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## Lake Skadar-Shkoder Integrated Ecosystem Management Project (LSIEMP)

Project activity: "Development of Skadar-Shkoder Lake Management Strategy and National Fishery Management Plans"

Component 1:

### **SKADAR-SHKODER LAKE MANAGEMENT STRATEGY**



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*Pelecanus crispus* – Dalmatian Pelican  
“Emblem” of Skadar–Shkodra Lake



“Cun” – traditional wooden boats of Skadar–Shkodra Lake  
Not one “Sinks down”

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## INTRODUCTORY NOTE

*The Skadar-Shkoder Lake Management Strategy* has been prepared as a component of REC activities for *Development of Skadar –Shkoder Management Strategy and National Fishery Management Plans* in the frame of World Bank / GEF *Lake Skadar-Shkoder Integrated Ecosystem Management Project*.

Document of the Strategy has been initially prepared by Mr *Buskovic Vasilije* as engaged principal consultant, reviewed by Ms *Srna Sudar* REC Work coordinator, and supervised by Mr *Novak Cađenović* Project Coordinator for aforementioned project.

Due to its relevance, document of the Strategy is accompanied with Zoning concept covering both, Montenegrin and Albanian part of Skadar - Shkoder Lake.

Among various recently developed analytical documents for Skadar – Shkoder Lake area, *Joint Strategic Action Plan (SAP, 2007)* and *Transboundary Diagnostic Analysis (TDA, 2006)* have been widely used or consulted for preparing text of this document, so most of the document text is given with no quotations.



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# I. INTRODUCTION TO SKADAR – SHKODRA LAKE MANAGEMENT STRATEGY

## I. 1. Character of Skadar – Shkodra Lake Management Strategy

While undertaking this assignment, consultant has estimated predominant character of the document that should be prepared (*Skadar – Shkodra Lake Management Strategy*) for public disclosure.

Upon reviewing relevant information in publicly available documents, following key reasons for determining character of the Strategy have been considered:

### a. Natural base - Physical and Biological characteristics of Skadar – Shkodra Lake -

- a. 1. **Physical characteristics** – Skadar - Shkodra Lake is located in Zeta-Skadar Valley, in the utmost southeast of Montenegro, and in the north of Albania. On northern side, Skadar - Shkodra Lake is bordered by the Zeta Plain, which is rich in groundwater<sup>1</sup>. On its southern side the Lake is bordered by the mountain slopes of Rumija, Taraboš and Sutorman, while on the east, in Albania, by Shkodra lowlands. The Lake occupies the lowest parts of Zeta-Skadar/Shkodra depression, which is in some parts a crypto-depression (under the isoline of 5 meters). The **water** level of Skadar – Shkodra Lake varies widely. Extreme observed values are  $H_{\min} = 4.97$  metres and  $H_{\max} = 9.84$  metres (10.44 metres in January 2011, HMI MNE), and area of surface water is varying between 395 km<sup>2</sup> with the minimum, and 530 km<sup>2</sup> with maximum water level. In the period of average / mean water level (6.59 metres), the Lake's surface is 475 km<sup>2</sup>. The Lake is mainly fed by the Moraca River, a 99 km long river flowing through Montenegro. Its watershed is app. 3,200 km<sup>2</sup>, and on average it brings 200 m<sup>3</sup>/s of the water into the Lake. Waters from the Lake empty into the Bojana/Buna River (44 km long) with an estimated outflow of 320 m<sup>3</sup>/s.

Skadar - Shkodra Lake is situated in an area where subtropical Mediterranean *climate* turns into moderate continental one. The absolute variations of the air temperature are significantly high. Maximum temperature reaches 40.6°C, while the lowest temperatures go down to –10°C. In a typical year there are around 50 tropical days (with temperature of 30°C or higher), while this number goes up to 80 days in extremely hot years. In the vicinity of the Lake the relative air humidity is high during any season of the year. Maximum values of up to 80% are normally recorded during the months of January and November, and minimum 64% in August. Precipitation intensity in the Lake's basin is typical for the Mediterranean climate. Maximum precipitation is in November and December (814 mm), and minimum in July.

The average annual precipitation equals to 2,100 mm, most of it in the western and southern parts of the basin. High temperatures, together with highly present airflows and relatively high air humidity, cause high level of evaporation during the

#### Basic data about Skadar – Shkodra Lake:

*Volume:* 2.6 billion m<sup>3</sup> (on average)  
*Surface Area:* 395 - 530 km<sup>2</sup>  
*Depth:* Mean depth: 6.59 meter, Maximum depth: 65 m  
*Age:* 0,25<sup>2</sup> million - 35<sup>3</sup> million years  
*Origin:* Tectonic, Karstic  
*Trophic State:* Mesotrophic with tendencies towards eutrophic in summer<sup>4</sup>  
*Type:* Freshwater, Permanent, Open, Natural origin  
*Catchment:* Catchment – Watershed area is 5500 km<sup>2</sup> (1000 km<sup>2</sup> in Albania and 4500km<sup>2</sup> in Montenegro)  
*Major settlements:* In Albania: City of Shkodra (196,400 inh.), Malesia e Madhe (45,700 inh.). In Montenegro: Podgorica, the capital of Montenegro (160,000 inh.), Niksic (73,000 inh.), Cetinje (22,000 inh.)

<sup>1</sup> According to D. Dragovic (1997) more than 17m<sup>3</sup>/s

<sup>2</sup> Cainozoic period when entire Zeta Skadar depression is formed

<sup>3</sup> Neocene period when basin of the Lake is formed

<sup>4</sup> Rakocevic-Nedovic, Jelena, 2005

warm period of the year. Winds, as a meteorological element, also have an important role in forming the climatic characteristics of the basin. Northern and southern winds dominate; there are also many local winds with original names<sup>5</sup>.

- a. 2. *Biological characteristics* - Lake Skadar is located in a zone where two major biogeographic 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 Ornithofauna, 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 Skadar/Shkodra Lake 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. Skadar/Shkodra Lake and its watershed represent a **complexity of habitats with a high diversity of living organisms**. It encompasses several types, subtypes and many smaller classification units of habitats, such as lacustrine, palustrine, riverine, limnetic, littoral, open water areas, vegetated and unvegetated, floating, emergent and submerged vegetation, hard and soft bottom, forest, shrub and herb vegetation etc. Some species [such as lush reed vegetation (*Phragmites communis*), water lilies (*Nymphaea alba*, *Nuphar luteum*) and water nuts (*Trapa natans*)] contribute to mitigation of effects of pollution from the catchments area.



*Trapa natans* – Water Nut



*Quercus robur scutariensis* – Skadar Oak

Significant deposits of peat are located in this part of the Lake's shore. Forest fragments of Skadar oak (*Quercus robur scutariensis*) are still present on the driest parts of the northern shore. The southern coast and lake islets are steep, rocky, with sparse sub Mediterranean pseudo-macquis vegetation (*Carpinus orientalis*, *Punica granatum*, *Paliurus spina-christi*, *Ficus carica*, *Phillyrea* sp.). The bed of the open lake is overgrown with submersed plants (*Chara*, *Potamogeton*, *Valisneria*, *Myriophyllum*, *Ceratophyllum* etc.). Ichthyofauna of the lake is dominated by carp species (*Cyprinidae*), common carp (*Cyprinus carpio*) and bleak (*Alburnus alburnus*) being the most important ones for local economy, which strongly depends on the traditional fishing. From the nature conservation point of view the lake is noted for common sturgeon (*Acipenser sturio*), a critically endangered specie on the IUCN red list. Skadar Lake is the most recognised for its Ornithofauna having the near-threatened Pigmy Cormorant (*Phalacrocorax pygmeus*), and the very rare Dalmatian Pelican (*Pelecanus crispus*) among the most important *flag* species. In the fish catch dominate: *Cyprinus carpio*, *Alburnus alburnus albarella*, *Carasius auratus*, *Perca fluviatilis*, *Alosa fallax nilotica*, *Anguilla anguilla*, *Liza ramada*.

<sup>5</sup> Original local names for the winds are: *grbin*, *danik*, *nocnik*, *bojanac*, *murlan*, *rumijas*, *orahovina* etc



a. 3. **Key Natural Resources** – Having in mind the above given, **Water** and **Biodiversity Resources** are considered as most valuable resources in the assignment/Lake area that consequently require undertaking long term framework for their management.

b. **Protected Area status** -

In Montenegro Skadar/Shkodra Lake is a **National Park** since 1983 (IUCN Management category II). In 1995 National Park Skadar Lake was inscribed in the Ramsar list (List of wetlands of international importance). The National Park area has a total surface of 40,000 ha.

In Albania the actual protection status of Skadar/ Shkodra Lake is **Managed Natural Reserve** (IUCN Category IV). The Albanian side of the Lake together with Buna River is inscribed in the Ramsar list on since 2006.

c. **Base given in documents produced within the LSIEMP (Scope of the Work for this assignment, SAP, TDA)**-

For preparing document of Skadar – Shkodra Lake Management Strategy consultant has followed requirements given in the Scope of the Work for this assignment (Chapter III in the Request for Proposal – Terms of Reference, pages 6 and 7). These requirements have guided consultant to focus on the following:

1. Defining of the **assignment/Lake area**, including National Park Skadar Lake and Shkodra Lake Natural Managed Reserve, with presentation of all protected areas data including status of protection, history of the implementation of protecting and developing measures, specially protected habitats and species at national levels, presentation of other important assets in protected areas (e.g. cultural heritage, infrastructure) and assessment of the capacities for sustainable management of the protected areas.
2. **Mapping** of the Lake **protected areas** in both countries, including GIS maps of important habitats and species and present zoning concepts.
3. **Local communities** in the Lake protected areas/watershed areas, depending of the Lake resources: basic demographic data, level of living standards, assessment of involvement in decision making processes and assessment of pressures on natural resources.
4. **Legal framework**: relevant national legislation (strategies, spatial plans, laws and sub-law acts) for management of the Lake protected areas, assessment of the enforcement and monitoring and supervision of the implementation.
5. **Institutional set-up**: institutions in charge for management of the Lake protected areas, capacities and capabilities for actual conducting of protection of the natural resources, as well as capacities for facilitation for sustainable development measures and implementation of plans.
6. Intra-state institutional/legal **cross cutting**: roles and responsibilities of different managing authorities in both countries, level of cooperation, conflicting issues identified and responsibilities overlapping.
7. **Inter-states commitments** and roles of the bi-national structures: transboundary agreements and their implementation status, Skadar-Shkoder Commission and its tasks and capacities, Commission Joint Working Groups responsibilities, other bi-national structures (e.g. Montenegrin-Albanian Commission for Waters), recognized needs for improvements and clear designation of responsibilities, as well as possibilities for improved cooperation.
8. Based on the analysis conducted under tasks 1-7, the Consultant will facilitate definition of the Joint Lake Management **Vision**, which will be elaborated through:

- Jointly agreed **priorities** for protection and sustainable development of Skadar-Shkoder Lake,
  - Tangible short-term and medium term **goals** to achieve the defined Vision,
  - Set of **actions** under each of the identified goals,
  - Identification of institutions/stakeholders in charge of actions **implementation** (local, national), with special attentions on the Joint structures (Skadar-Shkoder Lake Commission and its Working Groups),
  - Defining of Monitoring and Evaluation **indicators** to steer actions implementation,
  - Costs **table/time frame** for defined actions implementation.
9. The Consultant will propose **tentative zoning plan** for Skadar-Shkoder Lake, taking into account national zoning plans and national legislative demands.

While formulating goals / objectives and actions in the Strategy key facts and findings from the Strategic Action Plan (SAP) for Skadar/Shkodra Lake (Albania & Montenegro) (APAWA, CETI & SNV, April, 2007) have been consulted, as well as respective chapters from the Lake Shkoder Transboundary Diagnostic Analysis, Albania & Montenegro (Royal Haskoning, 2006.)

**Character of the document (Skadar – Shkodra Lake Management Strategy) determined**  
Regarding aforementioned reasons (a-c) character of the document (Skadar – Shkodra Lake Management Strategy) has been determined, as follows:

### Natural Resource and Protected Area Management Strategy



## **I. 2. Area of applying Skadar – Shkodra Lake Strategy = assignment area = management area**

As a response to requirements given in the Scope of the Work, consultant has defined area that is important for applying actions proposed by the Strategy.

For this purpose, zone of existing protected areas and Lake catchment area - zone important for Skadar – Shkodra Lake water and biological resources has been considered as management area that is relevant for applying this Strategy. These zones were ecologically evaluated and, consequently, tentative zoning concept has been formulated.

Plan of the zones I – III is presented in the Annex I of this document. As an exception, some of “generic” type of actions given in Chapter VII of the Strategy shall be applied in a larger geographic area than the proposed management area that requires character of these actions.

Proposed actions regarding fishery at Skadar – Shkodra Lake in next 5 (five) years are not presented in this Document, because they are presented in the Fishery Management Plans<sup>6</sup> for Albania and for Montenegro.

## **I. 3. Methodological base of the Strategy**

In compliance with the document character determined above, following methodological base – guides have been consulted in formulating respective chapters:

- a. Methodological guides for Protected Areas – IUCN / WCPA Best Practice Protected Area Guidelines series:
  - National System Planning for Protected Areas. No. 1. Adrian G. Davey, 1998, x + 71pp.
  - Evaluating Effectiveness: A Framework for Assessing the Management of Protected Areas. No. 6. Marc Hockings, Sue Stolton and Nigel Dudley, 2000, x + 121pp.
  - Transboundary Protected Areas for Peace and Co-operation. No. 7. Trevor Sandwith, Clare Shine, Lawrence Hamilton and David Sheppard, 2001, xi + 111pp.
  - Guidelines for Management Planning of Protected Areas. No. 10. Lee Thomas and Julie Middleton, 2003, ix + 79pp.
  - Identification and Gap Analysis of Key Biodiversity Areas: Targets for Comprehensive Protected Area Systems. Langhammer, P.F., et al. No 15. (2007). Gland, Switzerland: IUCN.
  - Guidelines for Applying Protected Area Management Categories. Dudley, N. (Editor) (2008). Gland, Switzerland: IUCN. x + 86pp
  - Vision for Water and Nature. A World Strategy for Conservation and Sustainable Management of Water Resources in the 21<sup>st</sup> Century. (2000). Gland, Switzerland and Cambridge UK XIII + 52pp
  - The Ecosystem Approach: Five Steps to Implementation. Shepherd, Gill. (2004). IUCN, Gland, Switzerland and Cambridge, UK. vi + 30 pp.
- b- Methodological guides for Natural Resource Management
  - Water and Rivers Commission (2003), *Natural Resource Management for the Brockman River Catchment*. Water and Rivers Commission, Water Resource Management Series, No WRM 33.
  - Inter Governmental Authority on Development (2007): *IGAD Environment and Natural Resources Strategy*
  - City of Kirkland – Natural Resource Management Team (2003): *Natural Resource Management Plan*. City of Kirkland, 123, 5<sup>th</sup> Avenue, Kirkland Washington 98033. xx + 75 pp

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<sup>6</sup> Component 2 of the assignment

- US Department for the Interior – Bureau of Reclamation (2003): *Resource Management Plan Guidebook – Planning for the Future*. Washington. 114 pp
- Evans, M. Petter, M., et all (2000): *Strategic Guide to Natural Resource Management in South East Queensland*. Department of Natural Resources and Brisbane Region Environment Council. 212 pp
- Van Ni, D., Shulman, D., Thompson, J., Triet, T., Truyen, T. & Van Der Schans, M. (2006). *Integrated water and fire management strategy for Tram Chim National Park, Vietnam*. MWBP. Vientianne, Lao PDR
- Justin Yifu Lin, Feiyue Li (2009): *Development Strategy, Viability, and Economic Distortions in Developing Countries*. Policy Research Working Paper 4906. The World Bank Development Economics Vice-Presidency. 26 pp

#### ***I. 4. Relation of the Strategy to the priorities of the countries (MNE, AL) and global initiatives***

This document represents a long-term Strategy for Natural Resources and Protected Areas Management in Skadar – Shkodra lake area and, as such, it is in conformity with other nature protection and development objectives of both countries – Albania and Montenegro. On the other side, this Strategy encompasses *national priorities* in both countries that include:

Main *political* priorities (Establishment of democratic society; Socio-economic development from local, regional to national level, Integration into European and Euro-Atlantic structures etc)

*Development* priorities (raise living standard and welfare of the population, fast and sustainable economic development etc).

