



Lake Shkoder Transboundary Diagnostics Analysis

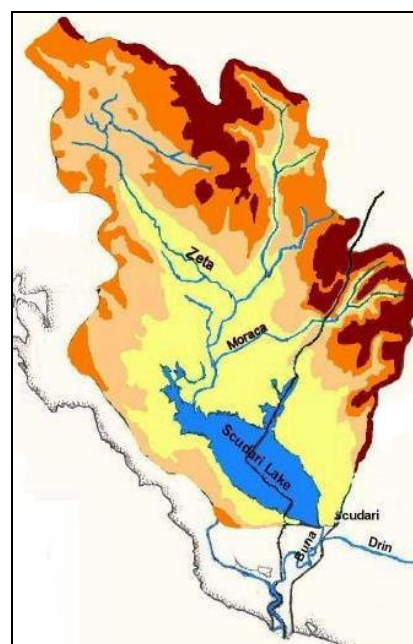
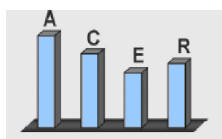
Albania & Montenegro

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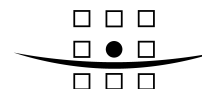
Final Report: Summary

9P6515



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**ABBREVIATIONS AND ACRONYMS**

ACER	=	Albanian Center for Economic Research
Alb.	=	Albania
a.s.l.	=	above sea level (Adriatic Sea)
BOD	=	Biological Oxygen Demand
CARDS	=	Community Assistance for Reconstruction, Development and Stabilisation
CETI	=	Ju Centar za Ekotoksikoloska Ispitivanja Crne Gore (Center for Ecotoxicological Research of Montenegro)
COD	=	Chemical Oxygen Demand
COOPI	=	Cooperazione Internazionale (Italia)
EAR	=	European Agency for Reconstruction
EC	=	European Commission
EEA	=	European Environment Agency
EIA	=	Environmental Impact Assessment
EU	=	European Union
FMO	=	Fishery Management Organisation
Geozavod	=	Institute for Hydrogeology and Engineering Geology, Serbia and Montenegro
GIS	=	Geographic Information System
HMI	=	Hydrometeorological Institute (Albania, Montenegro)
IBRD	=	International Bank for Reconstruction and Development (World Bank)
IEE	=	Initial Environmental Examination
IPPC	=	Integrated Pollution Prevention and Control
IUCN	=	International Union for the Conservation of Nature
KAP	=	Kombinat Aluminijuma Podgorica (aluminium factory)
KNMI	=	Koninklijk Nederlands Meteorologisch Institute
MAFWR	=	Ministry of Agriculture, Forestry and Water Resources
MEPPP	=	Ministry of Environmental Protection and Physical Planning (M.N.)
M.N.	=	Montenegro
MoE	=	Ministry of Environment (MoE)
MoU	=	Memorandum of Understanding
MPAS	=	Methylene Blue Active Surfactants (detergents)
NGO	=	Non-Governmental Organisation
NPMN	=	National Parks of Montenegro
PIU	=	Project Implementation Unit
POP	=	Persistent Organic Pollutants (e.g. DDT, PCB)
PPU	=	Project Preparation Unit
RBMP	=	River Basin Management Plan
REA	=	Regional Environmental Agency (Albania)
REC	=	Regional Environmental Center
REReP	=	Regional Environmental Reconstruction Programme
RH	=	Royal Haskoning, Dutch consultancy firm
RS	=	Remote Sensing
SAP	=	Strategic Action Plan (Lake Shkoder/ Skadar)
SNP	=	Skadar Lake National Park
TDA	=	Transboundary Diagnostics Analysis
ToR	=	Terms of Reference
UMN	=	University of Montenegro
UNEP	=	United Nations Environment Programme
UNDP	=	United Nations Development Programme
USAID	=	United States Agency for International Development
WB	=	World Bank
WFD	=	Water Framework Directive (European Union)
WHO	=	World Health Organisation
WWF	=	World Wide Fund for Nature

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1 PROJECT BACKGROUND AND OBJECTIVES

A Transboundary Diagnostic Analysis (TDA) is defined by GEF as “a scientific-technical assessment by which environmental issues affecting international waters in a region are identified and quantified, their causes analyzed and their impacts assessed, and the main actions needed to improve the problem are identified”. The TDA is a preparatory study for a larger project, the Lake Shkoder Integrated Ecosystem Management Project.

The overall objective of the Lake Shkoder Integrated Ecosystem Management Project is to assist the Governments of Albania and Montenegro in achieving more sustainable use of the natural resources of Lake Shkoder and its watershed. In this TDA an inventory of the available environmental data is made. The state of the environment, its use, and their developments were assessed in Lake Shkoder and its watershed, based on the data collected. The environmental pressures and threats to the lake and its basin have been identified and partly quantified. Finally, a set-up for a bilateral management strategy, including goals and approaches to address the identified problems, and some proposals for investment options are presented.

2 DATA AVAILABILITY AND KNOWLEDGE GAPS

There is in all fields of environment, treated in this report, quite some data available, but data collection has often been uncoordinated, irregular in time and space, and using different methods and standards. The dramatic political changes and bad economic situation in both Albania and Montenegro in the past 15 years contributed to this. The result is that parameters and variables are difficult to compare and trends hard to assess.

Since a few years, with institutional strength increasing, monitoring programmes are being developed (both by governmental and non-governmental organisations) in most environmental fields. One problem is that the objectives of the programmes are often not clear and the resulting strategy and design possibly inadequate.

The main problem today, however, is financing of often expensive programmes. A sometimes related issue is that, because of both the cost of data collection and the value and ‘power’ that data represent, access to the data may be restricted. Institutes and people are often not willing to share their data, unless high prices are paid.

Information on geology, geomorphology and soils is sufficient for management purposes of the basin. There exists ample literature on these subjects, and the Academies of Science, the Geological Institutes, and the Universities in both countries are the main sources.

Climatic and hydrological data are collected by the Hydro-Meteorological Institutes (HMI's) in Albania and Montenegro. The geographical coverage and measuring frequencies seem sufficient, but there are data gaps at many stations. The main problem however is access to the data; the HMI in Albania asks a high fee for their data, while in Montenegro the willingness of the HMI to share information is also limited.

