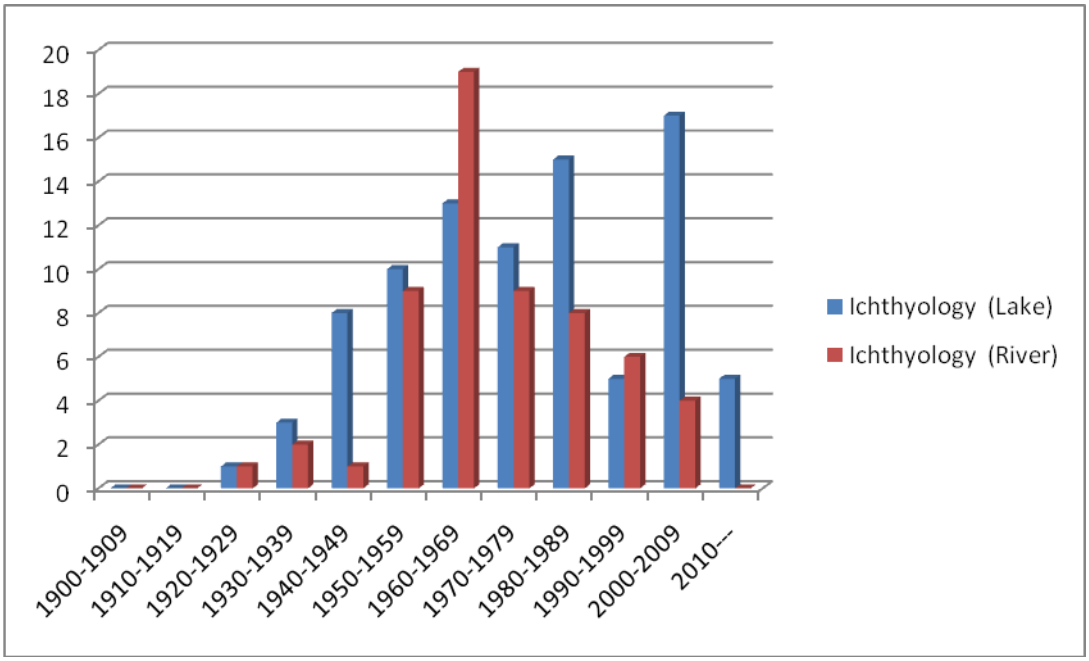

Fig. 2. Ichthyological studies on Lakes and Rivers of Georgia.

The research analysis dealing with the plankton study showed that lakes are better studied in this direction than rivers (Fig. 3). The similar picture was shown in benthos analysis (Fig. 4).