Due to its relevance, values, principles and goals of the *International Community* regarding Protected Area and Natural Resources Management are also integrated in the Strategy. Essence of these values, principles and goals is integrated in the documents considered as a methodological base (item I. 3.) for Strategy document.



*Village Vranjina and Moraca River right branch*



*Rijeka Crnojevica – winter aspect*



*Shkodra town, Lake and its mouth to Buna – Bojana River*

## II. PRINCIPLES, APPROACH AND STRATEGIC PRIORITIES

### II. 1. Fundamental principles

This Document represents a long-term framework - Strategy for Natural Resources and Protected Areas Management in Skadar – Shkodra Lake area that is in conformity with following fundamental (basic) **Principles**, as the starting points of the Strategy:

- Protection of Natural Resources and Protected Areas in Skadar – Shkodra Lake area is the key segment of national **policies** in both, Albania and Montenegro for which the ecosystem approach is used;
- Water and biological resources are one of the **basic values** of Skadar – Shkodra Lake area and one of the main resources for further regional development of this area in both, Montenegro and Albania
- Further development of Skadar – Shkodra Lake area depends on the capacities and productivity of this Lake **ecosystem**;
- Instead of barriers, requirements for effective and efficient Management of Protected Areas in Skadar – Shkodra Lake area in both countries, are considered as **standards** for achieving Sustainable Development in Skadar – Shkodra Lake area;
- Natural Resources and Protected Areas Management in Skadar – Shkodra Lake area rely on the engagement of all parts of Albanian and Montenegrin **societies**;

Application of these Principles implies incorporation of the interests of future generations in/around Skadar – Shkodra Lake area, including general good governance principles such as:

- *Rule of law and Effective governance,*
- *Balanced development of Natural and Human Resources and*
- *Public participation* in the important decision-making processes, and establishment of civic control over execution of these decisions.

### II. 2. General approach applied

Coherent to aforementioned fundamental principles a realistic implementation context of the Strategy shall be provided.

In relation to this need, following general approach shall be applied:

#### Recourses and Opportunities for implementation

- Existing **governance** system is the main resource in both countries for actions proposed by the Strategy. Due to the fact that other resources of the country are quite weak, a particular importance shall be given to the improvement of this system, particularly to the authorities responsible for Protected Areas management, Natural Resources management, as well as all responsible subjects for development in Skadar – Shkodra Lake area, including inspections, in respect to their transparency and accountability.
- The **people**, i.e. society at large, whose condition is planned to be improved for implementing actions proposed by the Strategy, represent the second important resource. The most significant task of the governance in Skadar – Shkodra Lake area is social and economic activation of the population and its involvement in democratic participatory process, thus giving people a chance

to self-determine own destiny. The participatory process proposed by the Strategy is based on this very approach.

### **Broad-Spectrum and Sector-Specific Actions**

- The majority of important problems facing Skadar – Shkodra Lake area and actions proposed by the Strategy are broad in their nature, i.e. they are closely connected with multiple economic sectors and various social realities. In the course of implementation of broad-spectrum measures, it is necessary to ensure effective **intersectoral coordination** and supervision, including cross-border coordination among the countries. In the reverse case, the implementation of the measures will be unilateral and will serve mostly the interests of the concrete entity / subject rather than wealth of Natural Resources and Protected Areas in Skadar – Shkodra Lake area.
- Numerous actions envisaged by the Strategy are sector-specific, even though the effects of and reactions to them go beyond the scope of concrete sector. Hence, such actions will be carried out by relevant government agencies, in most of cases. There is a danger that the relevant policy will be applied primarily benefiting the interest of the specific government agency, or will be based on narrow strategic vision. Correspondingly, the given Strategy document recognized relevant sectors and their actions in line with fundamental principles given above, in short and long term perspectives. The development strategy of each individual sector should be **based on this unified document** and priorities in these strategies regarding Skadar – Shkodra Lake area should be identified on this basis.

### **Regional Specificity**

- One of the most important specificities of Skadar – Shkodra Lake area lies in its natural and cultural diversity that, on the one hand, is a fortune, but on the other hand, complicates the application of an unified approach to the implementation of the actions. Thus, in the course of implementation of the Strategy, special attention shall be given to **correspondence** of proposed actions with concrete natural and cultural environment.
- In the course of implementing the Strategy, special attention will be paid to the **interactions of natural and cultural diversities** such as: water-land, Lake-villages, inter-state and inter-municipal borders, city-fortress, fishermen-tourists, ethnic, religion and cultural factors, climate and nature (floods...) etc.

### **Development of Rural areas**

- Due to the fact, that significant part of the population in Skadar – Shkodra Lake area live in rural areas that wait on their progress and development, the respective economy sectors shall elaborate efficient **development programs** targeted at the development of these rural undeveloped areas.
- In rural, especially fishermen areas, adequate **technical infrastructure** should be developed in order to provide basic prerequisites for further (private) investment through specific sustainable development initiatives.

## II. 3. Strategic priorities

As a co-relation between fundamental principles and general approach for implementation of the Strategy document, following strategic priorities for Skadar – Shkodra Lake area are proposed:

### A. Natural Resources

**Building public and political support** for effective and efficient Management of both, Natural Resources and Protected Areas in Skadar – Shkodra Lake area - Public support and political backing are needed for effective and efficient Management of both Natural Resources and Protected Area(s), if they are to succeed. It is true that many people have an interest in using or protecting Natural Resources or Protected Area(s): fisherman, farmers, tourist agents and tourists and others are also potential stakeholders, for example, and they can generate political support for the aims of a particular area. But the key factor is that people in these areas participate in local and state elections, and the people living in these areas are therefore represented by locally-elected representatives or others who speak for the community. The **support to the locally-elected (political) representatives** is vital; they in turn will respond to needs of local people and their concerns. Also, stakeholder participation and involvement of local people is needed at every stage of the planning and management processes for both, Natural Resources or Protected Areas Management. This is not only to build an understanding among the communities, but also to engage their knowledge and secure their involvement in the management. Local people in the area of Skadar – Shkodra Lake should be treated as partners, their views carefully considered and their support never taken for granted. But public and political support will only be guaranteed when local people can see a connection between the Natural Resources / Protected Areas and their livelihoods. This does not mean that every economic aspiration can be met, and there are bound to be 'losers' as well as 'winners'.

**Provide as broad as possible Sector-Specific Actions** - As explained above multiple economic sectors are invited to implement a broad spectrum of measures, but through effective intersectoral coordination and supervision, including cross-border coordination among the countries. Sector strategies should follow requirements from this Strategy document but also respond to the needs of local people. Among various Natural Resources, Water Resources require particular attention and implementation of International Community standards, starting from **EU Water Framework directive**. Fishery resources also require much efficient actions, as it is given in the **Fishery Management Plans** for Montenegrin and for Albanian part of Skadar – Shkodra Lake that are given in separate documents.

**Integrated Water management** - Having in mind hydrological connections of Skadar – Shkodra Lake in larger Adriatic River basin, a **regional scale long-term framework** for water management in cross-border context shall be applied to **Integrated** (a) Skadar – Shkodra Lake River basin or entire (b) Adriatic River Basin **Management Plan(s)**. Because of limited financial capabilities of both countries to undertake option (a) or (b) final decision should be dropped to the process that responsible national institutions conduct in the EU integration process. Main basement for these activities provide EU Water Framework directive, as noted above.

**Prevent pollution of Skadar – Shkodra Lake waters and groundwater in its watershed** - Skadar – Shkodra Lake is recipient of large water quantities from its watershed<sup>7</sup> that inhabit a population of ~ 500.000 inhabitants in Albania and Montenegro. About 65% of this population belongs to Shkodra and Podgorica, while the other part to smaller towns like

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<sup>7</sup> Watershed of Skadar – Shkodra lake cover ~ 5,500 km<sup>2</sup> (4,470 km<sup>2</sup> in Montenegro and 1,030 km<sup>2</sup> in Albania)

Koplik, Bajza in Albania, and municipalities of Nikšić, Cetinje and Bar in Montenegro, as well as villages around the lake. Recently, Podgorica municipality undertake following activities in order to mitigate adverse impacts on Lake environment, starting with adoption and implementation of LEAP, new Spatial Urbanistic Plan, sanitary landfill completed and operate, and upgrade of WWTP. Its future plans include construction of a metal net (floating waste barrier) at Moraca river. As essential component of Lake's Natural Resources, water quality maintains a healthy ecological **system that regulates pollution** from the watershed. Namely, quality of water resources is dependent on how well we look after its catchments, waterways and groundwater supplies in the watershed. Key pollution sources for surface waters, groundwater, as well as for soil and air in Skadar – Shkodra lake watershed originate from Podgorica, on Montenegrin side, and Shkodra town on Albanian side with solid waste and wastewater discharges.

**Ecosystem services and Protection of Biological resources** - Human beings benefit from a multitude of biodiversity resources and ecological processes within ecosystems that give rise to a range of goods and services called “ecosystem services”. This range from the relatively simple, such as drinking water supply, food production, and provision of timber, to the highly complex, such as maintenance of soil fertility, hydrological balance or regulation of the climate<sup>8</sup>. Ultimately all human life depends on ecosystem services for fundamental necessities such as clean air, clean water and food production. To date, there has been no significant research on ecosystem services in the Skadar – Shkodra Lake area in both, Montenegro and Albania, as well, the relationship between biodiversity and ecosystem services (which is important for the management of natural resources and their services), or, critically, any integrated approach to determining their values (economic or otherwise). Potential of the **water ecosystem of Skadar – Shkodra Lake** is very important for both, economic and ecological reasons.

**Biological resources** are also important for both, protection and sustainable utilization. While **fishery resources** require sustainable use / utilization, most of other biological resources of Skadar – Shkodra Lake require certain way of protection.

## B. Protected Areas

**Management** of Protected Areas in Skadar – Shkodra Lake area should be **flexible and adaptive**. Protected areas management in general need to be capable of adjustment over time in light of experience and changing circumstances – but since its scope embraces both natural and human systems, the need for flexibility is all the greater. Management of Protected Areas should also be flexible and adaptive in the sense that it should respond to the very different social, cultural and economic situations in which it takes place: it should always be culturally appropriate and economically relevant.

**Involving stakeholders in planning at national, regional and local levels (cont.)** – Effective Management of Protected Areas in Skadar – Shkodra Lake requires involvement of large number of stakeholders, including (i) community leaders, e.g. village headmen / commune leaders, priests / imams (hoxha), representatives of political parties etc, (ii) resource users: e.g. farmers, fishers, water use companies, gravel / sand exploitation entrepreneurs and their representatives; (iii) those with an economic interest: e.g. tourist agents, restaurant keepers, hoteliers, shopkeepers, transport operators etc and their representatives, (iv) those representing other relevant interests, e.g. local nature conservation or human rights NGOs; and (v) those individuals with knowledge relevant to the

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<sup>8</sup> The Millennium Ecosystem Assessment (2005) grouped ecosystem services into four broad categories: supporting services, such as such as nutrient cycling, oxygen production, soil formation, crop pollination, pest and disease control, which underpin all the other 'service' categories; provisioning services, such as food, fiber, fuel, water, precursors to pharmaceutical products; regulating services, such as climate regulation, carbon sequestration, water purification and flood protection; and cultural services, including education, recreation, spiritual and aesthetic value



area, e.g. holders of traditional knowledge, historians, artists and scientists. Management must be undertaken **with** and **through** local people, and mainly **for** and **by** them. This principle recognizes that the full involvement of local people is essential, and that Protected Areas should never be planned **against** their long-term interests. It also recognizes that local communities should play an important role in delivering protected area objectives and be among the principal beneficiaries of these.

**Transboundary context of Protected Areas** – Existing Protected Areas in Skadar - Shkodra Lake in both, Montenegro and Albania provide many opportunities for cooperation and collaboration between these two countries across their national boundaries. So far, process of cooperation and collaboration between Montenegro and Albania produced a solid base for further removal of institutional and political barriers to get an effective **Joint Management Plan** for respective Protected Areas. As always, there are organization / operation, financial and language challenges, but existing willingness to achieve this optimistic goal could be of great help to achieve it. Again, this process requires certain public participation that can help in building up local support for joint management activities, enhancing communication and fostering mutual understanding among diverse communities across administrative / political boundaries. In this process following issues are of particular concern: (i) water border crossing regime, (ii) fishery rights and practices, (iii) transport of people and movement of goods, (iv) responsibility and operations of warden / guard services and (v) joint cultural events (trade fairs, festivities etc).

## II. 4. Joint Skadar – Shkodra Lake Vision

At this moment two **Joint Visions** for Skadar – Shkodra Lake area are present, as follows:

1. Joint Vision of Joint / Transboundary Skadar – Shkodra Forum given in the Declaration on Skadar / Shkodra Lake (2<sup>nd</sup> February 2006) that *fosters **Protection and Management of Lake's Natural Resources** and Sustainable Development* at local level.
2. Joint Vision Statement given in the Joint Strategic Action Plan (2007) given in the following formulation: *Skadar/Shkodra Lake is a **Trans-boundary equally Protected Area**. The level of protection is in accordance with high environmental **standards**, high **water quality** and rich biological diversity. Skadar/Shkodra Lake is an area for **sustainable activities** and it offers authenticable ecological, historical, cultural, rural and educational experience with a lot of unique places to see and visit. The environment is smartly integrated in regional economy as regards sustainable tourism, fishery, safety food production, medical plants, clean water use, etc. The lake is used in sustainable manner, with cross-border cooperation and management and high ecosystem protection.*

Having in mind similar / common context of proposed **strategic priorities** (public and political support, broad sector specific actions, integrated water management, pollution prevention, protection of biodiversity and ecosystem services, flexible and adaptive protected area management, involvement of stakeholders, joint / transboundary protected area management plans) and aforementioned definitions of the Joint visions for Skadar – Shkodra Lake area, following **overall Joint vision** is proposed with this document:

### **Sustainable development and**

### **Protection of Skadar – Shkodra Lake Natural Resources and Protected Areas.**

Both elements of the overall Joint vision obviously lead to **JOINT MANAGEMENT** of the Lake.

Joint Vision(s) for Skadar – Shkodra Lake area and strategic priorities are base for formulating Plan of measures and activities for Joint Management of Skadar / Shkodra Lake (see chapter VII) that should respond to the major threats and factors endangering Lake and its resources (see chapter VI). Joint Vision(s) for Skadar – Shkodra Lake area are also base

for formulating Fishery Management Plans for Montenegro and for Albania, as specific component of the Management.



*Rozafa fortes*

### III. STATUS OF KEY NATURAL RESOURCES AND EFFICIENCY IN THEIR MANAGEMENT

#### III. 1. Natural Resources / Assets

##### III. 1. 1. Waters

###### *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 km<sup>2</sup> (4,470 km<sup>2</sup> in Montenegro and 1,030 km<sup>2</sup> in Albania). The lake area varies between 353 km<sup>2</sup> in dry periods and 500 km<sup>2</sup> in wet periods (at maximum level, 335 km<sup>2</sup> is in Montenegro and 165 km<sup>2</sup> in Albania). The lake volume varies between 1.7 km<sup>3</sup> in dry periods to 4.0 km<sup>3</sup> during wet periods. The distance between the mouth of the Crnojevica River (northwestern lake edge) and the Lake's outlet (Bojana / Buna river) is 44 km (maximum length); its greatest width is 13 km. The most important tributaries of Lake Shkoder enter the lake from the north: Moraca, Rijeka Crnojevica, Orahovstica, Karatuna, Bazagurska rijeka in Montenegro, and Rjoli and Vraka River in Albania.

The lake is mainly fed by the Moraca river (99 km long), which has its source in central Montenegro. The lake is supplied by the rather abundant precipitation of the region (on average 2,000 mm/year, local maxima up to 8,500 mm/year!) and partly by karst groundwater.

Lake Skadar / Shkodra is emptying into the Bojana/Buna river that end up (with an outflow of  $\approx 320$  m<sup>3</sup>/s) into the Adriatic Sea. Bojan/Buna has traditionally been a navigable river linking the city of Shkodra with the Adriatic Sea. After 1.5 km, the Drim river runs into Bojana/Buna. The Bojana/Buna bed is subject to aggradations by sediments from the river Drim during last decades. After completion of hydro-power plant Vau i Dejes in Albania, the sediment supply from the upper reaches of the Drim has been cut off, but sediment deposits stored in the bed of river Drim between Vaudeis and the confluence with Bojana river deplete.

The Lake has been formed by dissolution of limestone in a tectonic basin during the Tertiary or Quaternary period.