Data on quality of groundwater, surface water, soil, rain and air can be obtained from various sources. Again, the HMI's do the structural collection (monitoring), but additional studies are done by the CETI, the universities, and the Academies of Science. There is much information available, but methods, spatial coverage and sampling times vary,

which makes it difficult to compare the figures. Often the metadata (description of methodology, location, accuracy, date/ time, person who took the sample etc.) is missing.

Monitoring programmes for flora and fauna do not exist in the two countries; only for birds on and around the lake annual counts are realised (with some years missing). Plans for monitoring exist, but funding is lacking. Many studies on flora and fauna are done, but not basin-wide (e.g. raster-based inventories). Information sources are: the Institute for Nature Protection in Montenegro, the universities, the Academies of Science and NGO's (e.g. Euronatur).

An important data source for the socio-economy and population are the population census reports (about every 10 years). Further, reports and books from various institutes and websites have been used for this report. The social assessment component of the TDA gives more details on data availability, reliability and sources for socio-economy and population.

Information on institutional and legal context, policies, projects and programmes is available at the ministries and with the various other organisations and stakeholders active in the Lake Shkoder basin.

3 ENVIRONMENTAL DESCRIPTION OF THE LAKE AND ITS BASIN

3.1 Geology and geomorphology

The Balkan peninsula experienced a strong orogenic period resulting in the Dinaric Alps. The basin of Lake Shkoder is a depression located south of the Dinaric Alps and orientated northwest-southeast, parallel to the current shore of the Adriatic coast. Limestone and associated karstic processes determine the geomorphology. On the northern and north-eastern side of the lake, the flat Zeta Plain and the main inflowing rivers are located. Their deposits (deltas) and the lower edge of the Plain have created a wide marsh belt that is regularly flooded. Lake Shkoder is separated in the southwest by steep hills from the Adriatic Sea: the Tarabosa and Rumia mountains. This zone is only 10 to 15 km wide but with peaks up to 1600 m. Along the lake's coastline there are elongated islands. Many karstic springs can be found in the south-western part of the lake. The lake area drains through the Buna-Bojana River to the Adriatic Sea.

3.2 Climate

Climate in the Shkoder basin is Mediterranean, but with higher rainfall amounts due to the mountains. Annual rainfall on the lake is between 2,000 and 2,800 mm, but within the basin some areas receive over 3,000 mm. Humidity levels are low, sunshine hours and temperature in summer are high, giving a high evaporation. Temperature in winter is low, due to the high elevations and predominant easterly and northerly winds, but at lake level above freezing point.

3.3 Hydrology

Lake Shkoder is the largest lake on the Balkan Peninsula in terms of water surface. The drainage area of the lake is about 5,500 km² (4,470 km² in Montenegro and 1,030 km² in Albania). The lake area varies between 353 km² at a minimum lake level of 4.6 m (above sea level) and 500 km² at a maximum lake level of 9.8 m (with 335 km² in Montenegro and 165 km² in Albania). The lake volume varies between 1.7 km³ in dry periods

and 4.0 km³ during wet periods. The most important tributaries of Lake Shkoder enter the lake from the north: Moraca, Crnojevica, Orahovstica, Karatuna, Baragurska River in Montenegro, and Rjolska and Vraça River in Albania. On the west side many small streams flow into Lake Shkoder. Precipitation on the lake, groundwater and springs contribute also to the inflow. Two main groundwater sources can be distinguished: aquifers in the Zeta Plain and karstic springs, mainly on the south-western side of the lake. The lake's outflow through the Buna-Bojana River is sometimes impeded due to high water levels in the Drin River, which flows into the Buna-Bojana less than a kilometre from the lake outlet. The lake outflow by River Buna-Bojana is on average 300 m³/s.

3.4 Quality of groundwater, surface water, soil, rain and air

Most pollutants for surface water, groundwater, soil and air in the basin originate from Podgorica, situated on the Moraca River terraces in the Zeta Plain. On the Albanian side the main polluter is the City of Shkodra with its solid waste and wastewater. The main sources of pollution are:

- 1) The Aluminium Plant Podgorica (KAP = Kombinat Aluminijuma Podgorica);
- 2) Steelworks in Niksic;
- 3) Wastewater from the cities and towns in the basin;
- 4) Municipal wastes from the cities and towns in the basin;
- 5) Mineral waste oils in the Zeta Plain;
- 6) Agriculture in the Zeta Plain;

As early as 1981, analysis presented by Petrovic and Beeton indicated that the physical-chemical characteristics of the lake water are the result of inflow from its main tributaries (the Moraca and Crnojevica Rivers), inflow from the karstic springs, exchange between the sediments and overlying waters, and the chemical exchange between the waters and the extensive beds of aquatic macrophytes. Recent data on the quality of water in the lake and the tributary rivers supports their arguments. The 1981 study, the first overview of environmental data on Lake Shkoder, serves as the basis for evaluation.

Data presented in this report show that during the past three decades the lake and its basin have experienced varying states of pollution. A well defined pollution trend for the basin as a whole is difficult to establish on the basis of the fragmented and inconsistent data sets. Also, water quality in the lake varies in space and time. Most pollutants are brought by the Moraca and Crnojevica Rivers that are common places of disposal for poorly treated solid waste and wastewater. The concentration of pollutants like ammonia is high in the northern and north-western part of the lake and near the entry points of the Moraca. Further, the concentrations of pollutants show seasonal variation, depending upon the weather and the flow in the tributary rivers. For example, the dissolved oxygen is lower in the summer period. During peak flows, the Moraca River water influences most the water quality of the lake.

In general, the quality of the lake water appears to be reasonably good, thanks to the high refreshment rate of 2-3 times per year. However, lake sediment and dry soil quality in some locations is a concern. The following discussion by parameter group gives more details:

- Trend in basic parameters:

Most basic parameters of the lake water quality have remained more or less the same since the 1980s, but e.g. nitrates and oxygen have deteriorated. The increase in nitrates

and reduction in oxygen, in particular near the Moraca Delta and the Zeta Plain, may indicate an increase in organic pollution (e.g. by urban wastewater). Eutrophication is not (yet) an issue as a result of the high 'turn-over rate' of the lake water, but stagnant corners near the Moraca Delta and Zeta Plain are at risk.