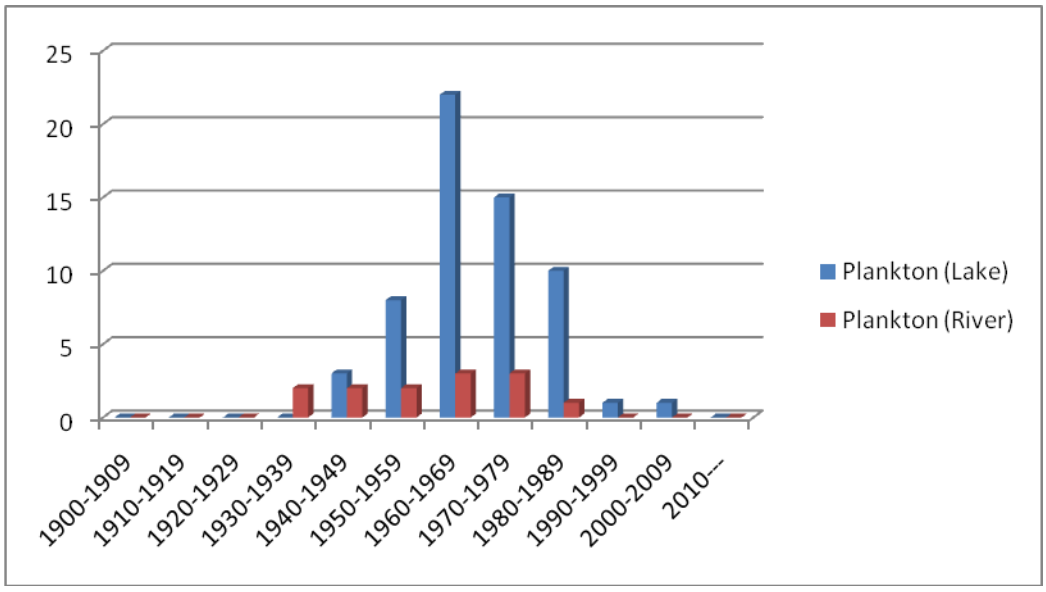

Fig. 3. The study of Plankton in the Lakes and Rivers of Georgia.

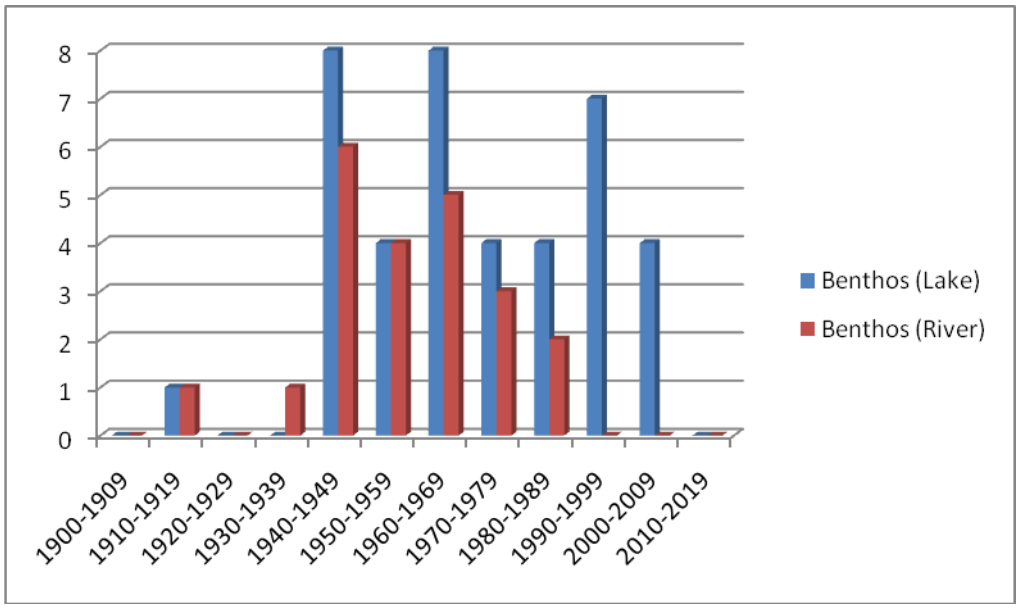

Fig. 4. The study of Benthos in the Lakes and Rivers of Georgia.

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. Fig. 5.