*Floods* - Floods between 1848 and 1858 and in 1896 diverted the Drim river (Albania), whose watershed is around 14,000 km<sup>2</sup>, towards the west into the Buna/Bojana river, a few hundred meters from the lake outlet. The large amounts of sediments raised the river bed and resulted in an increase in the lake level with several meters, until today. Significant floods occur in 1879, 1883, 1896, 1903, 1905, 1915, 1917, 1918 and, then recent one in 2010 two times (3-13 January and December) when Lake water level exceed previous (1963) record of 9,86m and get new one of 10,44m. There were many efforts and attempts<sup>9</sup> (in interstate agreements, plans, projects, investment proposals etc) to regulate water level of Skadar / Shkodra Lake and, consequently effects of flooding in the surrounding area of the Lake.

###### *Water quality*

Dissolved oxygen content in the Lake is varying 7 mg/l – 12 mg/l in the surface water layers and 5 mg/l – 12 mg/l in the bottom water layers. Low content of oxygen, up to 3 mg/l, has been recorded near Crnojevica River. Saturate index is about 80%. Free carbon dioxide (CO<sub>2</sub>) is recorded in very small concentrations in the Lake waters.

<sup>9</sup> Here are given some of these attempts: 1. Lambert project in 1888 that failure, 2. Agreement on regulating water level of Skadar / Shkodra and Bojana / Buna between Turqie and Montenegro from 1890 that has not been implemented, 3. Project for making Bojana / Buna river navigable prepared by Italian company Cidinio in 1939 that wasn't implemented, 4. Interstate (YU-AL, i.e. MNE-AL) commission(s) on regulating transboundary waters of Bojan/Buna and Skadar / Shkodra Lake that was established in 1947 but didn't succeed in applying solutions for regulating water level of Skadar / Shkodra Lake (Source for 1-4: Vuković D. (2011): Skadarsko jezero - vijek i po poplava 1846 - 2010. Podgorica)

The highest value in the coast has been recorded near Crnojevica River 2 mg/l – 5 mg/l, while the highest value recorded for the Lake water is 13,07 mg/l among the macrophytes, in reductive chemical conditions and very low intensity of natural light. Carbonates vary from 2 mg/l – 19 mg/l, while bicarbonates 86,6 mg/l – 254 mg/l. High variation of bicarbonates may be the main reason for the high variation of conductivity (100 µmhos – 343 µmhos). Water alkalinity varies 1,47 – 4,18 mval/l, while Ph 7,1 – 8,5, but it usually remains between 7,9 – 8,2. These Ph values fall within the optimum (6 – 8,5) for the development of a high diverse biota. The lake water is characterized by a high content of calcium, with an average 31 mg/l – 42 mg/l. Several areas have high calcium content, up to 132 mg/l. Total content of the dry residuals has been assessed 98 mg/l – 164 mg/l in the pelagic waters and 102 mg/l – 240 mg/l in the littoral waters. Values of phosphates in the Lake waters are 0,002 mg/l – 0,004 mg/l. In certain periods, in the littoral parts near the river mouths, these values increase hugely, up to 150 – 1000 times, e.g. near Crnojevica and Moraca mouths. Average value of the total phosphorous varies 0,004 mg/l – 0,040 mg/l, but near Crnojevica River these values reach 0,100 mg/l – 0,350 mg/l. Content of nitrates in pelagic waters is 0,012 mg/l – 1,200 mg/l, but its variation is high between the seasons. The highest values have been recorded near Moraca River, up to 9mg/l. Nitrites varies between 0,0 to 0,030 mg/l, with the highest values in the littoral. Chlorines have a content 6 mg/l – 9,8 mg/l in most of the lake area, but very low content in the “eyes” (wells). Content of Siliceous is 1,3 mg/l – 3,45 mg/l, Magnesium 4,8 mg/l – 74,8 mg/l and sulphates 3,2 mg/l – 30 mg/l. Most pollutants for surface Skadar - Shkodra Lake waters, groundwaters, soil and air 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:

- The Aluminium Plant Podgorica (KAP);
- Steelworks in Niksic;
- Wastewater from the cities and towns in the basin;
- Municipal wastes from the cities and towns in the basin.

*Water quality* in the Lake varies in space and time. Most pollutants are brought by Moraca and Rijeka Crnojevica Rivers that are common places for disposal of 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.

*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 on the Montenegrin side, 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 waters were above the permitted 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, Crnojevica River and in the Skadar - Shkodra Lake in 1981 (and the years before) showed minimum concentrations of Na, K, Cu, Zn, Cr, Pb, Mn, Co, As, Hg, CN 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.

#### *Springs:*

The current analysis of Albanian spring waters (Shegani and Viri) near the Lake shows 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.

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Recent analyses of Lake waters 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. 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 Skadar - Shkodra Lake in 2003, at 7 out of 10 locations the concentration of Ni exceeded the EU standards.

## III. 2. Biological Resources

### ***Algae***

According to available data sources total number of registered algal species in Skadar Lake is 1092<sup>10</sup>. About 420 species belong to the diatoms, where the most abundant are *Navicula*, *Nitzschia*, *Cymbella*, *Gomphonema*, *Fragilaria*, *Achnanthes*, *Cyclotella* etc. Species of these genera are found in both plankton and benthos. Charophytes are characterized by a high diversity, too. 470 species are known from this group for Skadar/Shkodra Lake, among which *Pediastrum*, *Scenedesmus*, *Tetraedron*, *Closterium*, *Cosmarium* and *Staurastrum* are the most abundant. Other well-presented groups are also *Euglenophyta* with *Euglena*, *Phacus*, *Trachelomonas* and *Cyanophyta* with *Croococcus*, *Merismopedia*, *Microcystis* and *Oscillatoria*. According to investigations on Biological production this lake is belonging to oligotrophic type of lakes. Littoral Phytoplankton has key role in Lake's bioproductivity.

### ***Vascular plants***

According to available data sources total number of registered vascular plants is 726. Macrophytes and other water plants dominate particularly on northern Lakeshore. They have ecological importance in mitigation effects of pollution because of possibility to retain nutrients in their life cycle. Because of that, following plant associations are under expansion: *Scirpus – Phragmites (Phragmites communis, Scirpus lacuster, Typha angustifolia), Myriophyllum verticillati – Nuphar (W. Kosh)*

<sup>10</sup> In its recent publication "Shkodra Lake [Liqeni i Shkodres]" D. Dhora (2005) has reported a number of 1100 microalgae, on the basis of previous works of Petkovic (1981), Rakaj, Hindak & Hindakova (2000), Rakocević (2001) and Rakaj & Miho (2005)

(species: *Nuphar* sp, *Ceratophyllum* sp, *Trapa* sp, *Potamogeton* sp etc). Association *Scirpus* – *Phragmites* has the highest bioproductivity.

### **Aquatic vegetation**

According to Lakusic (1978)<sup>11</sup> Skadar Lake inhabits following water-plant-communities<sup>12</sup>: *Najadetum marinae* Fuk. 61, *Potameto-Najadetum* Horvatic et Mic. 60, *Potametum perfoliati* Lakusic & Pavlovic 76, *Potametum lucentis* Hueck 31, *Potamion eurosibiricum* (W. Koch 26) Oberd. 56, *Nymphaeion* Oberd. 57, *Myriophyllo-Nupharetum* lutei W. Koch 26, *Nymphoidetum peltatae* (All 22) Oberd. et Th. Mull. 60, *Potametum natantis* Lakusic & Pavlovic 76, *Phragmitetalia* W. Koch 26, *Phragmition* W. Koch 26, *Sparangio-Glycerion* Br.-Bl. et Siss. 42, *Ranunculetum fluitantis* All. 22, *Scirpo-Phragmitetum* W. Koch 26, *Utricularietum vulgaris*, *Eupotamion* W. Koch 26, Oberd. 57, *Polygonetum amphibii-natantis*, *Menthetum aquatica* Lakusic 76 and *Ludwigietum palustris* Lakusic 76.

Together with Delta Buna / Bojana wetland ecosystem of Skadar - Shkodra Lake provide favourable habitats for high floristic diversity. Different ecologic forms of plants are evidenced in this area, including alluvial forests, hydrophytes, hygrophytes, halophytes, geophytes, psammo-halophytes and psammophytes etc. The flora of this region is characterised by a high number of the threatened and rare species as well as isolated endemic species. Eight globally and European threatened species and nine Balkan or local endemic species are recorded here. In the recent Red List of Albanian Flora (1995, 1997, 2007) 128 of total 330 species are from Shkodra district and 28 of them are living in the wetland ecosystem of the Lake Shkodra – Bojana Delta. 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 northern shore of the lake 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. Besides biodiversity values, reed beds and other macrophytes are also important for their purification capacities through nutrient retention and transformation (nitrogen, phosphor), and binding of pollutants. This is the reason why water vegetation shall be protected through so-called **active management**.

### **Terrestrial vegetation**

Around the Lake, stands of willow (*Salicetum albae*) are the most abundant forests, 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 wooden handicraft products. Forests of Skadar'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 cerris*), as

<sup>11</sup> Lakusic, R. & Pavlović, D., 1978: Vegetacija Skadarskog jezera. Glasn. Republ. Zav. Zašt. Prir. Prirod. Muz, 9: 45-50. Republički zavod za zaštitu prirode, Titograd (Podgorica).

<sup>12</sup> According to Dhora (2005), some 36 associations of macrophytes plants are presented in Skadar Lake, including: *Potamion*, *Najadetum marinae*, *Charetum fragilis*, *Charetum* sp., *Chareto-Nitellopsidetum obtusae*, *Potametum pectinati*, *Myriophylletum (spicatum – verticillatum)*, *Potametum perfoliati*, *Potametum – Ranunculetum*, *Potametum lucentis*, *Potameto – Najadetum*, *Utricularietum vulgaris*, *Nymphaeion*, *Myriophyllo – Nupharetum lutei*, *Nymphoidetum peltatae*, *Nymphaetum albo – lutea*, *Nymphaetum (alba)*, *Hydrocharetum (morsus – ranae)*, *Ceratophylletum (demersum)*, *Potametum natantis*, *Ranunculion*, *Ranunculetum fluitantis*, *Phragmitetalia*, *Eleochari – Hippuridetum*, *Heterophylletum*, *Eleocharietum (pallustris)*, *Sparangio – Glycerietum fluitantis*, *Scirpetum (lacustris)*, *Scirpeto – Phragmitetum*, *Phragmitetum (australis)*, *Typhetum (angustifolia – latifolia)*, *Menthetum aquatica*, *Ludwigietum palustris*, *Magnocaricietum*, *Juncetum* and *Agrostitetum (alba)*.

well as hornbeam (*Carpinetum orientalis*) with several sub-communities. Only degraded stands remain from the once well developed forests.

**Zone of Macquis - Scrub shrub vegetation** - This zone goes up to 400 – 500 m altitude. Among the evergreen trees and shrubs of this zone are: *Quercus ilex*, *Phillyrea latifolia*, *Juniperus oxycedrus*, *Erica arborea*, *Olea europea*, *Arbutus unedo* and *Laurus nobilis*. Other common species (not evergreen) of this zone are: *Pistacia terebinthus*, *Punica granatum*, *Carpinus orientalis*, *Crataegus monogyna*, *Rubus ulmifolius*, *Paliurus spina-cristi*, *Quercus robur*, *Ulmus laevis*, *Ulmus minor*, *Genista hassertiana*, *Fraxinus angustifolius*, *Fraxinus ornis*, *Populus alba*, *Populus nigra*, *Salix alba*, *Salix elaeagnos*, *Salix purpurea*, *Alnus glutinosa*, *Ficus carica* etc.

**Zone of Oak** - This zone is situated from 300 – 700 m altitude in wider Skadar Lake region. The most common oak species in this zone are *Quercus trojana*, *Quercus cerris*, *Quercus petraea*, *Quercus frainetto* and *Quercus pubescens*. Other species present in this zone are: *Acer platanoides*, *Acer pseudoplatanus*, *Acer obtusatum*, *Castanea sativa*, *Sorbus torminalis*, *Sorbus umbellata*, *Sorbus aria*, *Tilia platyphyllos*, *Corylus avellana*, *Crataegus pentagyna*, *Juniperus communis* etc.

**Zone of Beech (Fagus)** - The zone of beech covers the altitude 600 – 1700 m asl in wider area of the Skadar – Shkodra Lake, usually in remote areas of its watershed. In some areas this zone may reach up to 1900 m together with the zone of pines. Common trees of this zone are: *Fagus sylvatica*, *Acer pseudoplatanus*, *Sorbus graeca*, while the common shrubs are *Cotoneaster integerrimus*, *Rubus idaeus*, *Vaccinium myrtillus* etc. Among the pine trees, the most common are: *Pinus leucodermis* and *Pinus nigra*.

**Zone of Alpine Pastures** – Alpine – mountain pastures cover the areas at the altitudes over 1800 – 1900 m asl in remote areas of Skadar – Shkodra Lake watershed. The most spread plants of this zone are *Rosa sp*, *Juniperus sabina*, *Luzula italica*, *Gentiana verna*, *Gentiana lutea*, *Astragalus purpureus*, *Anthyllis aurea*, *Silene macrantha*, *Campanula*, *Poa*, *Festuca*, *Sesleria*, *Koeleria*, *Bromus* etc.

### **Fungi - Macrofungi (Basidiomycota)**

Kasom, G. (2010) in her abstract for the Conference on Skadar Lake Biodiversity held in Shkoder has referred 252 species of Macrofungi (*Basidiomycota*) for Montenegrin part of Skadar - Shkodra Lake. For Albanian part of the Lake there are no data and information available according to consultant knowledge

## **Fauna**

### **Invertebrates**

Most of Skadar Lake invertebrate groups are poorly researched but some recent reviews indicated presence of significant number of endemic species<sup>13</sup> in *Amphipods*, *Snails*, *Oligochaeta*, *Ostracods*, *Copepods* and *Fish*. 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. **Zooplankton** of the lake is an important community, which defines the trophic structure of the ecosystem. It plays an important role in the dynamism of nutritive matter in the water and other populations of vertebrates, especially fish. Zooplankton of Skadar – Shkodra Lake is predominated by *Protozoan*, (especially *Ciliophora*), Rotifers and Crustaceans (mostly *Cladocera*,

<sup>13</sup> Number of species / endemic species: Acanthocephala – 7sp, Gastropoda – 56 sp / 24 end, Bivalvia – 10 sp, Oligochaeta – 10 sp / 2 end, Hirudinea – 5 sp, Hydrachnidia – 36 sp, Cladocera – 57 sp, Copepoda – 29 sp, Ostracoda – 13 sp / 3 end, Branchiura – 1 sp, Isopoda – 1 sp, Amphipoda – 17 sp / 11 end, Spongia – 1 sp, Hydrozoa – 2 sp, Trematodes – 68 sp, Cestodes – 7 sp, Nematodes – 23 sp, Rotatoria – 205 sp / ? end, Nematomoprpha – 1 sp, Gastrotricha – 1 sp, Acanthocephala – 7 sp, Mysidacea – 1 sp, Decapoda – 3 sp, Odonata – 38 sp, Chironomidae – 17 sp, Bryozoa – 2 sp. (Source: Pešić, V. et al, 2011: *The Biodiversity of the Skadar Lake, a young ancient Lake* (abstract and \*ppt presentation). Institute for the Protection of Nature. Proceedings of the conference *Nature Protection in 21 Century*, Book no 2. Žabljak, Montenegro)

*Copepoda*, *Ostracoda*). Other groups presented in plankton are also Bivalves (larval stage), *Branchiura*, *Gastrotricha*, *Hydrozoa* etc. **Zoobenthos** is another important community of invertebrates, with a high diversity and predominating biomass in the Lake. Protozoan and Rotifers are characterized by high species diversity in the zoobenthos, too. From the Molluscs, 54 species are known in the lake and its watershed, of which 42 are Gastropods (snails) and 12 are Bivalves (mussels). *Oligochaeta* represent one of the most abundant biomass among the invertebrates, despite their relatively limited species number. Crustaceans are well-presented in the zoobenthos of the Lake, predominated by *Cladocera*, *Ostracoda*, *Copepoda*, *Amphipoda* and *Decapoda*. About 152 species of Insects are known in the zoobenthos of Skadar/Shkodra Lake, mostly in their larval stages. *Chironomids*, *Gastrotricha*, *Bryozoa*, *Hydrozoa* and *Spongia* are other important groups in the zoobenthos of the Lake.