- Trend in PCB-s and PAH-s:

Concentrations of PCB in surface water were above the detection limit in the Moraca River between 1990 and 1995. Recent measurements of PCB and PAH concentrations are below the detection limit and are currently no reason for concern for surface water quality (as long as the measures taken by KAP remain effective). In the groundwater and sediments these parameters were reason for concern. The values measured in 2005 decreased to acceptable levels, probably due to the measures taken at the KAP. In the dry soils of the Zeta Plain PCB and PAH show concentrations harmful for biota.

- Trend in heavy metals:

The analysis of metals in the water of the Moraca River, Crenojevica River and in the Shkoder Lake in 1981 (and the years before) showed minimum concentrations of Na, K, Cu, Zn, Cr, Pb, Mn, Co, As, Hg, Cd and Fe. The comparison between their concentrations upstream of the rivers and at the lake showed little difference, except for some insignificant increased concentrations of Na and Fe at a specific site in the Moraca River. This implies that the lake water at that time was hardly polluted by the existing industries within the lake basin. Note that the KAP began its first production at its full capacity in 1973. Further, all analyzed metals were below the Montenegrin MDK standards for drinking water.

Recent analyses of lake water and sediments show an increase in concentrations of heavy metals. The concentrations are higher at the mouth of the Moraca River, mainly due to the industrial wastes originating from the KAP. The highest Hg content in July 2005 was 1.77 mg/kg in sediments (0.40 mg/kg in fish), while it was undetectable in 1974-1977 (Filipovic, 1981, p.99). Heavy metals accumulate in the sediments, while the water is refreshed over twice a year. The Hg in the sediment exceeds the EU standards on four of eight locations and of Ni on two out of eight locations in 2005. On the Albanian side of Lake Shkoder in 2003, at 7 out of 10 locations the concentration of Ni exceeded the EU standards.

- Springs:

The current analysis of Albanian spring waters (Shegani and Viri) near the lake show that their quality is good and within the permissible limits of the EU standards. Although data are missing on spring water quality in Montenegro, one can expect that these are also of good quality, by lack of pollution sources in their areas of origin.

- Pollutants in biota:

Toxic and carcinogenic substances as PCB-s, PCT-s, PCDD-s, PCDF-s, PAH-s, Phenols, F and CN that enter the ecosystem accumulate in fat tissue of species (PCB-s from 0.008 µg/kg in man to as much as 14,000 mg/kg in fat tissue of fishes and birds). These substances are extremely stable and their decomposition by chemical means or by micro-organisms is very difficult.

Concentrations of PCB-s and other pollutants in lake water, river water, groundwater, lake sediments and in tissue samples from various fish species living in Lake Shkoder have been analyzed during the last 15 years. The concentrations of PCB's exceeded in some cases in the period 1990-1996 the permitted US EPA values for food consumption (2 ppm or mg/kg).

A recent study from 2005, by the Universities of Heidelberg (Germany) and Shkodra (Albania), showed that the highest concentration of total PCB-s was found in rudd (*Scardinius erythrophthalmus scardapha*) being 200 µg/kg and that the lowest concentration was found in perch (*Perca fluviatilis*) being 35 µg/kg.

Recent data from Montenegro on PCB-s in water and in fishes (analyzed in 2004 and 2005) show that concentrations of PCB-s decreased strongly since the 1990s. This is the result of a combination of the following:

- the removal of the source of pollution: all barrels and soil contaminated with Piralen from the KAP are put in a special bunker;
- pollutants are transported quickly by groundwaters due to the high permeability of the soil in the Zeta Plain;
- the high precipitation in the region during the last 15 years;
- the high 'refresh' rate of the water in the lake.

PCB-s end up partly in the lake sediments, where they can remain for a long time. This was confirmed during a project carried out by Heidelberg University with the Universities of Montenegro and Shkodrar in 2001-2002, applying passive sampling using Semi-permeable Membrane Devices (SPMD), simulating long-time exposure of an organism to pollutants. Bentic fauna (e.g. worms, eels) are in particular exposed to pollutants in the sediments.

3.5 Flora and fauna

The Shkoder Lake region is located in a zone where two major zoogeographic areas meet: the Palaearctic region (Europe, Asia, the Mediterranean and North Africa) and the Palaetropic region (Africa). Their linkage and influences can be seen among bird fauna, with incidences of African species (e.g. African cuckoo, African black heron, flamingo) and winter migratory species of West Siberia (ducks, geese). During the last glacial period Lake Shkoder represented a refuge for several species. As a result, today some relict and endemic animal and plant species are met in the area. After the ice age, species such as the turtledove, the Dauric swallow, Syrian woodpecker and Spanish sparrow have come to the region as they expanded their distribution area.

The majority of Shkoder Lake invertebrate groups have not been well researched. As invertebrates play an important ecological role, among others as principal food source for many higher level species, the lack of knowledge prevents a good understanding of the lake's ecological functioning. About 257 species are known in the area.

Shkoder Lake is very rich in amphibians and reptiles. These include endemic and endangered species. The lake, with its wide zone of water vegetation, floodplains, humid forests as well as many streams, is an ideal habitat for amphibians like the Ranidae (frogs, e.g. the Shkoder green frog, *Rana shqipERICA*). Currently 51 species have been met, including a large number of protected species and many endemics.

Shkoder Lake attracts birds, flying long migratory routes, but also provides good nesting and colonisation conditions. The avifauna shows a large number of species: some 271 belonging to 18 taxonomic orders. Ninety percent of the bird species are regionally and intercontinentally mobile, linking the region to neighbouring countries, Asia and Africa. Around 73 species of migratory nesting birds inhabit the lake in spring and summer, leaving in autumn, about 18 species fly over the area during autumn and spring, 45 species are regular winter guests and 12 species spend summers on the lake, while their populations nest in the north. In addition, there are some 90 species that visit the lake irregularly, including those that fly over or visit the lake during the winter or summer season. The number of waterfowl on the Montenegrin side is determined by winter counts since 1990. Between 1990 and 1999 numbers varied between 150,000 and 250,000, but since 1999 numbers have dropped strongly to 35,000 in January 2005. *Fulica atra*, *Anas platyrhynchos* and *Aythya ferina* are found in large numbers. Shkoder Lake is listed as an internationally important wetland and waterfowl habitat (Ramsar site).