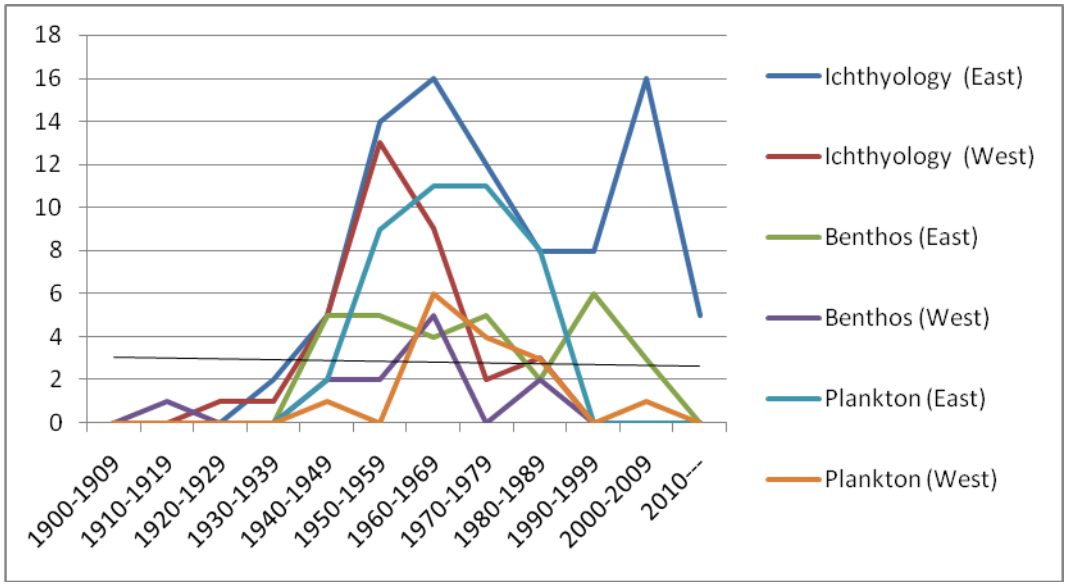

Fig. 5. Biodiversity researches carried out in internal waters of the East and the West Georgia.

The priority water facilities were revealed, water objects that are better studied (Fig. 6. 7.).

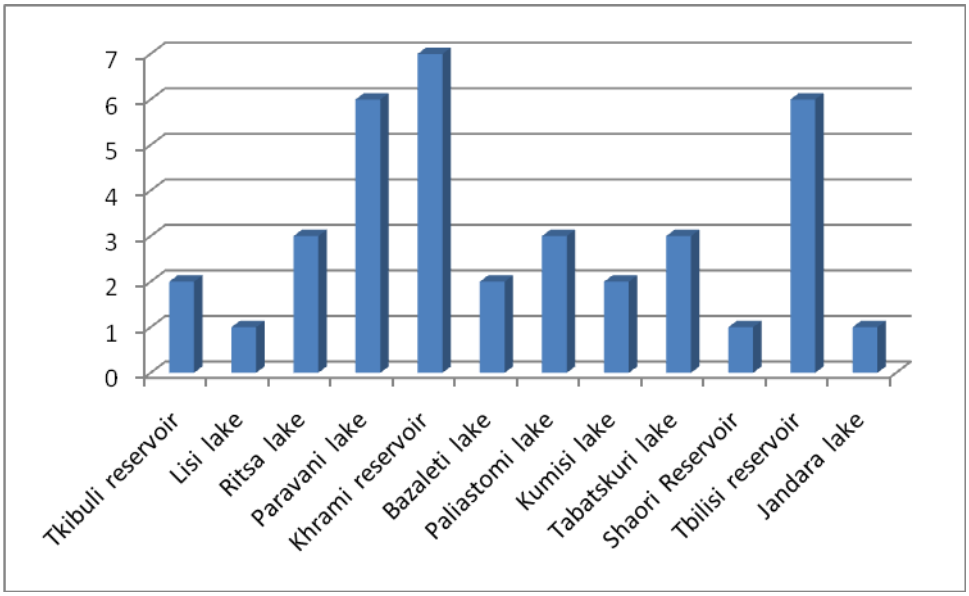

Fig. 6. Lakes and reservoirs.