## Vertebrates

### Fish population - Ihtyofauna

On the base of several literature sources (Maric & Milosevic 2009, Maric, 2010, Mrdak 2009, FISHERIES ASSESSMENT IN LAKE SHKODRA - SHKODER, ALBANIA & MONTENEGRO. Draft Final Report, 2011, Talevski *et al.*, 2009) Lake Skadar inhabit 49 species from 17 families, and 3 species of lamprey (*Lampetra planeri*, *Lampetra fluviatilis*, *Petromyzon marinus*) (see table 1 bellow)

**Table 1. Ihtyofauna of Skadar Lake**

Family	Scientific name	Name in English	Albanian name	Montenegrin name
1. Acipenseridae	1. <i>Acipenser sturio</i> Linnaeus, 1758	Sturgeon	Blini	Atlanska jesetra
	2. <i>Acipenser naccarii</i> Bonaparte, 1834 -1841	Adriatic sturgeon	Blini i Adriatikut	Jadranska jesetra
2. Clupeidae	3. <i>Alosa fallax</i> (La Cepède, 1803)	Twaite shad	Kubla	Kubla, Morska fraga
	3a. <i>Alosa sp. (A. agone)</i>	Twaite shad	Kubla e liqenit	Zimska fraga, Kublica
3. Moronidae	4. <i>Dicentrarchus labrax</i> (Linnaeus, 1758)	European sea bass	Levrek	Lubin
4. Mugilidae	5. <i>Mugil cephalus</i> Linnaeus, 1758	Flathead grey mullet	Qefulli i gushtit	Cipal
	6. <i>Lisa ramada</i> Risso, 1826	Thinlip mullet	Qefulli i vjeshtës	Skocac balavac
5. Anguillidae	7. <i>Anguilla anguilla</i> (Linnaeus, 1758)	European eel	Ngjala	Jegulja
6. Citharidae	8. <i>Citharus linguatus</i> (Linnaeus, 1758)	Spotted flounder		pljosnatica, pataraca
7. Pleuronectidae	9. <i>Pleuronectes flessus</i> Pallas, 1811	European flounder	Shojza	Iverak
8. Cyprinidae	10. <i>Cyprinus carpio</i> Linnaeus, 1758*	Carp	Krapi	Krap, Saran
	11. <i>Squalius platyceps</i> Zupancic, Maric, Naseka & Bogutskaya, 2010	White chub	Klen	Klen
	12. <i>Telestes montenegrinus</i> (Vukovic, 1965)	Montenegrus chub	Skorti me vizë	Moracka jelsovka
	13. <i>Phoxinus lumaireul</i> Schinz, 1840	Minnow	Cigani italian	gaovica, gagica, zelenak,
	14. <i>Rutilus albus</i> Maric, 2010	White roach	Skorti i Shkodrës	Bijeli brçak
	15. <i>Pachychilon pictum</i> (Heckel et Kner, 1858)	Sharadon	Skorti shqiptar Skorti i zi	Saradan
	16. <i>Scardinius knezevici</i> (Bianco & Kottelat, 2005)	Rudd	Gërmuqi Lloska e Shkodrës	Lola
	17. <i>Rutilus prespensis</i> (Karaman, 1924)	Yellow roach	Skorti i Prespës	Sutalj, Brona
	18. <i>Alburnus scoranza</i> (Heckel et Kner, 1858)	Bleak	Gjuca	Ukljeva
19. <i>Alburnoides ohridanus</i> (Karaman, 1928)	Ohridia schneider	Cironka (Gjuca e Ohrit)	Ohridska ukljevica	



	20. <i>Chondrostoma ohridanus</i> Karaman, 1924	Beak carp	Skobuzi Njila Ohrit	Ohridski skobalj
	21. <i>Chondrostoma scodrensis</i> Elvira, 1987	Scadar's beak carp	Njila	Skadarski skobalj
	22. <i>Barbus rebelii</i> Köller, 1925	Rebel barbel	Mrena e Fanit	Jadranska mrena
	27. <i>Pelasgus minutus</i> Karaman, 1924	Montenegrin minnow carp	Gurnec Grunci i Ohrit	Ohridska gaovica
	23. <i>Gobio skadarensis</i> Karaman, 1936	Skadar gudgeon	Mrena njëmustakore e Shkodrës	Skadarska mrenica
	24. <i>Rhodeus amarus</i> (Bloch, 1782)	Bitterling	Idhtaku	Gavcica
9. Balitoridae	25. <i>Barbatula zetensis</i> (Soric, 2000)	Bearded stone loach	Tufëza e Shkodrës Mrena e egër	Zetska brkica
	26. <i>Cobitis ohridana</i> Karaman, 1928	Ohrid Loach	Mrena e egër e Ohrit	Vijun
10. Gasterosteidae	27. <i>Gasterosteus gymnurus</i> Cuvier, 1829	Three-spined stickleback	Gjëmbaçi	Bodonja
11. Gobiidae	28. <i>Knipowitschia montenegina</i> Kovacic & Sanda, 2007	Pamzzo goby	Barburiqi malazez	Moracki vodenjak
	29. <i>Pomatoschistus montenegrensis</i> Miler & Sanda, 2008	Montenegrin sand goby	Burdullaku i Shkodrës	Moracki vodenjak
	30. <i>Pomatoschistiscus marmoratus</i>	Tubenose goby	Burdullaku i mermertë	Mramorasti glavoc
12. Salmonidae	31. <i>Salmo farioides</i> Karaman, 1937		Trofta e Drinit	Primorska potocna pastmka
	32. <i>Salmo marmoratus</i> Cuvier, 1817	Bighead trout	Trofta e mermertë Troftë njile	Glavatica
	33. <i>Salmo zetensis</i> Hadzisce, 1962	Adriatic trout	Trofta buzëbutë	Zetska mekousna
13. Bleniidae	34. <i>Salaria fluviatilis</i> Asso, 1801	Sharibrack	Barburiqi	Rijecna slingurica
Allochthonous fish				
Cyprinidae	35. <i>Ctenopharingodon idella</i> (Valenciennes, 1844)	Grass carp	Amuri i bardhë	Bijeli amur
	36. <i>Megalobrama terminalis</i> (Richardson, 1844)	Black amur bream	Pëllëmbëza e zezë	Amurska deverika
	37. <i>Tinca tinca</i> (Linnaeus, 1758)	Tench	Tinka	Linjak
	38. <i>Carassius gibelio</i> (Bloch, 1783)	Prussian carp	Karasi prusian	Srebrni karas
	39. <i>Hypophthalmichthys molitrix</i> (Valenciennes, 1844)	Silver carp	Ballëgjeri i bardhë	Bijeli tostolobik
	40. <i>Hypophthalmichthys nobilis</i> (Richardson, 1844)	Bighead carp	Ballëgjeri laraman	Sivi tostolobik
	41. <i>Mylopharingodon piceus</i> (Richardson, 1845)	Dark carp		crni amur, kineska plotica
	42. <i>Pseudorasbora parva</i> (Schlegel, 1842)	Amurian minnow	Notaku	Amurski cebacok
14. Poeciliidae	43. <i>Gambusia holbrooki</i> (Girard, 1859)	Eastern mosquitofish	Barkaleci pikalosh	Gambuzija
Salmonidae	44. <i>Salvelinus fontinalis</i> (Mitchill, 1815)	Brook trout	Troftë e përrenjve	potocna zlatovcica
	45. <i>Oncorhynchus mykiss</i> (Walbaum, 1792)	Rainbow trout		
15. Percidae	46. <i>Perca fluviatilis</i> Linnaeus, 1758	Perch	Perka	Grgec
	47. <i>Sander lucioperca</i> (Linnaeus, 1758)	Pike-perch	Luçiperkë Sharmaku i egër	Smud
16. Thymalidae	48. <i>Thymalus thymalus</i> (Linnaeus, 1758)	Grayling	Freskori Losa	Lipljen
17. Ictaluridae	49. <i>Ameiurus nebulosus</i> (Lesueur, 1819)	Brown bullhead	Peshk mace kafe	Patuljasti americki somic
* Since it was introduced into the lake during the Roman Empire, carp should not be considered as allochthonous invasive species, as it represents the symbol of the lake and the main fishing species.				

In the table 1 given above, species from 1 to 9 are being referred as Adriatic migrants; some of them seasonally occur in Skadar – Shkodra Lake. Species like *Twaite shad* (marked as 3 and 3a) and *Eel* (7), also being referred as migratory fish species, have great economic importance in terms of commercial fishing. Native cyprinid species, carp and bleak, have great importance in commercial fisheries and they represent the main fishermen catch in Lake Skadar. Salmonid fish species can

be found in Lake Skadar seasonally. They do not have greater importance for commercial fishing, being very scarce in the full-scale fish catch. Nevertheless, there are several endemic forms, among listed species, that might be of interest in terms of biological and conservation aspect. In terms of commercial fishing, the most interesting types of the allochthonous fish species are those marked as 38 and 46 in the table (primarily because of their high level of the relative representation). However, having in mind certain characteristics, these species do not have high market price, and therefore are used by local population as a food. So, based on the above mentioned, it can be said that referring to the fish fauna of Lake Skadar these are the species with the most important **economic significance**:

1. <i>Alosa fallax</i>	Twaite shad
1a. <i>Allosa sp.</i>	Twaite shad
3. <i>Anguilla Anguilla</i>	European eel
4. <i>Cyprinus carpio</i>	Carp
5. <i>Alburnus scoranza</i>	Bleak
6. <i>Carassius gibelio</i>	Prussian carp
7. <i>Perca fluviatilis</i>	Perch
8. <i>Rutilus prespensis</i>	Yellow roach
9. "Scrap fish" ( <i>Scardinus and Pachytilon</i> )*	rudd and spotted roach

In addition to these species, following species are of minor economic importance:

- White chub (*Squalius platyceps*),
- Beak carp and Scadar's beak carp (*Chondrostoma ohridanus* and *Chondrostoma scodrense*)

#### **Amphibians and Reptiles - Herpetofauna**

The lake and its basin are very rich in amphibians and reptiles, including 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*. Currently (14 + 22 =) 36<sup>14</sup> species of Herpetofauna are present in Skadar lake region, including a large number of protected species as well as endemics and subendemics.

#### **Birds - Ornithofauna**

Skadar/Shkodra Lake is a very attractive area for birds, especially along their migratory routes, but also provides good nesting and colonisation conditions. The avifauna of wider Skadar lake region is characterized by high diversity of species, with some 271 species<sup>15</sup> that belong to 18 taxonomic orders. About 90% 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 and leave 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.

Skadar Lake is located on one of the major migratory flyways for Eurasian birds marked as the Adriatic Flyway. International program for winter bird counting (IWC) on the Skadar Lake is provided since 1991, with the exclusion in 2001/2/2003<sup>16</sup>. In

<sup>14</sup> Recalling on Dhora, D. (2005) in the SAP for Skadar – Shkodra Lake different number of amphibian and reptile species - 51 species in total is indicated

<sup>15</sup> According to other data sources (Joint MNE-AL SAP (2007), based on Dhora D.(2001), total number of bird species registered in wider Skadar lake region is 282 species

<sup>16</sup> Ref. Saveljić. D., 2010: *International importance of Ornithofauna of Skadar Lake - species that cross the Census of 1% of regional wintering bird population in the period 1991-2010 year*. Conference on Skadar Lake

the period 1991 until now, and based on this program, up to 32,918 aquatic birds have spend the winter on the lake, that was counted in 2006, to more than 250,000 aquatic birds that were counted in January 1999.

Eleven species of aquatic birds in some years of counting have crossed the census of 1% of regional populations. This census number is mostly given to *Fulica atra*, which numbers during the winter through 11 years reached almost 9 % of regional population. *Phalacrocorax pygmeus*, during the winter on the lake exceeded the census 10 times - in the year 1998, nearly 7% of the regional populations of this species has spend the winter on the Lake. Similar is the case with *Podiceps nigricollis* - eight years it was crossing the census, up to 7% of regional population. *Aythya fuligula* in 1993 exceeded 5% of the regional population, while *Aythya ferina*, *Bucephala clangula*, *Chlidonias hybrida*, *Tachybaptus ruficollis*, *Anas crecca* crossed that census for a few years and from 1 - 4% of regional winter populations.

On the other hand, *Anas platyrhynchos* - common specie present in large numbers at all European water bodies, on Skadar Lake it was difficult to get its census in 1993 that consequently increased its regional population for 1.5%.

These data indicate that the significance of Skadar Lake for wintering of some birds species is crucial for the survival of their populations in the region. However, the IWC results have shown significant decrease in number of all water species of birds, particularly in 2010. *Phalacrocorax pygmeus* (for 1%) and *Fulica atra* (for 1.5%) are wintering in certain significant number in comparison to their regional populations.

### **Mammals**

The mammals in the area of Skadar Lake are poorly researched. The total number of species found is >50 species that belong 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.

### **Presence of the pollutants in biodiversity**

Current ecological status of Skadar - Shkodra lake area could be estimated with data concerning presence of certain pollutants in the various flora and fauna groups.

Concentrations of PCB-s<sup>17</sup> and other pollutants have been analyzed during the last 15 years in the Lake waters, waters in the rivers, groundwaters, sediments in the Lake and in the tissue of various fish species living in Skadar - Shkodra Lake. The concentrations of PCB's have been exceeded in some samples / cases in the period 1990-1996 in compliance with US EPA permitted values for food consumption (2 ppm or mg/kg).

A recent study undertaken in 2005 by universities of Heidelberg (Germany), Podgorica (Montenegro) and Shkodra (Albania) has indicated highest concentration of total PCB-s in Rudd (*Scardinius erythrophthalmus scardapha*) being 200 µg/kg, while lowest concentration was found in Perch (*Perca fluviatilis*) being 35 µg/kg. Also, analyses undertaken in Montenegro (2004 and 2005) comparatively indicated decrease in the concentrations of PCB-s after 1990's. This has been estimated as a result of combined impacts of following factors:

- i. removal of the source of pollution, i.e. all barrels and soil contaminated with Pyralen<sup>18</sup> from KAP were stored in a special bunker;
- ii. pollutants were transported quickly by groundwaters due to the high permeability of the soil in the Zeta Plain;

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Biodiversity. 2010. Shkoder

<sup>17</sup> PCBs - Poly-Chlorinated Biphenyles

<sup>18</sup> One of trade names for PCBs

- iii. high precipitation in the region during the last 15 years;
- iv. high 'refreshment' rate of the water in the Lake.

PCBs are ending 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 universities of Montenegro and Shkodra in 2001-2002, applying passive sampling of Semi-permeable Membrane Devices (SPMD), simulating long-time exposure of an organism to pollutants. Benthic fauna (e.g. worms, eels) are in particular exposed to pollutants in the sediments.

### III. 3. Assessment of the sustainable use of Natural Resources

There is very little direct information on whether biological resources are being used in a sustainable way in Skadar – Shkodra Lake area, which is a reflection of the lack of research and still insufficient level of monitoring of this area. On the other hand there are some indications that most species are being overexploited and that management is not based on any robust sustainable use models. Fishery is dominant way of using / exploiting biological resources of the Lake

There is also very little reliable data on **fish stocks** and its productivity for the last 15 years. Records on commercial catches of certain species for Montenegrin part of Skadar – Shkodra Lake had been properly maintained for the period since 1947 till 1976. Data on the number of boats and the number and types of fishing gear, are also properly recorded. The lack of direct information on CPUE could be compensated through indirect methods. There is certain variety in commercial catches, referring only to the migratory species (eel, twaite shad, shoes, sturgeon) and species that live in the Lake (carp, bleak, rudd, trout, chub nase). After 1976 until 2002, data records either do not exist or are very fragmented and difficult to reach. Data on fish catch in Lake Skadar - Shkoder since 1947 to 1976 are no longer useful for the planning of commercial fishing, as the terms and structure of commercial fishing have changed. Lately (since 2002, the table below), commercial fishing statistics in Montenegro include five species of fish and the category of "other", with the lack of data on one specie (pike) and the category of "mixed fish". On the other hand, it is obvious that the data related to the production of trout in ponds do not to include the trout catch in the open water.