The mammals related to Lake Shkoder are not well researched. The total number of species found is 50 (belonging to 6 orders). Only a few mammals are strongly linked to the water habitat, like the otter (*Lutra lutra*). Bats are especially abundant around the lake. The other mammals live mainly in the forested areas, predominantly located on the south-western shore of the lake and in the mountainous areas.

Lake Shkoder has a high variety of fish fauna, the result of a good communication with the sea, and of an extensive network of rivers and streams. Its ichthyofauna includes highland coldwater fish species, warm freshwater fish species and several marine species; in total about 60 species belonging to 17 families. The relatively high number of endemic species makes the lake significant on regional level. About 10 species are commercially exploited (e.g. carp, bleak and eel). Two fish families are especially important: cyprinids (most abundant in species) and salmonids (which are much rarer).

In Shkoder Lake about 64 genera with 310 species and taxa of phytoplankton are met. The phytoplankton population is mainly composed of Diatomeae. The majority of the species found are cosmopolitan and alkalophilic. Among the diatoms of the lake, the most common species are *Cyclotella ocellata* and *Aulacoseira ambigua*. The observed phytoplankton composition is a good indicator of the lake's oligotrophic conditions and is one of the parameters that should be included in a monitoring programme.

The total number of aquatic macrophytes for the whole area of Lake Shkoder is 164 species belonging to 66 genera and 43 families. At the lake's northern shore dominant plant communities include the *Scirpus* – *Phragmites* community (*Phragmites communis*, *Scirpus lacuster*, *Typha angustifolia*) and the *Myriophyllum verticillati* – *Nuphar* community, where especially *Nuphar*, *Ceratophyllum*, *Trapa* and *Potamogeton* species are represented. The western lake shore consists of steep rocks and hills with hardly any submerged vegetation. Along the eastern and southern lake shore extended reed beds (*Phragmites*) have developed.

Reed beds and other macrophytes have purification capacities through nutrient retention and transformation (nitrogen, phosphor), and binding of pollutants. The water quality of part of the Moraca River improves by passing through the macrophyte vegetation of the wetland before it enters the lake.

Stands of willow (*Salicetum albae*) are the most abundant forests around the lake, mainly on the northern shore and in the flooding area. They are used by the local population for the production of fuel wood, for construction and for woven handicraft products. Forests of Shkoder's oak (*Quercus robur* ssp. *Scutariensis*), which were widespread in the past, have substantially degraded. The most significant forest communities are domestic chestnut and oak (*Querceto castanetum montenegrinum*), oak and European Turkey oak (*Quercetum confertae ceris*), as well as hornbeam (*Carpinetum orientalis*) with several sub-communities. Only degraded stands remain from the once well developed forests.

3.6 Fisheries

Fishery constitutes a vital activity in the Lake Shkoder area and fish productivity has always been high. From the collected data the following trends are deducted:

1. Significant decline of migratory fish in the overall production;
2. Decline of autochthonous fish in the 1980s, but a recovery since then;
3. Increase in exotic species, especially after 1980.

However, data to support conclusions on recent developments are hardly available: little information was collected since 1987 in Montenegro and between 1992 and 2002 in Albania.

Regarding the catches of migratory fish, the catches of Twaide shad (*Alosa alosa*) show a sharp decline from 1980 onwards. Among the migratory species also the Mugilidae are of economic importance. They also suffered a decrease in the catches, although not as drastic as Twaide shad. Eel catches seem to be related to hydro-meteorological conditions, but in general the production is stable. Among the autochthonous fish, catches of carp intensified, but bleak catches were less. Low value species like *Rutilus* and *Pachychilon* are not exploited any more since about 1990. Among the exotic fish, the catches of *Carassius* show a significant increase and lately also the catches of *Perca* and *Stisostedion* increased. During the last years, also large fishes, herbivores and planktivores like grass carp and big head carp, showed an increase.

In general, both primary and secondary productivity in Lake Shkoder is good as it is a shallow lake with sufficient food supply. Probably the main reason for the above-mentioned decline in the catches of some species (especially Twaide shad) is caused by uncontrolled fishing during 1992-2002. Since then the two governments have increased their influence on fishery through organisation of the fishermen and improved licensing. However, law enforcement is minimal due to a lack of funding for fishery inspectors and equipment. To relate catch quantities (number of fishermen/ licenses) to sustainable levels for the various fish species, strict fish catch monitoring is required (including estimates of illegal catches). Only then a realistic policy can be established.

3.7 Institutional context and stakeholders in Montenegro

The Ministry of Environmental Protection and Physical Planning (MEPPP) is responsible for the formulation and execution of the national environmental policy. Its responsibilities include nature protection, biodiversity and protected area management and its legislation. In addition to these, it has a regulatory and coordinating role in communal and housing issues, including waste and wastewater management. Further, the ministry coordinates activities of nature protection institutions such as Public Enterprise National Parks of Montenegro and Republic Nature Protection Institute (see below).

The Ministry of Agriculture, Forestry and Water Resources (MAFWR) is responsible for, among others, the management of water resources (including their protection against pollution), agricultural land, forests, hunting and fishing. Some of its responsibilities overlap with those of the MEPPP, particularly in the control of collection and trading of wild-life species, fishing and hunting in protected areas. The MAFWR is also responsible for the development of projects that regulate water levels of the lake.

The Ministry of Internal Affairs has the authority to control fishing through their National Park wardens. The Tourism Ministry is inter alia responsible for the promotion of National Parks. Several other ministries play a role in the environment of the lake and its basin, depending on the issue.

Local governments play an important role because of their direct involvement in physical planning and implementation of urban development, and in acts that regulate the use of areas adjacent to the National Parks. They can have considerable impact in the Park management by controlling (and monitoring) illegal construction of buildings. Further, their responsibilities and authorities extend to the management and operation of public utility services such as municipal (solid) waste, water supply and sanitation. The inspectorates for these public utilities are organised within local administration.

The Public Enterprise National Parks is responsible for protecting, promoting and managing the four Montenegrin national parks: Biogradska Gora, Lovcen, Durmitor and Lake Shkoder. Its revenue is partly generated by the collection of fees and charges levied on hunting, fishing, wood cutting and other economic activities.