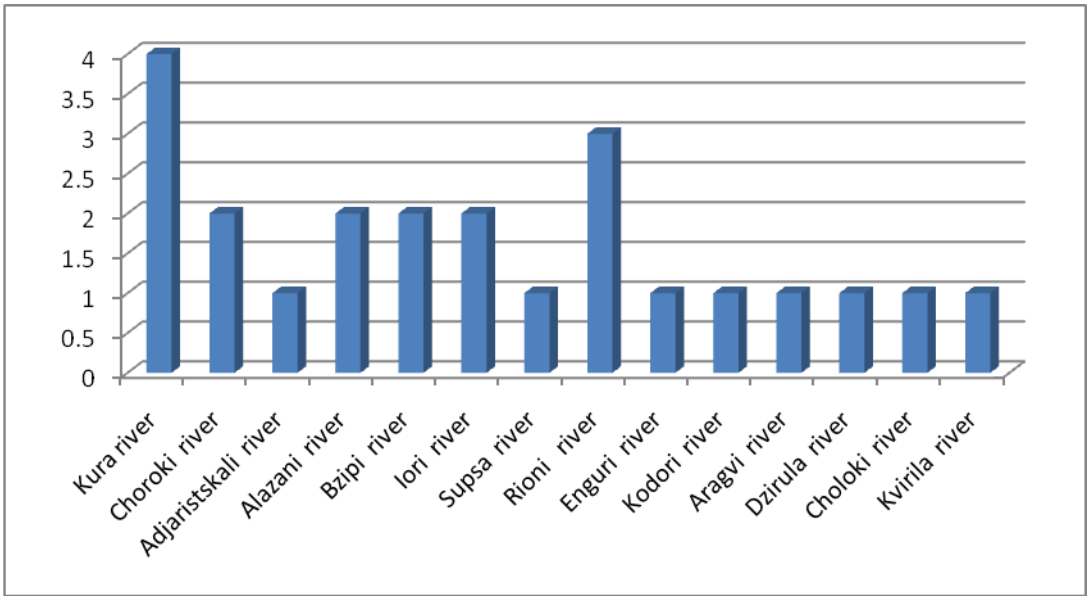

Fig. 7.Rivers.

The average number of scientific studies in Georgia is very low. E.g. in Finland upon the average18 scientific publications dealing with one lake only (the Lake Pyhajarvi the size of which five times exceeds the Lake Paravani) was annually published for the last 20 years whereas in Georgia upon average only three were done on the internal water research.

Statistics of total scientific researches shows two very important problems. The first is the decrease of hydrobiological studies since 60-70ies which reached nealy to zero for the last years and it happened against the background of the exponential increase of the research intensity in any developed countries. It means 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 figured from the scientific literature analysis is that the 100% of publications are directed to the faunistic, floristic and ecological researches. Practically there are no researches based on the results of monitoring that means that there is no reliable data, no information to go by, on the bases of which figuring any kind of tendencies and making the long-term plans are possible from the point of view of the internal water stabile development.

If we take into consideration that foreign project-grant financing has been reasonably increased for the recent 10-20 years (according to the data of 2000-2012 the total budget dealing with the different aspects of internal water projects exceeded of several million

dollars), then the small number of the fundamental researches or monitoring results (implying the results reviewed by international societies) will reveal the ineffective use of appropriate grant amount.

Chapter VI. inplemented and ongoing projects related to Biodiveristy of Internal waters of Georgia

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 identified priority actions for key environmental sectors, including water management. In The European Union the most important piece of legislation covering protecion of water environment is the Water Framework Directive (WFD), which defines the key principles as well the key objectives and the implementation plan for the management of water recources in the European Union.

On the water resources of Georgia many projects have been implemented and many of are ungoing. Huge amount of money is invested in those projects, although many problems are not solved still and there is not significant result. Below are listed projects related to Internal waters of Georgia.

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. Attempt of joint monitoring and information systems was started during the project implementation, although joint monitoring system is not developed yet. In the frame of the projecs was developed the Instruction: "Introduction to Biomonitoring of water quality", However the performance of the instructions is far from perfection.

The project continuied from January of 2012 to January of 2013. **Trans-Boundary River Management Phase III.** The aim of the project is improvement of water quality in Kura basin by transboundary cooperation. Project will assist to develop water quality monitoring and assessment using the methodologies of WFD.

Project: **Georgia Waters - Capacity Building on the Water Monitoring and Management in Georgia, 2010-2013**The project is performed by the Finnish Environment Institute (**SYKE**) and National Environmental Agency of Georgia. The aim of the project is: the collect the reliable information on internal waters of Georgia and water ecology and mitigation of negative influence of climate, strengthening of transboundary cooperation and development of water monitoring system.

Together with those projects shoud be mentioned project: **Reducing Trans-Boundary Degradation in the Kura-Aras Basin (UNDP/GEF)** (2011-2013). The project assists to: 1. Identify the principal threats and root causes of the trans-boundary water resources of the Kura Aras-River Trans-boundary Basin, 2. Develop and implement 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.