Fish species catch from freshwaters in Montenegro (in tons)

	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL	296	395	751	792	786	441	841	887
Trout	233	302	211	231	253	200	212	263
Carp	-	2	410	410	410	82	452	350
Mixed fish	-	-	-	-	-	-	-	-
Pike	-	-	-	-	-	-	-	-
Eel	2	2	7	4	6	1	1	6
Bleak	1	5	25	30	30	88	112	100
Other	60	84	98	117	87	70	64	168

Source: Monstat, Agricultural Statistics Department



*Scardinius erythrophthalmus scardafa* – Adriatic Rudd

Fish catch data during the last ten years are very scarce and reduced only to data referring catch of carp, eel and bleak (as main commercial species), as well as fish catch in category "other" that has no indication which fish species comprise such a category. Data obtained from Fish Processing Factory "Rijeka Crnojevica" (see table below) may indicate total annual volume of catch which is being processed.

Fish catch and its processing volume in Fish Processing Factory "Rijeka Crnojevica" 2007/2008/2009/2010/2011 (in kg).

<i>Fish Type</i>	2007	2008	2009	2010	2011
Bleak	47 380	/	38 430	44 800	34 100
Carp	27 300	/	1 065	10 720	6 500
Silver Carp	4 950	/	2 640	5 560	4 700
Redstart	1800	/	3 840	/	/
Perch	/	/	2 100	/	/
<i>Total:</i>	81 430	0	48 075	61 080	45 300

2008. - factory reconstruction, no catch, no trading

There are no data on fishing efforts and CPUE, crucial for the commercial fishing planning in the last ten years. Currently available data refer only to the number of issued permits for commercial fishing, as well as the number of permits issued for recreational fishing (see table below).

Year	Permits				
	Carp Catch	Eel Catch	Bleak Catch	longlines	recreational fishing
2005	171	29	10	14	273
2006	165	7	11	11	391
2007	134	51	5	6	132
2008	173	50	4	19	230 (518)*
2009	148	70	3	8	188 (46)*
2010	151	83	2	12	195 (99)*

\* - the number of daily permits issued for recreational fishing (in brackets)

Preliminary analysis of the total catch and number of sold permits for commercial fishing ratio demonstrates some unusual trends, and even illogical. The annual carp and bleak catch from 2002 to 2010, indicates a clear trend, while the number of sold permits for commercial fishing of these two species has a decreasing trend (Fig 1 and 2)

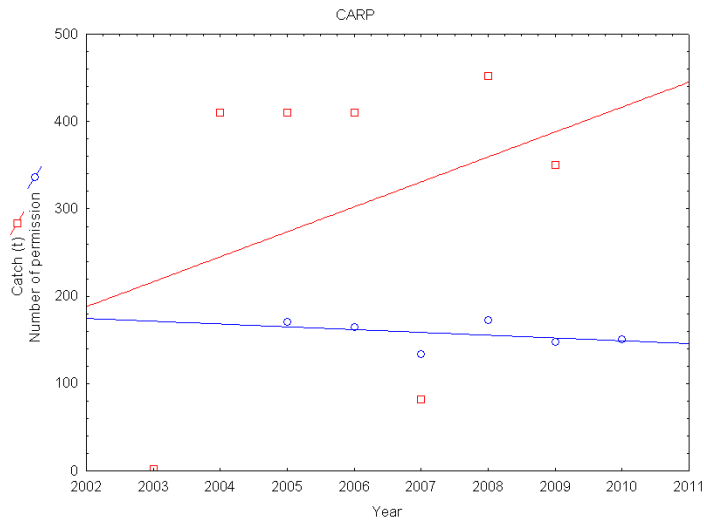


Fig. 1 - Trends on the carp catches and the number of sold permits for commercial fishing of carp in Lake Skadar from 2002 to 2010

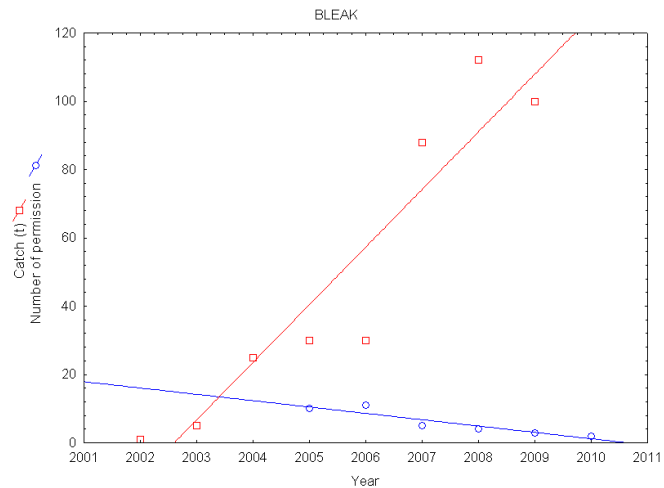


Fig. 2 - Trends on the bleak catches and the number of sold permits for commercial fishing of bleak in Lake Skadar from 2002 to 2010

On contrary, trends on the number of sold permits for eel increases, while its catch can be estimated as relatively constant for the same time period (Fig 2).

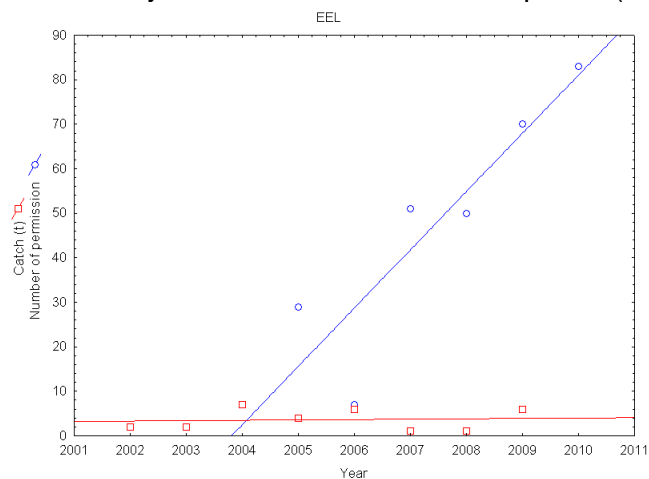


Fig. 3 – Trends on the eel catch and number of sold permits for commercial fishing of eel in Lake Skadar from 2002 to 2010

The rate of trends for carp and bleak could be interpreted that, in the period of ten years, fishing efficiency increased, meaning minor fishing effort increases the catch. When it comes to eel, the increase of fishing effort does not have a significant impact on the annual catch volume. Relevant experience regarding other inland fresh waters, does not respond to both interpretations; as both interpretations are inadequate. It is more likely the summarizing up data on the catch of all 3 types of fish is not adequate, and this is certainly one of the things that will need further consideration.

Concerning Albanian part of Skadar – Shkodra Lake, 410 commercial fishermen and 210 fishery boats are registered (2-3 persons per boat) while 1 (one) fishing permit is issued for 1 (one) boat. Census of fishermen in Shkodra FMO (last update March 2011) is presented in following table.(Source: Fisheries Assessment In Lake Shkodra – Skadar, Albania & Montenegro. (Draft Final Report, December, 2011)

Fishery Grounds	Number of boats	Number of fishermen
Zogaj	32	66
Shiroke	39	78
Buna	9	18
Rrethinat	8	16
Vraka	10	20
Grizha	15	30
Dobre	2	4
Culaj	5	10
Kalldruni	12	24
Palvar	4	8
Sterbeq	9	18
Jubice	24	48
Kamice	14	28
Flake	11	22
Shegan	12	24
Hoti	2	4
Zusi	2	4
Total	210	410

In addition to the number of fishermen and the number of the boats, there are records on the fishing tools, allowed to be used: each boat may use up 2000 m of nets, trammel nets 1000 m and 1000 meters of gillnets allowed. For each 500 meters Trammel net has 80 mm mesh size and 500 meters has 35-40 mm of mesh size. Meanwhile the same length (500 meters each) and the same mesh sizes are respectively used for gillnets In 2011, FMO introduced the logs on the catches. The respective data will be available by the end of 2011. The number of hooks used, for each boat, has not been determined yet.

Maximum of 120-130 days per year is the number of days when fishermen fish. It is common for one boat to use 800 to 1000 m of nets, while daily catch ranges from 5 to 20 kg. Previously obtained data, interviewing stakeholders, correspond to the results obtained by benchmarking of 20 fishermen. According to the Questionnaire 80% of fishermen have 200 fishing days in one year, and only 20% of them claim to have between 200 and 250 fishing days. About 85% of fishermen use standing nets while fishing, approximately 15% of them use gillnets. Annual catch per fisherman is ranged from 600 to 1700 kg, an average of 1116 kg. The average catch varies by season, the highest in the last quarter of year (about 370 kg per fisherman) and the lowest during the spawning seasons prohibitions (about 185 kg per fisherman). Fishing is only one life occupation for most of Albanian fisherman that provide revenues for their families, ranging from 150 to 200 EUR per month. The market price of the most important fish species in economic terms, are as follows:

- mullet: 3-4 EUR/kg,

- carp above 4 kg: 7-8 EUR /kg,
- eel: from 5 EUR /kg to 8-10 EUR /kg depending on the season,
- bleak (in winter): 1 EUR /kg,

Data on recreational fishery in the Albanian part of the Lake are currently lacking.



*Fishermans in action in the area of Hum bay, Skadar – Shkodra Lake*



## IV. STATUS OF SKADAR – SHKODRA LAKE PROTECTION

In Montenegro Skadar/Shkodra Lake is a *National Park* since 1983 (IUCN Management category II). In 1995 National Park Skadar Lake was recorded in the Ramsar list<sup>19</sup> (List of wetlands of international importance). The National Park area has a total surface of 40,000 ha. So far zoning of the National park is not elaborated in relevant Physical Plans (Physical Plan of Special Purposes for NP Skadar Lake 2000).

In Albania the actual protection status of Skadar/ Shkodra Lake is *Managed Natural Reserve* (IUCN Category IV), declared by the Albanian Government with the decision No. 684, date 02. 11. 2005. The Albanian side of the Lake together with Buna River is recorded in the Ramsar list on 02.02.2006 with a total surface of 49,652 ha.

The administration of the managed natural reserve of Skadar/Shkodra Lake in Albania is composed by ten employees (Rangers), who depend on the Ministry of Environment, Forests and Water Administration. This Ministry is charged with drafting the administration regulations, the management plan and the monitoring programme of the managed natural reserve of Skadar/Shkodra Lake in cooperation with local government, non profitable organizations, community representatives and scientific institutions.

### IV. 1. Areas important for protection of habitats and species

#### - Important Bird Areas (IBA)

Lake Skadar / Shkodra is IBA site that meets the site-selection criteria 1(iii), 2 and 3.

Other IBA sites near to Skadar Lake are *Ulcinj Saltworks* and *Sasko Lake*.

#### - Important plant Areas (IPA)

Following IPA site have been identified<sup>20</sup> in wider Skadar Lake area: *Skadar Lake*, *Rumija*, *Velika Ulcinjska plaza*, *Cijevna river canyon* and *Mrtvica river canyon* and all 5 meet IPA criteria<sup>21</sup>.

#### - EMERALD sites

Following EMERALD sites have been identified<sup>22</sup> in the wider Skadar Lake area:

Skadar Lake – Identified habitat types (Resolution 4, Bern Convention): 44.8 – Southern riparian galleries and thickets, 44.5 – Riparian alder and birch galleries, 44.43 – Southeast European ash – oak – alder forests, 44.1 – Riparian willow formations, 22.44 – Chandaliere algae submerged carpets, 22.4321 – Water crowfoot communities, 22.415 – (Salvinia) covers, 22.414 – Bladderwort colonies, 22.412 – Frogbit rafts, 22.341 – Short Mediterranean amphibious swards, 22.34 – Mediterraneo-Atlantic amphibious communities, 22.3232 – Small galingale swards, 22.31 – Euro-Siberian perennial amphibious communities. Important Bird species present at the site: *Sterna hirundo*, *Sterna albifrons*, *Porzana pusilla*, *Porzana porzana*, *Porzana parva*, *Podiceps auritus*, *Plegadis falcinellus*, *Platalea leucorodia*, *Phalacrocorax pygmaeus*, *Pernis apivorus*, *Pelecanus crispus*, *Pandion haliaetus*, *Nycticorax nycticorax*, *Mergus albellus*, *Larus melanocephalus*, *Lanius collurio*, *Ixobrychus minutus*, *Hippoboscus olivetorum*, *Hieraaetus fasciatus*, *Haliaeetus albicilla*, *Gavia stellata*, *Gavia arctica*, *Ficedula albicollis*, *Falco vespertinus*, *Falco peregrinus*, *Falco naumanni*, *Falco columbarius*, *Falco biarmicus*, *Emberiza hortulana*, *Egretta alba*, *Dendrocopos syriacus*, *Dendrocopos medius*, *Circus pygargus*, *Circus macrourus*, *Circus cianeus*, *Circus aeruginosus*, *Circaetus gallicus*, *Ciconia nigra*, *Chlidonias niger*, *Chlidonias leucopterus*, *Chlidonias hybridus*, *Caprimulgus europaeus*, *Buteo rufinus*, *Bubo bubo*, *Botaurus stellaris*,

<sup>19</sup> Lake meets Ramsar criteria 1a, 2b, 3b, 4b and 5b

<sup>20</sup> Petrović, D. (2009): Važna biljna staništa u Crnoj Gori – IPA projekat. NVO Zelena gora, Podgorica, str 46 – 47.

<sup>21</sup> For example, Mrtvica river canyon, because of the presence of following habitat types: 41. 1. Beech forests, 41. 2. Oak – Hornbeam forests and 54. 12. Hard water springs. Following protected species are also present at this site: *Omphalodes verna*, *Daphne laureola*, *Ilex aquifolium*, *Aquilegia dinarica* etc. Larch (*Taxus baccata*) lives at the Canyon slopes

<sup>22</sup> Source: EMERALD DataBase, Institute for the Protection of Nature

*Aythya nyroca*, *Asio flammeus*, *Ardeola ralloides*, *Ardea purpurea*, *Aquila pomarina*, *Aquila heliaca*, *Aquila clanga*, *Aquila chrysaetos*, *Anthus campestris*, *Alcedo atthis*, *Accipiter brevipes*. Important Migratory Birds registered at the site: *Tringa ochropus*, *Tringa nebularia*, *Tringa glareola*, *Tringa erythropus*, *Sternus roseus*, *Scolopax rusticola*, *Podiceps nigricollis*, *Pluvialis apricaria*, *Pluvialis squatarola*, *Philomachus pugnax*, *Pernis apivorus*, *Pandion haliaetus*, *Mergus serrator*, *Mergus albellus*, *Melanitta fusca*, *Limosa limosa*, *Lanius excubitor*, *Falco columbarius*, *Ergetta alba*, *Cygnus cygnus*, *Circaetus gallicus*, *Ciconia nigra*, *Ciconia ciconia*, *Carduelis spinus*, *Calidris ferruginea*, *Calidris alpina*, *Bucephala clangula*, *Aythya fuligula*, *Aythya ferina*, *Ardeola ralloides*, *Ardea purpurea*, *Apus pallidus*, *Apus melba*, *Apus apus*, *Anthus cervinus*, *Anser fabalis*, *Anser anser*, *Anser albifrons*, *Anas querquedula*, *Anas penelope*, *Anas crecca*, *Anas acuta*, *Acrocephalus scirpaceus*, *Acrocephalus palustris*, *Accipiter brevipes*. Important Mammals present at the site are: *Lutra lutra*, *Myotis myotis*, *Myotis emarginatus*, *Myotis capaccinii*, *Myotis blythii*, *Miniopterus schreibersi*. Important Herpetofauna present at the site: *Elaphe situla*, *Elaphe quatuorlineata*, *Vipera ursinii*, *Triturus carnifex*, *Bombina variegata*, Important Fish species present at the site: *Padogobius panizzae*, *Cobitis taenia*, *Alosa fallax*, *Alburnus albidus*, *Rutilus rubilio*, *Rhodeus sericeus amarus*, *Salmo marmoratus*, *Leuciscus souffia*, *Barbus meridionalis*, *Acipenser sturio*, *Acipenser naccarii*, *Petromyzon marinus*, *Lampetra planeri*, *Lampetra fluviatilis*. Important Insects present at the site: *Lycaena dispar*. Other important plant species: *Marsilea quadrifolia*, endemic *Quercus robur scutariensis*, nationally important plants *Minuartia velenowskyi*, *Hermodactylus tuberosus* and internationally important plants *Orchis simia*, *Himantoglossum carpinum*, *Hydrocotyle vulgaris*, *Utricularia vulgaris*.