The Skadar Lake National Park management authority is directly involved in the protection and management of the lake and its shores. They try to suppress illegal hunting and fishing. The SNP has a 5 year programme (2005-2010) and annual plans for the conservation and development of the park.

Three municipalities – Podgorica, Bar and Cetinje – bounding the lake, have a twofold role in the management of the SNP. They act as protection institutions as well as resource users. These local bodies are directly related to the park management and preservation because of their responsibility for managing municipal solid waste and wastewater (through public enterprises). They are also the sources of funding for the public enterprises. However, they have limited budget and, as a consequence, shifts their interests towards the use of the lake's resources through different economic activities.

Both the Institute for Nature Protection and the Natural History Museum have the responsibilities to record, protect and conserve protected objects, animals and plant species such as historical monuments, nature reserves, and endangered species. They are also involved in the implementation of nature protection policies.

The Center for Ecotoxicological Research (CETI) and the Hydrometeorological Institute (HMI) monitor the quality of the water, air, rain and soil, as part of their regular activities or upon the request of the MEPPP. Educational and scientific institutions include the University of Montenegro and the Academy of Science.

There are many (inter)national environmental non-governmental organizations (NGOs) active in promoting Lake Shkoder and its environment. The REC field office has

established a national and transboundary Lake Forum. Several NGO's work directly with local communities.

Several international organizations have been involved in the preservation of Lake Shkoder and its ecosystem. Their activities range from supporting local NGOs to providing technical assistance to nature protection institutions and funding the government in capacity building.

Private enterprises and local businesses such as hotels, handicrafts shops, tourist agencies, fish markets, hunting clubs, restaurants, catering services etc. are another group of stakeholders.

In addition to the institutions mentioned above, there exists a Council of Ministers of the State Union of Serbia and Montenegro. This Council oversees the implementation of international agreements and conventions that have been ratified by the former Federal Republic of Yugoslavia and for ratifying further ones. Little progress has been made in implementing these agreements due to the political transformation of former Federal Republic of Yugoslavia, poor cooperation between republican and federal authorities, the (transition) period of developing new institutions and lack of funds.

3.8 Institutional context and stakeholders in Albania

The Ministry of Environment, Forests and Water Administration (the former Ministry of Environment, MoE) is responsible for environmental protection in the country. After a recent restructuring of the government, the MoE also encompasses forestry and water management sector. Under its guidance, other ministries are responsible for ensuring the implementation of the national program on environmental protection.

The Ministry of Territorial Regulation and Tourism is responsible for the policy and planning of activities related to the development of tourism areas along the lake, water related activities in the lake basin and territorial regulation. The Ministry of Agriculture and Food has, among others, the authority to ensure sustainable use of Lake Shkoder's resource potentials such as fishing and preservation of aquaculture. The Ministry of Local Government and Decentralization is responsible for efficient functioning of local governments and their development policies.

The Council of Ministers is the highest body entrusted with approval of urban planning studies, master plans and regional plans, needed to account for environmental planning, procedures for the proclamation of protected and buffer zones.

Other government institutions and inter-ministry committees involved in the lake development and management are the National Council of Waters, Council of Aquiferous (River) Basins, Council of Territorial Regulation, Albanian Geological Service, Academy Sciences and Hydrometeorological Institute.

The National Water Council is the central decision making body for the development and management of water resources in the country. The NCW is headed by the Prime Minister and its members include Ministries of Environment, Tourism, Foreign Affairs, Energy, Agriculture, Health, and Academy of Sciences and the Technical Secretariat for Water. It formulates water strategies, decides national water policies and has the power to endorse international agreements on cross-border water bodies. For each river basin or a group of river basins a Council of Aquiferous (River) Basin is formed.

The Council of Territorial Regulation of the Republic of Albania is responsible for the approval of urban studies concerning development of National Parks, development of tourism, ports and physical infrastructures, mostly at the national level.

In January 1993, the Albanian parliament endorsed the basic law for environmental protection and some other laws related in particular to environmental items. As a result of this, the National Environmental Agency, an independent body, was established in 1998.

The government institutions that are responsible for the implementation of plans and programmes related to the conservation and management of the environment at local level are a.o. the Prefectures of the Shkodra Region, Directorate of the Drin-Buna Basin, Directorate of Agriculture and Food (Shkodra/ Malësia e Madhe), Regional Environmental Agency and the Directorate of Forest Service (Shkodër/ Malësia e Madhe).

There are local government bodies, the municipalities and communes representing administrative and territorial units covering the urban and rural areas. Most relevant of these are the Council of the Region of Shkoder, Municipality of Shkoder and the Council of Territorial Regulation of Shkoder. These institutions are responsible for the design of local environmental action plans in accordance with national environmental strategies.

The educational and scientific bodies involved in the protection and preservation of the lake's environment are the University of Shkodra, Museum of Natural Sciences, Faculty of Natural Sciences (University of Tirana), Fishing Inspectorate (Shkodër/ Malësia e Madhe), and the High Forestry School (Shkodra).

International organizations that have been supporting the lake's preservation and management include the World Bank, German Technical Cooperation (GTZ), Global Environment Facility (GEF) and various embassies.

Community organizations, non-profit organization and NGOs play a role by supporting local communities (e.g. REC field office Shkodra).

3.9 Socio-economy and population

About 500,000 people live in the Lake Shkoder watershed; most of them in the Montenegrin cities Podgorica, Niksic, Cetinje and Danilovgrad, and Shkodra in Albania. The current population growth in Serbia and Montenegro is 0.03% and the life expectancy is 73 years. In Albania it is resp. 0.6% and 74 years. The population living below the poverty line in both countries is about 30%.

There are 17 villages within the National Park area (Montenegro), with their population varying from 6 to 550 people. The population showed a decline in size in the park area in the 1990s, but this trend has reversed in the past years. This is partly due to development activities and the increasing political stability in the region. The migration of people to the lake side has increased the pressure on the coastal zones of the lake.