Project: **Establishment of Javakheti National Park in Georgia** (2009-2012) (**kfw**).The goal of the project is to establish a Javakheti National Park and five wetland sanctuaries as well as National Park's support zone 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 the transboundary cooperation in biodiversity conservation in the project area. It should be mentioned that the law on Establishment and management of Javakheti protected area completed and in force (2011, March).

Project: **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 of the Protection and Use of Transboundary Watercourses and International Lakes (further Water Convention) has been negotiated to strengthen measures for the protection and ecologically sound management of transboundary surface and groundwater. Implementing the UNECE Water Convention is important for improving water management in the South 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 Water Convention. Water quality of the shared waters is one important issue.

The objective of this project is to support Georgia to ratify and implement the UNECE Water Convention and to strengthen transboundary water cooperation between Azerbaijan and Georgia. The project will be implemented in collaboration with the Ministry of Environment Protection of Georgia and Ministry of Ecology and Natural resources of the Republic of Azerbaijan.

It should be noted the pojects implemented by **Caucasus Environmnetal NGO Network** (**CENN):**

Project: **Consultancy Services in the framework of Environmental and Social Impact Assessment (ESIA) of the Khrami Cascade** (2011-2012), (**Poyry Energy Ltd.),** Aim: Provide consultancy Sevices on Fauna (terrestrial and aquatic) and flora of each affected site.

Project: **Environmental and Social Impact Assesssment for the Khudoni Hydropower Project in Georgia** (2011-2012), (**TransElectrica Ltd.).**

Project: **Integrated Natural Resources Management Watersheds of Georgia** (INRMW). (2010-2014), **(USAID/GLOWS/ The Florida International University (FIU)**

Improving the welfare of the population of Georgia (water resources, biodiversity, ecosystems) promoting their sustainable use and management. Target area: Alazani, Iori, Rioni rivers basins.

Project: **Identification and Evaluation of Pollution Sources (Hot Spots) in the River Rioni Basin** (1.06.2008-31.08.2008) **(SYKE).** The overall objective of the project was to identify major hot spots affecting the ecological state of water bodies within the Rioni Basin.

Project: **Strengthening Transboundary Cooperation and Community Involvement for Sustainable Water Resources Management** (Georgia, Armenia, Azerbaijan) (1.06.2007-1.12.2007), (Government Services Inc. (PA) as an authorized **USAID** Contractor). Overall goal of the Project was development of sustainable water resources management in the Kura-Aras river basin through strengthening transboundary cooperation and community

involvement. Education of youth and their involvement in the activities supporting sustainable management of water resources (i.e. joint biological river monitoring and oversight of illegal landfills on the riverbanks).

Project: **Local Capacity and Regional Confidence Building and Networking for Promotion of Integrated Water Management in the South Caucasus Countries (Watersheds of the Debeda and Khrami Rivers)** (2005-2006). (**South Caucasus Cooperation Program of The Eurasia Foundation).** Project aim was Regional confidence and partnership building through establishment of the mechanism of regional cooperation and public awareness (regional seminars and trainings, regional newspaper).

Project: **Increase of Public Environmental Awareness and Information in Transboundary Regions of the South Caucasus Countries (watersheds of the Debed and Khrami Rivers)** (04.2003-01.2004) (**South Caucasus Cooperation Program of The Eurasia Foundation).** The Project encompassed a range of activities in the field of integrated management of water resources in the South Caucasus transboundary region - basin of the Khrami-Debed Rivers. Within the scope of project has established Public Environmental Information Centers in the transboundary regions of the South Caucasus, namely in Bolnisi (Georgia), Akhtala (Armenia) and Kazakh (Azerbaijan).

Other important projects related to internal waters of Georgia are as follows:

Project: **Water Management in the south Caucasus (Armenia, Azerbaijan, Georgia)** (2000-2004) (**USAID**). The project goal was to increase the dialogue for sustainable water management between representatives in Georgia, Armenia, and Azerbaijan in the riparian states of the South Caucasus, and to encourage bilateral actions on the sustainable use of natural resources.

Project: **South Caucasus Water Program (Armenia, Azerbaijan, Georgia)** (2005-2008) (**USAID**). Goal of this project was to increase regional cooperation in the management of shared water resources that is effective and sustainable.