Cijevna - Identified habitat types (Resolution 4, Bern Convention): 4.1 Beech Forests, 41.7 – Thermophilous and supra-Mediterranean oak woods, 41.8 – Mixed Thermophilous forests, 42. 7 – High oro-Mediterranean pine forests, 44.1 - Riparian willow formations, 44.8 - Southern riparian galleries and thickets, 45 - Temperate broad-leaved evergreen forests. Important Birds registered at the site: *Picus canus*, *Pernis apivorus*, *Lanius minor*, *Lanius collurio*, *Ficedula albicollis*, *Falco peregrinus*, *Falco biarmicus*, *Dendrocopos syriacus*, *Circaetus gallicus*, *Caprimulgus europaeus*, *Bubo bubo*, *Aquila chrysaetos*, *Alcedo atthis*. Important Migratory Birds registered at the site: *Accipiter nisus*, *Accipiter gentilis*, *Accipiter brevipes*, *Actitis hypoleucos*, *Alauda arvensis*, *Anthus pratensis*, *Alectoris graeca*, *Anthus spinoletta*, *Apus melba*, *Aquila chrysaetos*, *Asio otus*, *Bubo bubo*, *Buteo buteo*, *Calandrella brachydactylis*, *Carduelis cannabina*, *Carduelis carduelis*, *Carduelis chloris*, *Cettia cetti*, *Coccyzus coccyzus*, *Columba palumbus*, *Columba oenas*, *Columba livia*, *Corvus corax*, *Corvus monedula*, *Cuculus canorus*, *Delichon urbica*, *Dendrocopos syriacus*, *Emberiza cirrus*, *Emberiza hortulana*, *Falco tinnunculus*, *Falco peregrinus*, *Falco biarmicus*, *Ficedula albicollis*, *Fringilla coelebs*, *Galerida cristata*, *Gyps fulvus*, *Hieraaetus pennatus*, *Hippolais pallida*, *Hippolais olivetorum*, *Hirundo rustica*, *Lanius collurio*, *Melanocorypha calandria*, *Monticola saxatilis*, *Monticola solitarius*, *Montifringilla nivalis*, *Oenanthe oenanthe*, *Oenanthe hispanica*, *Muscicapa striata*, *Motacilla flava*, *Motacilla alba*, *Oriolus oriolus*, *Otus scops*, *Parus major*, *Parus cristatus*, *Parus caeruleus*, *Pernis apivorus*, *Passer domesticus*, *Parus cristatus*, *Parus caeruleus*, *Parus major*, *Phoenicurus ochurus*, *Phoenicurus phoenicurus*, *Phylloscopus sibilatrix*, *Phylloscopus collybita*, *Pica pica*, *Picus viridis*, *Picus canus*, *Prunella collaris*, *Pyrrhocorax graculus*, *Regulus regulus*, *Saxicola torquata*, *Saxicola rubetra*, *Serinus serinus*, *Sitta europaea*, *Sitta neumeyer*, *Strix aluco*, *Sturnus vulgaris*, *Sylvia atricapilla*, *Sylviacantillans*, *Sylvia communis*, *Sylvia curruca*, *Sylvia hortensis*, *Sylvia melanocephala*, *Upupa epos*. Important Mammals registered at the site: *Canis lupus*. Important Amphibians registered at the site: *Testudo hermanni*, *Triturus carnifex*, *Bombina variegata*, *Elaphe quatuorlineata*, *Elaphe situla*. Important Fish species registered at the site: *Salmo marmoratus*, *Barbus meridionalis*, *Leuciscus souffia*, *Alburnus albidus*. Important Insects registered at the site: *Lucanus cervus*, *Cerambyx cerdo*, *Lycaena dispar*, *Eriogaster catax*, *Callimorpha quadripunctata*. Other Important Plants registered at the site: *Narcissus angustifolius*, *Ramonda serbica*, *Geranium dalmaticum*, *Ilex aquifolium*, *Orchis provincialis* (plant species of international importance)

Rumija – Identified habitat types (Resolution 4, Bern Convention): 34. 3 - Dense perennial grasslands and middle European steppes, 34. 5 - Mediterranean xeric grasslands, 4.1.1 - Beech Forests, 4.1.2 – Oak – hornbeam forests, 41.7 – Thermophilous and supra-Mediterranean oak woods, 41.8 – Mixed Thermophilous forests, 42. 7 – High oro-Mediterranean pine forests, 65 - Caves. Important Birds registered at the site: *Accipiter brevipes*, *Accipiter gentilis*, *Accipiter nisus*, *Alectoris graeca*, *Athenae noctua*, *Asio otus*, *Bubo bubo*, *Buteo buteo*, *Caprimulgus europaeus*, *Circaetus galicus*, *Cettia cetti*, *Coccyzus coccyzus*, *Columba palumbus*, *Corvus corax*, *Delichon urbica*, *Dendrocopos syriacus*, *Falco peregrinus*, *Falco tinnunculus*, *Ficedula albicollis*, *Fringilla coelebs*, *Galus glandarius*, *Hippolais pallida*, *Hippolais olivetorum*, *Hippolais icterina*, *Hirundo rustica*, *Hirundo daurica*, *Lanius collurio*, *Monticola saxatilis*, *Oenanthe oenanthe*, *Oenanthe hispanica*, *Motacilla alba*, *Oriolus oriolus*, *Parus major*, *Pernis apivorus*, *Passer domesticus*, *Phoenicurus apivorus*, *Phoenicurus ochurus*, *Phoenicurus phoenicurus*, *Phylloscopus collybita*, *Pica pica*, *Picus viridis*, *Picus canus*, *Prunella collaris*, *Prunella modularis*, *Pyrrhocorax graculus*, *Sitta europaea*, *Sitta neumeyer*, *Strix aluco*, *Sturnus vulgaris*, *Turdus merula*. Important Mammals registered at the site: *Miniopterus schreibersi*, *Canis lupus*. Important Amphibians and Reptiles registered at the site: *Testudo hermanni*, *Vipera ursinii*, *Elaphe quatorlineata*, *Elaphe situla*. Important Insects registered at the site: *Lucanus cervus*, *Cerambyx cerdo*, *Osmoderma eremita*, *Eriogaster catax*, *Callimorpha quadripunctata*. Other Important Plants registered at the site: *Narcissus angustifolius*, *Edraianthus wettsteini* ssp. *Wetsteini*, *Ramonda serbica*, *Asperula baldacci*, *Pinus heldreichii*, *Gymnospermium scipetarum*, *Minuartia velenovsky*, *Tulipa grisebachiana*.

Cemovsko polje - Identified habitat types (Resolution 4, Bern Convention): 34.3 – Dense perennial grasslands and Middle European steppes, 41.7 - Thermophilous and supra-Mediterranean oak woods, 44.8. - Southern riparian galleries and thickets. Important Birds registered at the site: *Lanius minor*, *Pernis apivorus*, *Perdix perdix italica*, *Otis tarda*, *Milvus milvus*, *Milvus migrans*, *Melanocorypha calandra*, *Lanius minor*, *Lanius collurio*, *Gyps fulvus*, *Grus grus*, *Ficedula albicollis*, *Falco vespertinus*, *Falco naumanni*, *Falco biarmicus*, *Falco peregrinus*, *Circus pygargus*, *Circus macrourus*, *Circaetus gallicus*, *Caprimulgus europaeus*, *Calandrella brachydactyla*, *Aquila chrysaetos*, *Anthus campestris*, *Accipiter brevipes*. Important Migratory Birds registered at the site: *Upupa epops*, *Turdus merula*, *Sylvia atricapilla*, *Saxicola torquata*, *Saxicola rubetra*, *Prunella collaris*, *Pica pica*, *Phoenicurus phoenicurus*, *Phoenicurus ochurus*, *Phasianus colchicus*, *Pernis apivorus*, *Perdix perdix*, *Passer hispaniolensis*, *Passer domesticus*, *Parus major*, *Otus scops*, *Oenanthe oenanthe*, *Oenanthe hispanica*, *Motacilla alba*, *Milvus milvus*, *Milvus migrans*, *Melanocorypha calandra*, *Lanius collurio*, *Hirundo rustica*, *Grus grus*, *Garullus glandarius*, *Gallinago gallinago*, *Galerida cristata*, *Fringilla montifringilla*, *Fringilla coelebs*, *Ficedula albicollis*, *Falco subbuteo*, *Falco peregrinus*, *Delichon urbica*, *Coturnix coturnix*, *Corvus monedula*, *Corvus corax*, *Coracias garrulus*, *Columba livia*, *Circus pygargus*, *Circus cyaneus*, *Carduelis spinus*, *Carduelis carduelis*, *Carduelis cannabina*, *Caprimulgus europaeus*, *Calandrella brachydactyla*, *Buteo buteo*, *Athene noctua*, *Asio otus*, *Anthus spinoletta*, *Anthus pratensis*, *Anthus campestris*, *Alauda arvensis*, *Accipiter nisus*, *Accipiter gentilis*, *Accipiter brevipes*. Important Amphibians registered at the site: *Testudo hermanni*. Other Important (endemic) Plants registered at the site: *Ramonda serbica*, *Hiacinthella dalmatica*, *Romulea bulbocodium* subsp. *graeca*

Note: Spatial distribution of the habitats and species given above have been used for delineation of zones in the Zoning Concept for Skadar Lake.

## IV. 2. Management Effectiveness

### Protected Area (PA) Management Authorities - Capacities for sustainable management

While Albanian protected part of the Lake is waiting on establishing direct PA management structure<sup>23</sup>, management authority of National Park Skadar Lake is functioning in Montenegro since 1986.

#### *Implementation of protecting and developing measures*

Management of *National Park* Skadar Lake in Montenegro is based on legal provisions given by the Law on National Parks (1991), and management authority is implementing: Physical Plan of the National park Skadar Lake (2000), Five years Management Plan (2005, 2010) and Annual Management Operational Plans. Following structures are presented in the management authority of National Park Skadar Lake: Director, Park service (24 wardens), Scientific Council and Management Board of entire Public Enterprise for National parks of Montenegro. Due to traditional manner in the planning of National parks management, there is a poor interaction between local communities and National Park authority in both, management planning and implementation, as well as in participation in making important decisions. Also, lack or insufficient cooperation between National Park and other responsible institutions have negative consequence on management efficiency.

*Managed Natural Reserve* - Protected Area in Albania is under the territorial jurisdiction of Shkodra Prefecture, belonging to two districts: Malesia e Madhe (eastern and northern coast of Shkodra/Skadar Lake) and Shkodra (the whole remaining part of the proposed area). Functional jurisdiction is divided between different institutions responsible for Shkodra and Malesia e Madhe, as follows: Directorate of Forestry Service, Directorate of Agriculture and Food, Directorate of the basin Drin – Buna, Regional Environmental Agency, Council of the District, Prefecture and Municipality Shkodra.

Concerning future management of the Lake, there is a *need to provide joint management* i.e. reach official agreement among the states, create joint management body as well as adopt and implement joint management plan.

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<sup>23</sup> At present, direct management authority is missing, but different institutions are responsible for the administration of certain activities such as: (i) General Directorate of Forests and Pastures (forests and pastures) and General Directorate of Fisheries (fishing), both under the Ministry of Agriculture and Food; Ministry of Territorial Planning and Tourism that is responsible for tourism strategies through the National Tourism Agency; (ii) Ministry of Environment that is responsible for environmental protection but represented at the Lake by the Regional Environmental Protection Agency in Shkodra.

## V. CROSS – CUTTING ISSUES RELEVANT FOR THE STRATEGY

### V. 1. Tourism

In the context of national economies, tourism is viewed as one of major sources of income in both, Montenegro and Albania. A significant number of foreign investments has entered Montenegro but also Albania in the last 10 years to fund the development of this industry. Both countries are promoted as new Mediterranean tourism destinations competing with other countries in the region such as Croatia and Greece.

In respect to complementary of Skadar – Shkodra Lake area and Montenegrin and Albanian coastlines offer, and additionally with Cetinje as a royal capital offer, well positioned Shkodra town, Podgorica as a capitol and Bar town as a main port in Adriatic region, one can tell with certitude about great potential of the region. Natural values, cultural heritage, gastronomy, old fishermen settlements, closeness of the seaside, are advantages of the Lake, which are still not even nearly utilized, rather packed in sharp recognizable tourist product. Moreover, possibility of opening the Lake with navigable system of Bojana, opening boat line Virpazar-Skadar, as well as Sozina tunnel, generate conditions for major changing of the Lake offer.

*Excursive tourism – boat trips* – In Montenegrin part of Skadar – Shkodra Lake, in NP Skadar Lake currently the most often is excursive form of tourism, which mostly has visitors from Montenegro coastline for clients. Excursion tours are usually done trough local people. The most popular for tourists are combinations of boat trips and catering that provided 7.000 tourists in 2004, while in 2005, 15,500 tourists visited the area (sources are the records of the National Park). In 2004, five entrepreneurs and twelve cruising boats on the territory of the National Park were engaged in this activity. Certain number of households in Krajina and Crmninca derive income from tourism, as well as entrepreneurs involved in catering. Indirect income from tourism is gained through the sale of fish, olive oil, and fruits to the tourists coming to visit Krajina and Vranjina. In general, reported as a secondary activity for the majority of households in this area, 20% of households derive their annual income from tourism. The reasons for low utilization of tourism as financial support for households are the short tourist season, poor organization and insufficient accommodations.

*Accommodation capacity* – Accommodation capacities are very modest. Besides three hotels, there are private accommodations as well, which are the most common, not registered.

*Other tourist contents* – Beside something around ten tourist objects, the offer is made out of bird watching, wind surfing, walking. All these contents are still at the beginning and do not generate significant income.



*One of tourist boats ready for cruising*



*Tourist resort Plavnica*

## **V. 2. Large energy and infrastructure development**

Development of large energy and infrastructure systems is oriented towards satisfying national or regional needs, instead of local needs at the Lake. It could create multiple negative effects on natural resources, biodiversity and integrity of protected areas. In this sense the biggest interventions were named “large”, including roads, energy and hydro-technical infrastructures etc, which change the natural shape of the terrain and particularly natural resources. In the Skadar – Shkodra Lake area, such large energy and infrastructure systems are as follows: (i) hydro power plants on the river Moraca, (ii) nuclear power plant near Shkodra town, (iii) highway Bar – Boljare – Belgrade and (iv) Adriatic – Ionian highway.

Conflicts between the environmental protection and positioning of large infrastructure are present with protected natural areas which is obvious in the case of the road infrastructure corridor(s) that passes through the NP Skadar Lake in Montenegro.



*Embankment for existing road and railway is crossing NP Skadar Lake*

## **V. 3. (Strategic) Environmental Impact Assessment**

In order to overcome the existing problems and limitations to the efficient functioning of the system of environmental protection the Environmental Impact Assessment was introduced in the system of national legislations in both Montenegro and Albania, as a new mechanism and an instrument for the implementation of nature protection policies. These laws are very important to integrate the requirements of sustainability and environmental protection, and therefore the preservation of biodiversity in planning documents.

Adequate application of the Strategic- and Environmental Impact Assessment represent a great challenge for the bodies and institutions at the central and local level who participate in the procedures related to their application. This is particularly important for the sectors related to the use of natural resources in the area of Skadar – Shkodra Lake, such as fishery, water management, agriculture, planning large infrastructural projects, tourism, residential and development zones which can endanger natural habitats under protection.

Consistency in the application of these two mechanisms in the transboundary context has to be checked particularly in the case when these mechanisms will be applied on large energy and technical infrastructure projects that are mentioned in the chapter V.2.

Establishing *bilateral management structure* for Skadar – Shkodra lake area is of great importance for successful applying of these two mechanisms in the transboundary context in practice, as it is already indicated in TDA (2006) and Joint SAP for Skadar – Shkodra Lake (2007). This is also enabled with Memorandum(s) of Understanding (2003, 2007) between Albanian and Montenegrin ministries responsible for environment protection.



*Size of Skadar Lake (in winter season) – provide (physically) large area for crossborder cooperation*





## VI. THREATS AND FACTORS ENDANGERING NATURAL RESOURCES OF SKADAR – SHKODRA LAKE

Skadar – Shkodra Lake has been providing human civilization with the great development opportunities for centuries both due to its convenient position and due to the good access to its natural resources. In time, the development resulted in impoverishment of the Lake resources, while intensity of the pressures and factors endangering the resources has been growing all the time. Apart from the endangerment of the natural resources, Skadar – Shkodra Lake also went through significant physical changes, which had an additional impact on the ecological balance and stability of this important ecosystem.

On the other side, such trends are contrary to the already accepted standards for protection of the Lake, and therefore in practice there are frequent conflicts between the need to use the resources and the need to protect them. It is exactly the reconciliation of this conflict that is the key challenge for anyone involved in achieving sustainable development of the Skadar – Shkodra Lake.