Albania has made significant economic progress since its transition from a communist regime towards a democratic market-based economy. The country's economy has been increasing since 1993 at an annual rate of about 8%. Although agriculture has traditionally played an important role in the economy, recent growth has been driven by the services and construction sectors. Agriculture in Albania counts for about 25% of its GDP. About 20% of the land is cultivated and approximately 50% of the labour force is

engaged in agriculture; the majority of the balance is involved in industries. Besides, Albania is rich in mineral resources, notably oil, lignite, copper, chromium, limestone, salt, bauxite and natural gas. Nevertheless, Albania remains one of the poorest countries in Europe.

Montenegro has experienced a severe decline in the standard of living in the last decade. The GDP has dropped by 50% since 1989. The (real) GDP growth rate for 2004 is estimated at 6.5%. The inflation rate established for the year 2004 is 8.8%. However, Serbia and Montenegro show signs of improvement in agriculture and industry. Agriculture remains an important economic activity in Montenegro, though it presently employs less than 5% of the labour force, and contributes to 15% of the country's GDP. The scale of farming is small and farmers use old and poorly maintained farming equipments. Irrigated agriculture is limited.

Fishing is another main activity in the coastal area of Lake Shkoder. Shkodra city (Albania) is an important fishing center. For many people living on the lake side, both in Montenegro and Albania, this is the only source of livelihood.

Both countries have a high tourism potential, but the necessary infrastructure is currently lacking. Hydropower has also in both countries development perspectives, making them less depend from foreign energy suppliers, in particular in Montenegro.

3.10 Projects and programmes

The concern shown by the national governments and international organizations towards the environment of the Shkoder Lake basin has resulted in many plans, programmes and projects, mostly internationally funded. Priority is given to the water and wastewater sector, with emphasis on the treatment of municipal and industrial waste and wastewater. Various road plans and developments are foreseen for the lake basin, one of which may run near the lake shore. In addition, small-scale projects and programmes are implemented by the government, local NGO's and private entrepreneurs.

Three major water projects, which were taken up by Montenegro and Albania, have been stopped or deferred, due to conflicts of interest, financing issues and potential adverse social or environmental impacts. These projects are the Moraca Hydropower System in the Moraca River basin, the Water Supply Project that includes transfer of water from Lake Shkoder to the coastal area (of Montenegro), and the Bushati Hydropower Plant on the Drin River in Albania. The hydro-power projects are essentially of bilateral interests because of the increasing energy demand of the two countries. Although on halt, the projects are still under discussion. Related to the Bushati Hydropower Project, the option to use the Buna-Bojana River as a waterway is being investigated and to convert lake wetlands, falling dry after a lake level reduction, into agricultural land.

The Skadar Lake National Park in Montenegro has a 5-year program (2005-2010) for the conservation and development of Shkoder Lake National Park, detailed by annual plans. In November 2005 the Albanian government proclaimed its part of Lake Shkoder a 'Managed Natural Reserve'; no programmes are developed yet.

3.11 Environmental policies and legislation in Montenegro

The basic legislation for environmental protection and biodiversity in Montenegro can be said to be in place and is gradually strengthened by acts, regulations and decisions. The Environmental Law published in 1996 states all provisions related to the assessment

and conservation of the environment. The legal provision to identify Montenegro as an 'ecological state' and to institute an environmental logo under Article 2, "Basic provisions of the law", illustrates the importance given by the State to the environment.

As mentioned earlier, the Ministry of Environmental Protection and Physical Planning (MEPPP) is responsible for the formulation and implementation of policies and legislation related to the environment. In 2001, the Montenegrin Government adopted the 'Directions for Development of the Ecological State of Montenegro', which represents their long-term development strategy.

While the MEPPP is entrusted with the overall formulation and implementation of the country's environmental policies and legislations, natural resources management is the task of two other ministries: the Ministry of Agriculture, Forests and Water Resources Management (MAFWR) and the Ministry of Economy and Energy (in charge of mineral resources).

3.12 Environmental policies and legislation in Albania

The Constitution of Albania gives a special place to the environment. In Chapter IV it is clearly defined that every citizen has the right to be informed about the environmental protection. In Albania, the legislation for environmental protection and management is in the process of being harmonised with the EU environmental legislation. The law (No. 8934 of 5 September 2002) entitled "On Environmental Protection" is the legal act which regulates the protection and conservation of the environment. Article 7 of Chapter II of this law lays down the policy guidelines on environment to be followed by the State.

The Ministry of Environment, Forests and Water Administration is the main policy-making public institution in Albanian. The environmental policy identifies the following priority objectives: strengthening environmental management capacities at national and local level, developing the necessary legal framework, ensuring the integration of environmental considerations into sector policies and programmes, improving the environmental situation in identified 'hot' areas, promoting environmental awareness, and integrating the sustainable development principle in the use of natural resources.

In 1999 the first Biodiversity Strategy and Action Plan (BSAP) was made. One of the goals of the BSAP was the enlargement and enforcement of the network of protected areas. The updated National Environment Action Plan (NEAP) of 2002 (the original one was from 1992-93) elaborates the environmental policies of the country. This updated plan envisages measures to be taken for the protection of different environmental mediums, and normative acts to be approved. In 2003 an intersectorial committee has been established for the implementation of the NEAP.

Recently, the Albanian government has proclaimed its part of Lake Shkoder a "Managed Natural Reserve" through the Council of Ministers' decision No. 684 dated 02.11.2005.

The enforcement of the laws and regulations and implementation of the government decisions in both countries are still weak.

3.13 Transboundary collaboration

Lake Shkoder area is a common resource to Albania and Montenegro. The dialogue between the two governments on issues related to the lake environment began in 1995.

However, it was only in May 2003 that the Memorandum of Understanding (MoU) for the Protection and Sustainable Development of Lake Shkoder was formally signed by the Ministers of Environment. By doing so, the two countries commit to conserve the natural resources of Lake Shkoder in a coordinated and integrated manner, to establish a bilateral Lake Management Commission and to improve the relevant national level regulatory and institutional capacities.

In the last few years the governments of the two countries have acknowledged the possible impact of further degradation of the lake's natural resource base in their development goals. Both governments show their willingness to cooperate in improving the protection and management of the lake and its resources. A Lake Shkoder Strategic Action Plan will be prepared under the framework of the 2003 MoU.