Project: **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 Kura. The overall objective of this

Project was to support the prevention, control and reduction of adverse trans-boundary pollution impact caused by the quality of the four rivers selected for the Project. Although the focus was strongly on monitoring, the project addressed related legislative, institutional, economic and financial issues.

Project: **Reducing Transboundary Degradation in the Kura-Aras Basin (Armenia, Azerbaijan, Georgia)** (2003-2005) **UNDP,SIDA.** 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.

Project: **Trans-boundary cooperation for hazard prevention in the Kura-river basin. (Armenia, Azerbaijan, Georgia)** (2003-2006)**The Federal Environmental Agency of Germany (UBA).** Main objective was to find out the risks and uncertainty and specially the following general conditions for the project: Development of industrial hazard prevention system; Development of 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.

Project: **REC Caucasus Water Program (Armenia, Azerbaijan, Georgia) (**2001-up) (**EU,USA)** Aims strengthened cooperation and coordination between the various stakeholders of the three countries of the region for integrated management of transboundary water resources.

Project: **Support to the 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.

Project: **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

Project: **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 Closely oordination of the project with the UNECE activities.

Project: **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.

Project: **REC Caucasus "Creation of Enabling Environment for Integrated Management of the Kura-Aras Trasboundary River Basin"** (2010). (**EU, USA**). Elaboration of a Road Map on sustainable management of the Kura-Aras river basin through introduction of the EU Water Directives.

Project: **Development of Environmental Monitoring and Management Systems in Georgia** (2007-2008) **Finnish Gov.** 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 large number of projecs were implemented related to Internal waters of Georgia, spent million of U.S. dollars and Euros, although majority of the project was/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 in this direction; cooperation of the specialists and systematization of scientific component of the projects, because without the outcomes of such cooperation efective implementation of the projects is impossible.

Although, huge financial resources were invested on sustainable waters resources managements in transboundary cooperation direction, similar thematic projects financed by different donors were/are taking places in parallel, the desirable outcomes in this regard still is not achieved.

Separately to the above mentioned projects, should be mentioned the projects related to Aquaculture.

Report: **"Review of fisheries and aquaculture Potentials in Georgia"** was 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 emphasizes 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, in February- June of 2011 has been developmed and successfully implemented Project: **TCP/GEO/3301 "Upgrading Georgian Fish Farm Facilities and Supporting the Restart of Fish Seed Production"** (**FAO-SEUM**).

The physical survey of 121 fish farms and their production facilities, individual and group discussions with farmers, as well as three successful practical training workshops on the artificial propagation of carps and African catfish are the most important results of TCP/GEO/3301.

To avoid threats to the internal waters biodiversity aquaculture it should be regulated untill it is not well-developed.

Chapter VII. Problems, dangers and recommendations for the biodiversity protection of internal waters of Georgia

Biodiversity of Georgia has the global importance. The Caucasus ecoregion is one of the "hottest points" of the biodiversity and the ecoregion of the global importance distinguished by diversity of species, higher level of endemism and by rare biomes.

In the fourth national report of Georgia prepared for the biodiversity convention is mentioned that the great amount of plants and animals are endangered and also near to extinction because of the habitat destruction and resource output. 29 species of mammals, 35 birds, 11 reptiles, 2 amphibians, 13 fish and 56 species of arboreal plants are registered in the "Red List" of Georgia. 44 species representing vertebrate fauna of Georgia are globally endangered and registered in the IUCN Red List as a vulnerable (VU) or a taxon of higher category.

Inventory and evaluation of fresh water and swamp ecological conditions hasn't been carried out in Georgia. Most of them are not protected; they are modificated s a result of anthropogenic factors' pressure (water pollution, illegal fishery and dam). Invaded (invasive) species are added to it and as a result we get fragmentary wetland ecosystems and habitats destroyed not only for birds. Fish resources are significantly decreased in internal reservoirs of Georgia. Condition of the species of internal water ichthyofauna (accept sturgeon and the Black Sea salmon) among them endemic forms of the Caucasus ecoregion is unknown.