### VI. 1. Threatened water / wetland habitats and ecosystems

The greatest threat to Skadar – Shkodra Lake waters and wetland habitats is **Eutrophication**<sup>24</sup> which is a consequence of pollution from human settlements. Apart from the practice of direct use of biological resources from freshwater ecosystems, plans for its drying are a possible factor for endangering of flora and fauna communities particularly fish population.

Threats to water and wetlands habitats, as well as hunting of water birds, have been one of basic threats to ecological stability of Skadar – Shkodra Lake area.

Development of new practices in agriculture and market pressures have led to the loss of agro-biodiversity, first of all local varieties and breeds which are declining and disappearing from our households or their genetic basis has changed due to cross-breeding with other varieties and breeds imported from other areas.



*Detail of Lake waters affected by Eutrophication*

### VI. 2. Major threats to Skadar – Shkodra Lake area

On the basis of the available information, the following 5 main categories of threats to Skadar – Shkodra Lake area can be identified:

- Pollution - particularly of water resources, as well as of living organisms, air and land by various pollutants from industry, settlements, agricultural areas in the direct vicinity and beyond. Apart from direct adverse impact on water, the pollution with wasted waters and solid waste which apart from intoxication of living organisms leads to Eutrophication in the Lake ecosystem
- Direct use of the Lake natural resources – particularly of water, biological (fishery, hunting), and mineral (sand, gravel, peat) resources and this negative impact has consequence on the capacities of these resources and the ecological stability of the Lake, as well.

<sup>24</sup> Eutrophication state varying over the seasons, oligotrophy has a tendency to (beta) mesosaprobity in summer (Babani, F et al, 2011: Seasonal variation of chlorophyll phytoplankton in relation to trophic status of Shkodra Lake. CANU & ASS - Skadarsko jezero - stanje i perspektive / Liqeni i Shkodres - gjendja dhe perspektivat. CANU book series no.105, Vol I pages 127 - 133. Podgorica - Shkoder)

- Uncontrolled expansion of human settlements associated with changes in land use practices at the Lake and its surrounding causes manifold negative effects, starting from the loss of natural habitats, through increased pollution, to the permanent change of landscapes.
  - Uncontrolled tourism development which can jeopardize vital ecological functions of the Lake (pressure and loss of biodiversity, pollution etc.) and reduce opportunities for sustainable development for the local population.
  - Plans for construction of large technical / infrastructural systems (highway, hydro- and nuclear power plants, regional water-supply system, regulation of the water levels etc.) which would change the current physiognomy of the landscapes on the Lake and particularly stability and functioning of the networks of the local bio-centres and bio-corridors.
- Apart from aforementioned categories of threats, two relatively new threats affect Skadar – Shkodra lake area, as follows

1. *Introduction of alien, invasive species*, mostly for commercial reasons<sup>25</sup>, is a threat to biodiversity which has not been well studied yet<sup>26</sup>, but its actualization is expected in the near future;
2. *Climate change* represents a forthcoming threat to Lake natural resources, which has a small variation of the amplitude of ecological factors, particularly in temperature and water regime and more attention<sup>27</sup> must be paid to the analysis of consequences from climate change<sup>28</sup>.

However the most significant cumulative effect of the above mentioned threats to the biodiversity in Skadar – Shkodra Lake area is the loss of rare or endangered habitats and their associated rare, endemic or endangered species particularly on the coast as well as a reduction in the functionality and stability of ecosystems, particularly of water ecosystems.

### **VI. 3. Major reasons which cause threats to the natural resources in Skadar – Shkodra Lake area**

There are a number of endangering factors - the threats to the natural resources in Skadar – Shkodra Lake area. These endangering factors create the need to undertake appropriate measures and activities which would primarily address the key causes of the problems, the most important of them being the following:

1. Low political priority given to the protection as opposed to the use of the natural resources - Although the protection of natural resources is formally emphasized as a priority in numerous official documents<sup>29</sup>, in practice it has a very low position in the political agenda, because profitable economic sectors like tourism, energy sector and agriculture are considered real priorities. The interest of „development“ without any barriers is most frequently explained by strong financial and investment arguments, which are stronger than ecological interests, legally required procedures and the measures considered being barriers for such development.
2. Promotion of policies not compatible with sustainable development of the Skadar – Shkodra Lake area based on the development of the focal communities - it is already

<sup>25</sup> The most frequently encountered invasive species are as follows: Black Locust (*Robinia pseudoacacia*), which is already a resident, Chinese sumac (*Ailanthus altissima*)

<sup>26</sup> Preliminary list of plant invaders for Montenegro (include habitat types associated to Skadar – Shkodra Lake area) is provided in Stešević D. and Petrović, D (2010): *Preliminary list of plant invaders in Montenegro*. Biologica Nyssana 1 (1-2), while general inventory of invasive insects and fungi could be found at <http://www.europe-aliens.org/regionFactsheet.do?regionId=YUG-MN> )

<sup>27</sup> The necessity of making forecasting scenarios for climate change and other necessary measures concerning the impact of climate change on coastal and marine biodiversity of Montenegro are included in the document the Ministry of Tourism and Environment and UNEP RAC / SPA (prepared by V. Buskovic (2008)): *Vulnerability and impacts of Climate Change on Marine and Coastal Biodiversity in Montenegro*, National Overview. This document covers Mediterranean part of Montenegro, including Skadar – Shkodra Lake area.

<sup>28</sup> Expected climate changes in Montenegro (the IPCC AR 4, and other sources) in the period to 2050: warming - rising temperatures of 1.8 to 2.2 0C especially during summer and a pronounced temperature contrast between land and sea, (ii) decreased amount of precipitation - the range between -6% and - 14% especially during summer, while reducing relative humidity in the air and soil and increased evaporation, (iii) increasing the frequency of extreme climate phenomena and (iv) increase in sea level by about 18 - 22 cm

<sup>29</sup> Following official documents are important in Montenegro; Declaration of Ecological State of Montenegro, Spatial Plan of Montenegro until 2020, National Strategy for Sustainable Development, National Biodiversity Strategy with Action Plan for period 2010 - 2015 etc.

easy to indicate to the sectoral policies that are not directed to environmentally sustainable forms of activities. Thus, for example, the policy in the tourism industry in practice still is not sufficiently directed to more sustainable but more expensive forms of tourism on the Lake that are tailored for a smaller number of guests. It is more directed to development of mass „touring“ tourism, which is damaging not only to the Lake resources, but also to the possibility of generating higher incomes for the local communities.

3. Low level of prohibitions, restrictions and incentives for protection of natural resources - the existing system of prohibitions, penalties and sanction for violation of nature protection regulations (from pollution to using biological resources) is inefficient and it does not function as a restricting factor. If sanctions are imposed they are frequently considered as an additional „tax“, which makes doing business more difficult. Apart from that, there is a lack of incentives for investment into improvement of the conditions of natural resources of the Lake, both for the economic sectors (agriculture, industry, tourism) and for individuals who are to change their awareness and behaviours.
4. Minimum participation of the local stakeholders from the Skadar - Shkodra Lake area - historically speaking, the mechanisms for participation of the local stakeholders in making decisions important for using the natural resources in the area of the Skadar – Shkodra Lake always existed. Thus, for example, the fishermen had their fishermen assemblies (named *Ampo*) where they were making decisions on using the fishermen areas and distribution of the catch; decisions on the rights within the villages, like the right to port, were made in the village councils etc. However, those mechanisms do not exist today as such, so that the rights of the local population in the decision - making processes are significantly reduced and limited mostly to the participation in the public consultations about the documents that "some other body" (of the central or local government) prepares "for them". On the other side, the local stakeholders (fishermen, tourism workers, farmers) are not organized and therefore the interests they have cannot be articulated and let alone valorised on a higher level. This situation is not good for the protection of the natural resources because of the lack of engagement of the most important segment of the public in the protection of Lake and its natural resources.



*An old drawing of Zabljak Crnojevica*



## VII. PLAN OF PRIORITY ACTIONS FOR JOINT MANAGEMENT OF SKADAR – SHKODRA LAKE

### VII. 1. Main challenges that require undertaking adequate measures and activities

Taking into account previously established *fundamental principles* (see chapter II. 1, pg 13) and *strategic priorities* (see chapter II. 3., pg 15) that stipulate **sustainable use and management of natural resources and protection and (joint) management of Protected Areas**, on one side, and identified *threats* and factors endangering natural resources of the Lake (see chapter VI, page 41) that include **pollution**, direct **use of lake natural resources**, expansion of **human settlements**, uncontrolled development (tourism), large technical / **infrastructure** systems, on the other side, following five thematic areas are proposed for undertaking appropriate measures and activities for achieving Skadar / Shkodra Lake vision and strategic priorities in the Management of Skadar / Shkodra Lake

Main linkages of in these thematic areas with previously identified issues are as follows:

1. **Sustainable use of Natural Resources and their efficient Management** that should address specific issues<sup>30</sup> given in the chapter II. 3. – item *A. Natural resources*, (pg 15). Measures and actions in this thematic area are responding to the major threats<sup>31</sup> and factors of endangering natural resources in Skadar – Shkodra Lake area given in the chapter VI.2 (page 41).
2. **Flexible and adaptive Protected Area Management** that should address specific issues<sup>32</sup> addressed in the chapter II. 3. – item *B. Protected Areas*, (pg 16). Measures and actions in this thematic area are also responding to the Protected Area requirements given in the chapter IV (page 33).
3. **Transborder cooperation on planning and management of Protected Areas in Skadar – Shkodra Lake area** that should enable adequate: (i) legal, (ii) institutional and (iii) joint management framework for joint AL – MNE work on the issues<sup>33</sup> indicated in the chapter II. 3. – item *B. Protected Areas*, heading *Transboundary context of Protected Areas* (pg 17).
4. **Environmental investment** aimed at direct support in aforementioned thematic areas that is mainly linked to applying pollution prevention measures as well as reduction of the pollution from existing sources.
5. **Monitoring of the efficiency** is linked to all measures and actions in previous thematic areas. Ideally, monitoring activities should follow effects of undertaken measures on the state of adequate component of the environment. However, classic environmental monitoring facilities and applied techniques shall be gradually improved, particularly in the area of surface/ground water quality monitoring and area of biodiversity monitoring, as well.

In this way, aforementioned thematic areas connect strategic priorities and "problems" (threats) and their objectives are integrated in the strategic priorities. Once again they are aimed to a better protection of PAs and applying sustainable use of natural resources of Skadar / Shkodra Lake.

Realations and linkages between strategic priorities, threats and thematic area are presented in following graphic scheme.

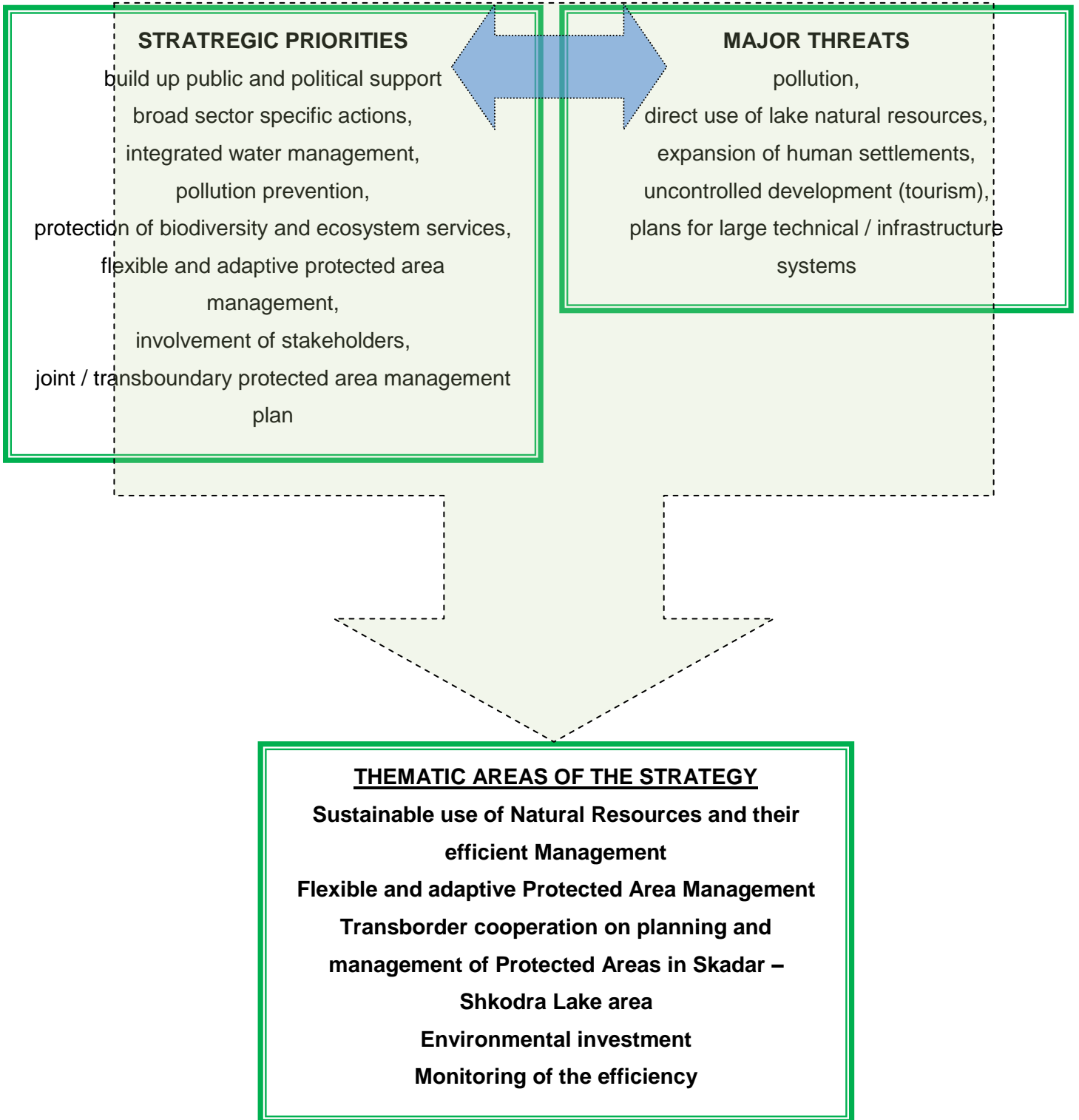
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<sup>30</sup> Building public and political support, provide sector specific actions (based on EU Water Framework Directive...), apply Integrated River basin management Plan, pollution prevention and protection of ecosystem services / biological resources

<sup>31</sup> Identified major threats are: pollution, direct use of lake natural resources, expansion of human settlements, uncontrolled development (tourism), large technical / infrastructure systems.

<sup>32</sup> Flexible and adaptive management for the benefit of local people, involving stakeholders in planning at national, regional and local level.

<sup>33</sup> Following issues are of particular concern: (i) water border crossing regime, (ii) fishery rights and practices, (iii) transport of people and movement of goods, (iv) responsibility and operations of warden / guard services and (v) joint cultural events (trade fairs, festivities etc).



## VII. 2. Action plan – plan of measures and activities for Joint Management of Skadar – Shkodra Lake for the period 2012 – 2017

As a response to the previously identified challenges and in accordance with available organizational (staff and financial) capacities, implementation of the measures and activities<sup>34</sup> given in the following table will be provided for Joint Management of Skadar – Shkodra Lake for the period 2012 – 2017.