A recent development in bilateral co-operation is the joint inauguration by the Prime-ministers of the two countries of the international workshop on "Lake Skadar international designations for territorial development" on 18-19 October 2005 in Vranjina and Shkodra. This workshop was organised by the "Dinaric Arc Initiative", a framework of collaboration between offices of UNESCO, WWF, IUCN, UNDP and the Council of Europe and was attended by the Environment Ministers of both countries and other important stakeholders.

Both countries have signed, with most of them ratified, a number of international agreements and conventions related to transboundary waters and protection of the environment. The international agreements made previously under the Former Yugoslavic Republic at federal level (now Union of State) are *de jure* valid for Montenegro as well.

Further, legislatively the Government of Albania, by the Decision of its Council of Ministers no. 337 of 15.07.1999, has provided a special state-level commission to deal with water-related issues with the neighbouring countries. However, this Commission has been inactive to date.

4 ANALYSES OF PRESSURES AND THREATS

4.1 Status of flora and fauna

The current status of the ecology in the Shkoder basin is a mixed picture for the various flora and fauna groups. The good status of some flora and fauna species and habitats is partly the result of the turmoil in the previous decade that halted the economic development in the area, and the slow recovery in recent years. The limited number of pollution sources in combination with the high refresh rate (2-3 times a year) of the lake water and the inflow of clean karstic groundwater are the main reasons that the water quality remains good. The low population pressure and the inaccessibility of the higher parts of the catchment contribute too. In contrast, hunting has continuously affected wildlife, in particular birds, fish and mammals. The Skadar Lake National Park organised until 2003 hunting trips. The recent decline in bird numbers is a serious concern. Autochthonous fish is recovering after a decline in a period of uncontrolled fishing (1980's), but migratory species seem still to be affected by fishing, although not necessarily within the basin. Exotic species are expanding rapidly. Data on the status of other faunal species is limited due to a lack of monitoring. The flora remains relatively undisturbed to date; illegal logging in forests occurs.

4.2 Pressures and threats

Now that the economies of Albania and Montenegro are recovering, the grip of the government is still weak and the government programmes and projects are in their initial stages. Uncontrolled building activities, development plans on the lake shores, industrial growth and increasing municipal waste production threaten the ecology. Lack of financial means and institutional 'infancy' hampers the governments to effectively execute environmental programmes. However, with the political situation stabilised, international support gives opportunities to face the threats.

The following threats for the deterioration of the soil, water and sediment quality, and biodiversity of Lake Shkoder and its basin have been identified:

- 1) Pollution (industries, municipalities, solid waste, liquid waste);
- 2) Hunting and fishing;
- 3) Lakeshore development;
- 4) Water management measures.

The impacts of these causes cannot be quantified in the absence of a comprehensive set of data concerning the quality of soil, water and sediment and biodiversity, and pertinent data related to the causes. However, for the development of a strategy aimed at the conservation of the lake and its biodiversity it is important that the relative importance of the causes are assessed so that adequate policies can be formulated for the reduction of the impacts of different causes.

Table 4.1 Main pressures and threats and their expected short- and long-term impact on flora, fauna and habitats; government policies are expected to become more effective on long-term

Factor	Trend and impact on flora, fauna and habitats		
	Current	Short-term (1- 10 years)	Long-term (> 10 years)
Current and continuing activities			
Chemical pollution by industries	Slow increase: lake sediments are of concern	Strong increase: lake water may become a concern	Decrease: sediments remain a concern
Organic pollution/ wastewater by cities/ towns	Increase: surf. water locally of concern	Stabilisation: surf. water locally of concern	Decrease: surf. water locally of concern
Solid waste by cities/ towns	Increase: groundwater locally of concern ?	Stabilisation: groundwater locally of concern ?	Decrease: groundwater locally of concern ?
Hunting	Unsustainable	Unsustainable	Sustainable ?
Fishing	Unsustainable	Sustainable ?	Sustainable
Tourism	Slow increase	Strong increase	Stabilisation
Small constructions on the lake shore (e.g. houses)	Increase: little impact	Strong increase: impacts are a concern	Stabilisation: impacts mitigated ?

Factor	Trend and impact on flora, fauna and habitats		
	If realised now	Short-term (1- 10 years)	Long-term (> 10 years)
Potential developments			
Big development projects on/near lake (e.g. marinas)	Big impact	Big impact	Big impact
Projects lowering lake level, but maintaining dynamics	Huge impact	Big impact	Considerable impact
Projects lowering lake level and reducing dynamics	Huge impact	Huge impact	Big impact
Projects maintaining level, but reducing dynamics	Huge impact	Huge impact	Big impact

4.3 Institutional and legislative issues

After the drastic political and economic changes in Albania and Montenegro in the 1990s, a new institutional structure was created in both countries, similar to those in other democracies with open market economies. The structures are new, not yet fully settled and the inter-institutional relations and responsibilities are still developing.

There has been some collaboration between the two countries concerning Lake Shkoder, but this was and is mainly realised at scientific level (e.g. between the Universities of Shkodra and Montenegro, the two Academies of Science, biological institutes) and through the REC offices. Frequent consultation between the two Ministries of Environment is still lacking. This is probably due to the situation described above, asking full attention at national level (e.g. the ministries in Albania have been restructured after the recent elections in summer 2005), but probably also the historical-cultural background of the two countries plays a role.

Montenegro has little experience in transboundary institutional collaboration regarding shared water resources and environment. Albania has some experience with the set-up of a bilateral management set-up for Lake Ohrid with Macedonia, which can serve as a base for Lake Shkoder.

The environmental legislation of Albania is in transition from the pre-1990s situation to full compatibility with the EU legislation. Also in Montenegro EU legislation is being integrated into the national laws and the promotion of Montenegro as an 'ecological state' reflects its efforts to enhance its legislation. Thus, both countries give ample attention to the legal aspects of the environment, but enforcement is a major problem.

5 IMPROVEMENT OPTIONS

5.1 In general

To reach an acceptable and sustainable environmental situation in the Lake Shkoder basin is a long-term matter. The World Bank intends to assist the Albanian and Montenegrin Governments in preparing a strategic action plan for the lake and its basin and to support small projects and activities that will have a direct impact or trigger developments towards improving the environment. Other donors, as the EU and USAID, are also assisting in the implementation of projects with environmental components. The risk is that uncoordinated projects at this stage may upset a long-term integral approach. On the other hand, small-scale activities showing immediate results will motivate the local people.