Main threats to the biodiversity of internal waters are: illegal fishery, the construction of the dams on the rivers, invasive species, efficiency of monitoring system, lack of qualified staff, water pollution, etc.

High percentage of the illegal fishery is still unsolved. Among violations revealed in environmental protection must be mentioned 272 cases in fishery in 2008, 494 cases - in 2009, 427 cases - in 2010, but in 2011 were revealed 231 ones. If we take into consideration that above facts are only the part (presumably only the small number) of the real quantity, then the pressure from the side of poachers on the Georgian internal water resources becomes obvious. While fishing the local poachers often use electric devices, poisoning and explosive substances that cause irreparable damages to the life of Georgian internal waters.

Big dams destroy fish and fishery. The reduction of fish species in head water dam (riverbed located in the upper of the dam, where there is also a reservoir) is invoked by blocking migration routes of fish with dams. As a result fish reproduction reduces on the one part, but on the other part fish movement in tail-water is broken off. In addition the water flow and quality is significantly changed in the water-tail, which negatively influence on fish species. As a result of above mentioned fish species in rivers are reduce or generally disappeared. The water ecosystem undergoes degradation. The present year is the year of the construction of huge dams. Much attention should be paid to the evaluation of the influence above objects on environment to avoid getting poor results instead of improving economical situation.

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 has appeared in Georgia as an invaded species in recent 30 years and at present it is widely spread in the reservoirs of Georgia. Though its influence on the ichthyofauna of various reservoirs is unknown, accordingly types of taking measures couldn't be defined.

According to the present condition the problem is lack of monitoring system and qualified staff in this field. Old data and their small quantity, must be separately noted which considerably decreases setting of specific activities, which are necessary to be carried out for the sustainable fisheries management.

Pollution of surfacel waters in Georgia by such organic substances as: phenol, hydrocarbon, copper, manganese, zinc and nitrates significantly exceed the threshold level. Until recent years surface waters of Georgia in lowland areas were strongly polluted by chemical fertilizers, industrial waste and sewage waters. The first two factors were considerably reduced because of the agricultural and industrial activity reductions. Though it is likely that there is still great quantity of dangerous elements (heavy metals) concentration at the bottom of the water reservoirs. At present the main sources of surface waters pollution are municipal sewage systems, medical institutions 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.

Despite the existed potential the aquaculture is weakly developed in Georgia. Since 1994 all the aspects of fishery section have been moved from the Ministry of Agriculture to the Ministry of Environment Protection and Natural Resources. This change has been done in

order to achieve the management synergism of biodiversity, fishery, introduced species, pollution, and protection of environment from degradation and of other environment protection spheres. At present the Ministry of Agriculture is in charge of the fishery and marketing, in particular, of safety of food products, veterinary, hygiene and quality control, fish industry and of aquaculture sections (National Agency of Food products). Issues of sphere development are the competence of the Administration Development Sector of the Ministry of Agriculture. The 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. Aquaculture section has not been regulated yet.

To reduce biodiversity threats of internal waters of Georgia and to solve problems should be done as follows:

- To make serious supports to the research of internal water biodiversity (in the direction of staff training and financial support).
- To make systematic and regular monitoring of the biodiversity, to collect regularly new information by using modern methods, to study internal water faunistic and floristic components by means of new methods, to study and to make monitoring of invasive species and to work out appropriate preventive measures.
- To prevent pollution by permanent control of water quality, to determine various contaminants in the tissues of water animals.
- To strengthen and make active the Inspection of Environmental Protection.
- To evaluate the resources of fishery frameworks and improve the system of quotes determination.
- To ensure sustainable profit for fish resource renovations and to reproduce endangered and endemic species.

For the efficient management it is necessary to raise internal water awareness and analyze their real function. Any resolution should be accepted deliberately. Persons making decisions and politicians must be sure that intersection approach must be based on transparency, compromises and on long-term, effective and sustained plans.

Biodiversity protection in sustainable profit conditions needs system approach, where all chains are in close interrelations (Fig.8).