Thematic Area	Measure / Activity	Costs – AL (USD)	Costs - MNE (USD)	Ongoing foreign cofinancing (USD)	Other financing resources (USD)	Indicator
<b>Sustainable use of Natural Resources and their efficient Management</b>	Preparation and implementation of the Integrated Management Plan of Skadar Lake Basin in Montenegro and Albania	?	2.500.000			Integrated Management Plan prepared and implemented
	Preparation of urban, territorial and development planning for each of the villages around the Lake.			100.000		Physical / urbanistic plans adopted
	Develop a landscape and building architecture identity based on local tradition. Establish basic rules for building in the area (type and size of buildings, village extension areas) and support removal of illegal activities.			10.000		Regulation for building traditional infrastructure adopted and enforced
	Promotion of village economies based on “wise use” of natural resources (trainings including inventory of resources, identification of groups, and criteria on economy and positive environmental impact)			20.000		Number of villages with wise use concepts applied
	Identify and promote pilots in commodity chain development that reduce pressure on natural resources and promote economic development	56.000	20.000	500.000		Number of pilots for reducing pressures on natural resources
	Prepare Fishery stock assessment				30.000	Document on Fishery stock assessment prepared
	Prepare Fishery management Plan, including quota management system				10.000	Fishery Management Plan prepared and enforced
	Identify, support, and invest in incentives to legal fishing				10.000	Number of fisherman receive incentives to legal fishing
	Provide mechanism by which fishermen can identify and address issues of common concern				20.000	Mechanism provided
	Identify, define and implement sustainable agricultural pilots in transition zone	210.000	50.000			Number of sustainable agriculture pilots applied in transition zone
	Inventory of cultural heritage sites	10.000				Publication on cultural heritage of Skadar / Shkodra Lake prepared and printed out
	Implement two pilot renovations and provide required equipment	20.000				Number of pilot renovations provided
	Master plan for informational infrastructure			10.000		Master plan prepared
	Rehabilitation of existing structure to serve as visitor centre			150.000	50.000	Facility of Visitor center (re)constructed
	Support for the establishment of information and education infrastructure (build an information and education centre in Shiroka; visitor centers in western and eastern coast of the lake; watch towers in Vraka, Kalldrun, Kamice, Shegan; cycling routes; signing and info desks along the road Buna Bridge – Zogaj and Grile – Shegan)	30.000				Number of information and education infrastructure established
	Establish a small natural museum (exhibition) of Shkodra Lake (Flora, Fauna, Paleontology, Archaeology)				50.000	Natural Museum established

<sup>34</sup> As already mutually agreed between MNE and AL, relevant measures and activities given in the Joint Strategic Action Plan for Skadar / Shkodra Lake are included in the Action plan of this Strategy

	Support for the establishment of the facilities for cultural activities (theatre, amphitheatre, temporary stages in Shiroka and Koplik)	200.000				Number of the facilities for cultural activities established
	Provide infrastructure for "eco camping" site				50.000	"Eco-camping" infrastructure delivered
	Projects for restoration and enlargement of the areas with autochthon vegetation, especially forests (willow, ash, poplar) in the east coast of the lake (Pilot project for 6 ha in Koplik)				60.000	Number and size of the areas with restored / enlarged autochthonous vegetation
	Controlled grazing in Virpazar				10.000	Controlled grazing applied
	Support erosion control measures on streams of Tarabosh Mountain (pilot project for the most problematic streams)				110.000	Pilot project for controlling erosion applied
	Maintain controlled cattle grazing as a tool for management of habitats (Pilot project for preservation of a pasture area in Shegan)				30.000	Number of pilot project for controlled cattle grazing applied
	Stipulation of the measurements for protection of important habitats for fish reproduction and nursery (5 Ha Kamic and 2-3 Ha in Shiroke)				20.000	Protection measures applied
	Study unit for bird preservation at the lake (Vranjina)		20.000		50.000	Study unit established
	Platform for nesting of pelicans and other selected endangered bird species				45.000	Platform for nesting pelicans placed at the spots
	Building of platform and two towers for birdwatching and wardening				45.000	Birdwatching platform and 2 towers placed at the spots
	Promotion programme for sustainable tourism				30.000	Promotion programme for sustainable tourism prepared and delivered
	Educational awareness programme		10.000		30.000	Education awareness program prepared
	Produce promotional materials		10.000		125.000	Promotional material produced
	Produce Tourism Master Plans in Montenegro and in Albania			20.000 for MNE	30.000 for AL	Tourism Master Plans in Montenegro and in Albania prepared
	Public pilots (construction of water sports center, construction of small marina in Shiroka, set up small scale tourist infrastructure)	150.000				Number of public pilots
	Private pilots (creation of tourist facilities, development and promotion of Shiroka, educational projects in Shiroka and Koplik)	180.000				Number of private pilots
	Activities from Regional Development Plan	525.000				Activities from Regional Development Plan implemented
	Increase inspection control and eliminate/abate illegal activities		-			Inspection control applied regularly
	Enforcement of SEA and EIA methods and techniques in practice		5.000			SEA and EIA methods and techniques enforced
	Introduce criteria for ecological minimum in water flow in adequate regulation		5.0000			Criteria for ecological minimum in water flow introduced in adequate regulation
<b>Flexible and adaptive Protected Area Management</b>	Prepare a Zoning plan, including info gathering, consultation, and adoption of the Zoning Plan				50.000	Zoning plan prepared and adopted
	Implement the Zoning Plan at the field (signalization) at and around the Lake				40.000	Zoning Plan implemented and signalization implemented at the Lake
	Update / develop Management plans for Protected Areas in MNE and AL respectively				40.000	Management plans for Protected Areas in MNE and AL updated
	Establish direct management authority for Protected Area in Albanian part of the Lake				52.000	Direct management authority for Protected Area in Albanian part of the Lake established
	Develop and / or update regulations and bylaws for the protected area management in Albania and their adoption				32.000	Regulations for protected area management in Albania developed and / or updated
	Develop and implement training programmes for PAs staff				60.000	Training programmes for PAs staff delivered



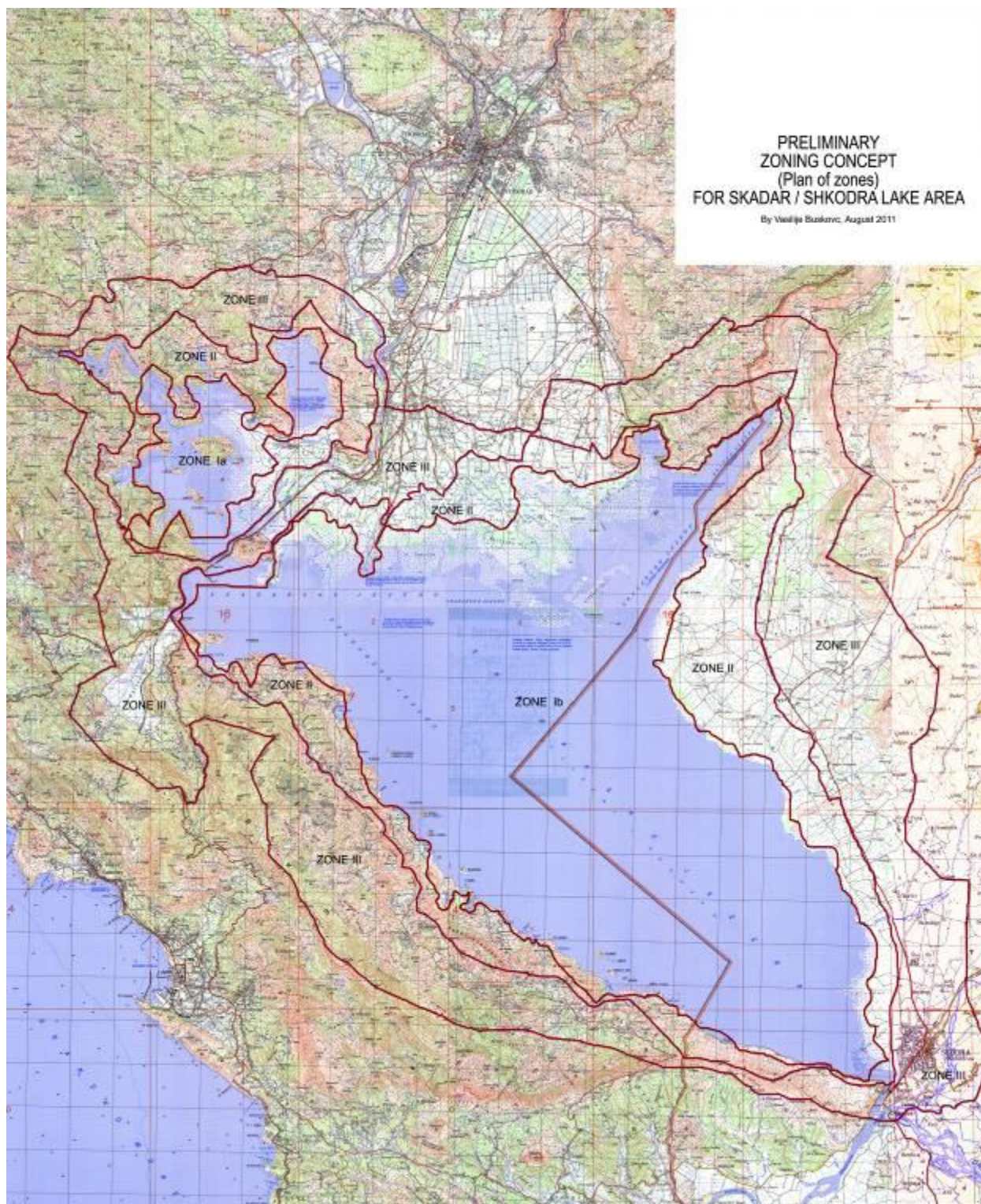
	Provide equipment for PAs staff		10.000			Equipment for PAs staff provided
	Improve human capacities of NPSL in terms of staffing		60.000			Human capacities of NPSL improved
	Implement park signalization			80.000	40.000	National park signalization implemented
<b>Transborder cooperation on planning and management of Protected Areas in Skadar – Shkodra Lake area</b>	Support a study to analyze existing legal framework for the management of natural resources in Albania and identify gaps and provide recommendations for improvement				15.000	Study for analyzing existing legal framework for the management of natural resources in Albania prepared
	Support approximation of legislation between both countries to facilitate joint management of the Skadar/Shkodra lake				30.000	Legislation for joint management of the Skadar/Shkodra lake prepared in MNE and AL
	Define and set up working groups for different transboundary activities as zoning, monitoring, tourism, fishing, agriculture, basin management, boating and traffic				150.000	Number of working groups for different transboundary activities established
	Establish and support Skadar/Shkodra Lake Commission				50.000	Skadar/Shkodra Lake Commission established
	Establish a joint secretariat for assisting Skadar/Shkodra Lake Commission		10.000		120.000	Joint secretariat for assisting Skadar/Shkodra Lake Commission established
	Develop and establish a Joint Vision on the Skadar/Shkodra Lake, including issuing a Joint Newsletter on conservation activities (three monthly and three lingual – support for 4 years) and the creation and promotion of a common label for the trans-boundary Protected Area / Lake region		10.000		150.000	Joint Vision on the Skadar/Shkodra Lake developed Number of Joint Newsletter on conservation activities issued
	Explore the importance of potential international designations as international RAMSAR site to promote and develop the protected areas and the lake region				40.000	Study on potential international designations as international RAMSAR site n
	Creation of Joint Management Plan for the Lake, based on national strategic documents in Montenegro and Albania		2.000		40.000	Joint Management Plan for the Lake prepared
<b>Environmental investment</b>	Waste water treatment of Cetinje municipality and of settlements from around the Lake in Montenegro (e.g. Karuc, Vranjina)		50.000			Number of Waste water treatment facilities in Cetinje constructed
	Waste waters treatment facilities for Skadar - Shkodra Lake settlements			200.000		Number of Waste waters treatment facilities constructed in the settlements
	Pilot projects for wastewater treatment using environmental friendly technologies for the touristic buildings (bars, restaurants and hotels) in the areas Shiroke – Zogaj and Shegan			400.000		Number of pilot projects for wastewater treatment using environmental friendly technologies
	Establish wastewater plant for Shkodra			875.000		Wastewater plant for Shkodra constructed
	Assess the feasibility for introducing wastewater fee to businesses				5.000	Feasibility Study on introducing wastewater fee to businesses
	Support for National park and local municipality in organization of the collection and disposal of the solid waste (containers, garbage bins, equipments...) and support activities for cleaning the existing solid wastes along the whole lakeshore			20.000	120.000	Number of containers, garbage bins, equipments delivered
	Support a project for raising awareness of the local community for the economic benefit (tourism, fishery, agriculture) from reducing and controlling the pollution (consultancies, seminars, publications)				12.000	Number of public awareness project implemented
	Establish landfill for the urban wastes of Shkodra	125.000				Urban landfill for Shkodra and

	and Koplik					Koplik established
	Develop studies for the establishment of landfills for the urban wastes of Bajza and Koplik (feasibility study, planning)				15.000	Number of feasibility studies for establishing landfills
	Inventory of hazardous waste on KAP waste disposal and categorization of waste on hazardous waste disposal in KAP		50.000		300.000	Inventory of hazardous waste on KAP prepared
	Project design for hazardous waste disposal in accordance with EU regulations		100.000		300.000	Project design for hazardous waste disposal in accordance with EU regulations prepared
	Co financing of Construction of the hazardous solid waste disposal		3.000.000		400.000	Hazardous solid waste disposal site constructed / established
<b>Monitoring of the efficiency</b>	Establish monitoring unit at Shkodra Lake in Albania	30.000			250.000	Monitoring unit at Shkodra Lake in Albania established
	Automatic stationary monitoring stations for measurements of general elements (physical-chemical) in accordance with WFD (3 stations in Montenegro)				400.000	Number of automatic stationary monitoring stations for measurements of general elements (physical-chemical) established in accordance with WFD (3 stations in Montenegro)
	Establish two automatic monitoring stations for measurements of general physical-chemical elements of the water (in western coast – Shiroka and in northeastern coast – Koplik)				250.000	Number of automatic monitoring stations for measurements of general physical-chemical elements of the water established
	Upgrade the existing biological laboratories for research and monitoring of biodiversity in AL and MN				130.000	Existing biological laboratories for research and monitoring of biodiversity in AL and MN updated
	Setting up an information database and a networked system of monitoring including software development				40.000	Information database and networked system of monitoring are established
	Joint manual for the monitoring program of Skadar/Shkodra Lake and data distribution				40.000	Joint manual for the monitoring program of Skadar/Shkodra Lake prepared and distributed
	Implementation of the monitoring for 4 year, based on monitoring program		67.500		120.000	4 year monitoring implemented
	Monitoring of the vegetation of the lake, focused mostly on macrophytes (map of submersed vegetation)				25.000	Vegetation / macrophytes monitoring established
	Monitoring of the fish population especially autochthonous species and important species of fish market (carp, eel, bleak, mullet...) and their important habitats for spawning and nursery				45.000	Fish population monitoring established
	Monitoring of the state of bird populations and their nesting habitats including facilities at the Lake				75.000	Bird population monitoring provided
	Monitoring of the state of rare and endangered species and habitats				20.000	Monitoring on rare and endangered species and habitats provided
	Monitoring of benthos at specific sites				25.000	Monitoring of benthos at specific sites provided
	Implementation of bio-testing to detect environmental threats				50.000	Bio-testing to detect environmental threats implemented
	Develop hydrological model of the Skadar/Shkodra Lake				250.000	Hydrological model of the Skadar/Shkodra Lake developed
	Develop a study on the water quality of the springs, underground waters and superficial water of the lake (consultancies, field work, data analysis, stipulation of urgent measurements for improvement of the quality of lake water) and indicate the importance to local communities				37.000	Study on the water quality of the springs, underground waters and superficial water of the lake prepared
	Periodic studies of trends in well-being of the population; income, productivity, employment, etc				105.000	Periodic studies of trends in well-being of the population prepared

## VII. Annexes



**Annex I – Tentative Zoning Concept - Plan of zones for Skadar / Shkodra Lake Area**





## **Annex II      *Explanation of the Plan of zones***

In compliance with spatial distribution of key natural resources in the assignment zone (Lake - water resources and water related biodiversity - habitats and species) and respective IUCN / WCPA guidance (series 1, 7, 9, 10, 15 and 16) following zones are applied:

- ZONE I (Ia and Ib) as zone(s) of *strict protection* that are within the administrative borders of existing protected areas
- ZONE II as *buffer zone* to the zone(s) of strict protection that mostly fit to the administrative borders of existing protected areas
- And
- ZONE III as a wider *protective zone* dedicated for development.

Main **criteria** used in the proposed zoning concept are:

- As the most relevant for protecting Natural Resources in the entire Skadar – Shkodra Lake area, **water and water related habitats** are prioritized for ZONE I, i.e. 1<sup>st</sup> regime of strict protection, for so-called active protection.
- ZONE I is delineated in the manner to follow water and water related habitats within the administrative borders of existing Protected areas (National Park in Montenegro and Nature Managed Reserve in Albania)
- **Settlements and Infrastructure** have been **excluded** from the ZONE I
- Key **economic activities** in the Skadar – Shkodra Lake area are **excluded** from ZONE I and ZONE II (Buffer Zone) to the maximum possible extent and delineated in the ZONE III, while Buffer zone remain for smaller area of settlements / housing, small scale infrastructure and environmentally friendly activities, including agriculture adapted to local conditions.