To support the overall strategy for more sustainable use of the natural resources of Lake Shkoder and its watershed, a number of support mechanisms or policies should be formulated. The most relevant policies for the sustainable use of the natural resources of Lake Shkoder and its watershed are to be established and agreed between the key stakeholders involved in the development and implementation of the strategy. In this TDA relevant policies for achieving the sustainable use of the natural resources of Lake Shkoder and its watershed are suggested. The Strategic Action Plan should define the institutional structures and include a roadmap and actions to give effect to these supporting policies.

Regarding the institutional structures a distinction is to be made between the structures at national level and the bilateral management structure. The latter structure can only be effective when at the national level the institutions are well equipped for the planning and management of the use of the natural resources in the lake and catchment area.

A preliminary assessment of the institutional capabilities in both countries indicate that still much is to be done to achieve an institutional structure that could form the basis for an effective bilateral management structure. It is, therefore, recommended to focus on the strengthening of the relevant Albanian and Montenegrin institutions before a full fledged Lake Shkoder Water Management Committee is established. In the meantime, however, it is very important that lines of communication between the two countries with respect to the Lake Shkoder environmental issues are formalised. The first step would be the creation of a bi-lateral working group for Lake Shkoder as stipulated in the Memorandum of Understanding in the field of environment between Albania and Montenegro (2003). This working group should, at least, prepare a draft agreement on environmental protection and sustainable development, including the preferred institutional set-up for a Lake Shkoder Water Management Committee.

5.2 Pathway to a bilateral management organisation

With the MoU related to environment between Albania and Montenegro the basis exists for cooperation and establishment of a body for water management the Lake Shkoder basin. Working groups, as stipulated by the MoU, will be created and an action plan prepared for its implementation. Although signed in May 2003, no working group has been created yet, let alone an action plan prepared.

A primary goal of The Lake Shkoder Integrated Ecosystem Management Project (LSIEMP) is "to put in place a sound [...] institutional framework for joint management of the lake and its watershed [...]". The Lake Shkoder Strategic Action Plan (SAP) is intended to be the vehicle to achieve this goal. On the other hand, this SAP is assumed to be prepared jointly by the both countries. Such joint preparation requires a minimum bi-lateral management structure.

It is proposed that this initial bilateral management structure will consist of a Steering Committee (SC), supported by a joined secretariat. This joined secretariat could function as the bilateral working group (BWG) as mentioned in the MoU. The SC should be composed under the jurisdiction of the respective governments and should include representatives of:

- Ministries of Environment (Albania & Montenegro);
- National Parks of Montenegro and Skadar Lake National Park (Montenegro);
- Main municipalities (at least Shkodra and Podgorica).

It is recommended that the GEF participates in the SC as an observer and that the directors of the national PPU's¹ will participate as advising members of the SC.

The BWG is in charge of the daily activities related to:

1. the preparation of a draft agreement between Albania and Montenegro for the sustainable use of the natural resources of the lake Shkoder and its watershed,
2. the design of a bilateral water management committee,
3. the coordination of the preparation of the Lake Shkoder SAP.

The actual implementation of the Lake Shkoder SAP would then be supervised and monitored by the bilateral water management committee, once the bilateral agreement and corresponding management structure has been ratified by the two countries. The BWG could eventually merge into the bilateral management committee serving as its secretariat.

For the design of the bilateral water management committee the BWG should make a comprehensive stakeholder analysis in the whole basin and establish an inventory of opinions and ideas of all parties. For the design of the bilateral water management committee, subjects to consider are the legal basis, objectives, responsibilities and 'decision power', structure of the basin organisation, location, permanent and non-permanent members, voting and non-voting members, financing mechanisms, coherence of the organisation's activities with other policies and conventions, etc.

It is recommended that in the framework of the preparation of the Lake Shkoder SAP, the BWG will initiate:

1. the creation of a data base for the biodiversity and the economic activities in the Lake Shkoder basin;
2. the preparation of a monitoring programme of surface and groundwater.

Consultation with existing watershed management committees in other countries is advisable: committees in EU countries, having experience with the Water Framework Directive (like the ICPR and CIPEL), would be a logical choice, considering the prospect of EU accession.

The European Union member states are currently working on the creation of River Basin Management Plans (RBMP) for each river basin 'district', which is an obligation set by the Water Framework Directive. With the likely future accession of Albania and Montenegro to the EU, the WFD approach is an important guide.

5.3 Approaches for improvement and recommended strategic actions

The policies to support a RBMP for the Lake Shkoder basin are essentially the same policies that are needed to support the Lake Shkoder management strategy and that will form the skeleton of the Strategic Action Plan. This skeleton consists of the goals of the strategy, with for each goal and its components the current situation, pressures and

¹ The implementation arrangements for the LSIEMP call for the national Project Preparation Units (PPU's) to be operational for the preparation of the SAP.

threats (= future/ expected pressures) defined. From these it becomes clear whether action is required. A supporting policy indicates the way the action should be channelled. The following approaches or policies can be distinguished:

- Institutional development and coordination:
Assist the institutions involved in policy making, planning and managing development of the lake basin to develop their capacity and capability and systems for integrated and participatory management.
- Nature development:
Promote a coherent set of protected areas, well managed.
- Pollution reduction:
Promote Integrated Pollution Prevention and Control (IPPC).
- Legal framework:
Establish an appropriate legislative framework for integrated and participatory management, which promotes self-reliance, co-management and enforcement to the greatest feasible extent.
- Education and awareness raising:
Raise awareness of institutions and communities for sustainable use of natural resources.
- Information and knowledge development:
Support applied research and appropriate technology application. Improve information collection, storage, dissemination and accessibility.
- Environmental impact evaluation:
Improve environmental assessment, management and procedures.
- Livelihood support:
Assist in poverty alleviation in the lakeshore zone through supporting sustainable livelihoods development.
- Investment support:
Promote local and external investment in lakeshore areas for a sustainable economic and ecological development. Recognize the role and encourage involvement of private sector in all aspects of lake zone and basin management.

To put the policy into action for the above-mentioned policies, 17 small projects or investment opportunities have been identified.