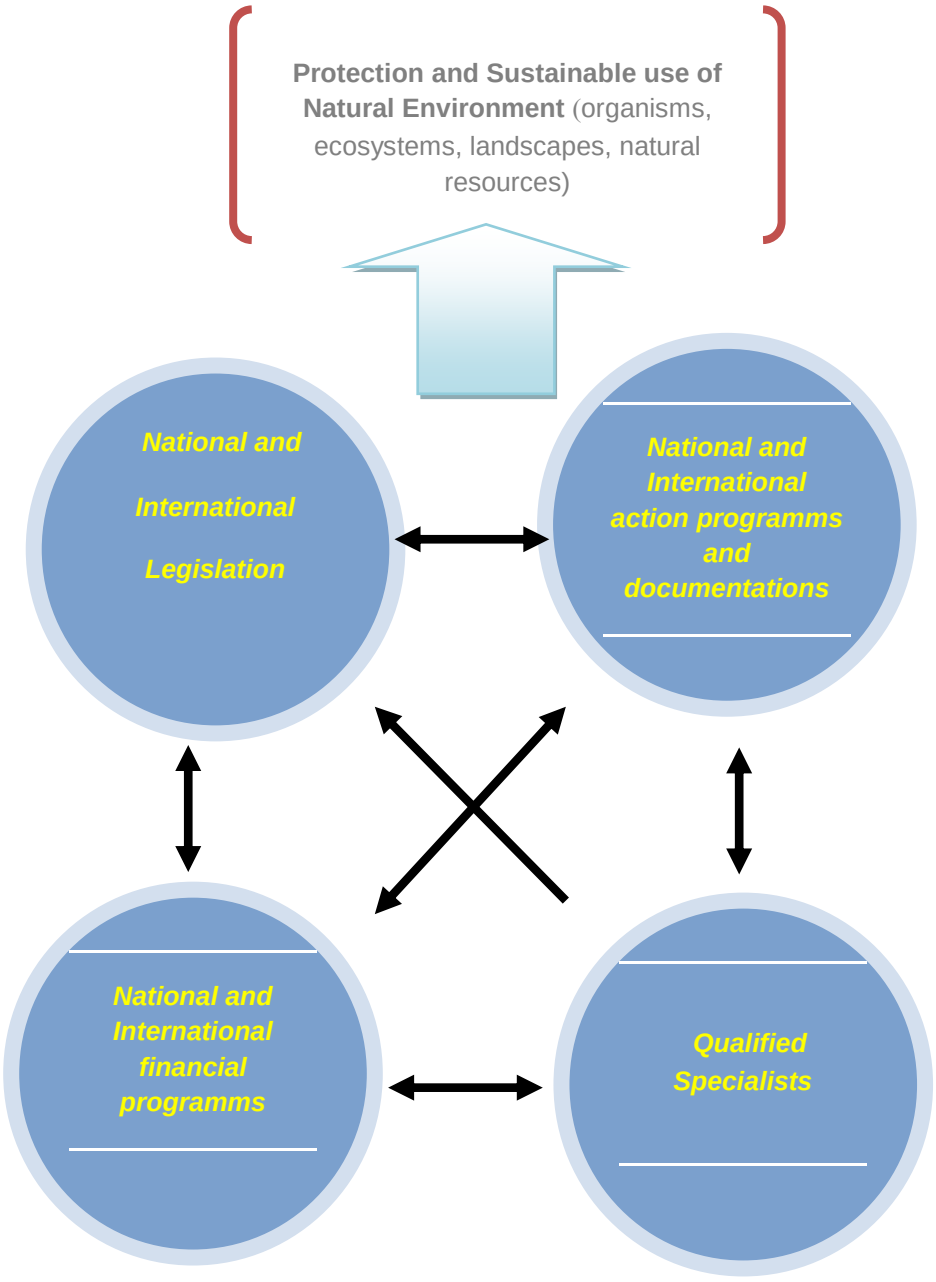
Protection and Sustainable use of Natural Environment (organisms, ecosystems, landscapes, natural resources)
National and International Legislation
National and International action programms and documentations
National and International financial programms
Qualified Specialists

Fig.8.

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