Draft Status Report

Management of the "extended" Transboundary Drin Basin

Athens, 2008

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Preamble

This Report presents the status of the management of the transboundary Drin Basin and its sub-basins. It draws on previous related papers elaborated in the framework of GEF IW:LEARN Activity D2, prepared by GWP-Med: "Assessment on the Transboundary Water Resources Management in the Southeastern Europe" (2005); Assessment of the Management of Shared Lake Basins in Southeastern Europe" (2006).

The Report aims to establish a knowledge base facilitating the initiation of a process for the establishment of a "Common Vision" among the riparian countries' stakeholders regarding the management of the Drin. Such a process would build on the outcomes of the work already done in the area by the riparian countries in the field of basin and natural resources management at national as well as at transboundary levels, and the work of the international institutions, donor countries and civil society organizations in this respect.

This initiative may find its routes in late 2006 during the International Roundtable on Integrated Shared Lake Basin Management in Southeastern Europe that was held in Ohrid, the former Yougoslav Republic of Macedonia (12-14 October 2006). It was organized in the framework of the Petersberg Phase II / Athens Declaration Process and the GEF IW:LEARN project. The overall aim of the Roundtable was the promotion of cooperation for the management of the transboundary water bodies of the South Western Balkan Peninsula region. It has been the first time that stakeholders from the three international Lakes within the Drin River basin met to discuss common challenges and aspirations for the management of the lake basins. It was also the first time that the issue of the management of the "extended" Drin River Basin (the basin countries are Albania, the former Yougoslav Republic of Macedonia, Greece, Montenegro and Serbia (Kosovo)) was discussed by a group of local stakeholders from the countries of the region. **It was recommended that all available possibilities to gradually build a common vision as a first step towards the integrated management of the greater Drin River Basin should be explored.** The Roundtable concluded that sharing of experiences among the three sub-systems of the greater Drin Basin namely Prespa, Ohrid and Shkoder, is beneficial to strengthening cooperation and identifying synergies and that it is important this sharing to be further encouraged and stimulated. It suggested that the existing formal and informal structures (commissions, committees etc.) should be strengthened and used in an appropriate way in order to move to the next steps, namely to institutionalize the collaboration between the riparian countries and make these structures fully operational and effective. The group of 55 participants included representatives of competent authorities and organizations that work in the shared water bodies of focus from Albania, the former Yougoslav Republic of Macedonia, Greece, Kosovo and Montenegro; of Donor Countries (Germany, Italy, Netherlands, Switzerland) and International and Regional Institutions and Organizations (European Agency for Reconstruction, GEF, GWP, GWP-Med, International Sava River Basin Commission, MedWet, Peipsi Center.

Processes supporting the initiative

The Petersberg Process Phase II / Athens Declaration Process (from now on referred to as the 'Process'), the UNECE Water Convention, the EU Water Framework Directive provides the policy framework for such a process. The GEF through its IW projects in the area and the forthcoming "Strategic Partnership for the Mediterranean Large Marine Ecosystems" initiative provide the basis and means for integration at national and transboundary levels towards cooperation among the riparian countries for the sustainable management of the Drin River Basin and its sub-basins.

The Petersberg Phase II Process / Athens Declaration Process (Process) for the South Eastern Europe is jointly coordinated by Germany, Greece and the World Bank.

The "Petersberg Process", initiated in 1998, concerns cooperation on the management of transboundary waters. The Petersberg Process – Phase II is intended to provide support to translate into action the current developments and opportunities for future cooperation on transboundary river, lake and groundwater management in the SEE. It is supported by the German Ministry for the Environment, Nature Conservation and Nuclear Safety and the World Bank.

The "Athens Declaration Process" concerning Shared Water, Shared Future and Shared Knowledge was initiated in 2003. It provides a framework for a long-term process to support cooperative activities

for the integrated management of shared water resources in the SEE and Mediterranean regions. It is jointly supported by the Hellenic Ministry of Foreign Affairs and the World Bank.

The two processes progressively came together in order to generate synergies and maximize the outcomes for the benefit of the SEE region. The Global Water Partnership – Mediterranean (GWP-Med) is the technical facilitator of related activities.

GEF IW:LEARN is supporting synergy in the Petersberg Phase II / Athens Declaration Process, and contributions of practical experience from GEF projects working in transboundary rivers, lakes and groundwater in the SEE region as well as elsewhere in the world.

The main joint objective is to build capacity and share experience on Integrated Water Resources Management (IWRM), and to develop IWRM plans for shared water bodies as a response to the targets of the 2002 Johannesburg Summit. The Process supports a series of complementary activities that provide a forum for transboundary water management issues in SEE.

The Process complements the EU integration processes and other ongoing initiatives in the region. It contributes directly to the scope and objectives of the Mediterranean Component of the EU Water Initiative (MED EUWI) and the Global Environmental Facility (GEF) Strategic Partnership for the Mediterranean Large Marine Ecosystem.

For more information visit www.watersee.net

The **UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention)** is the only existing international legal framework outside the EU in force for transboundary water cooperation in Europe. The Convention was signed in Helsinki in 1992 and entered into force in 1996. As of September 2007, 34 countries and the European Community are Parties to the Convention, including Albania, Bulgaria, Croatia, Greece, Romania and Slovenia. The former Yugoslav Republic of Macedonia is preparing to ratify the Convention.

The Convention aims to protect surface and ground water by preventing transboundary impacts on health, safety and nature, which in turn affect the quality of life. It also promotes ecologically sound management of transboundary waters, and their reasonable and equitable use as a way of avoiding conflicts.

Parties to the Convention are obliged to conclude specific bilateral or multilateral agreements providing for the establishment of joint bodies (institutional arrangements such as river basin commissions). These joint bodies must agree on a common action plan to reduce pollution, in addition to agreeing on water quality objectives and waste-water emission limits. They are also required to cooperate on information exchange and monitoring and assessment. Early warning systems must be established to warn neighboring countries of any critical situation such as flooding or accidental pollution that may have a transboundary impact. Parties to the Convention are also required to inform the general public of the state of transboundary waters and any prevailing or future measures.

The Convention provides a legal framework for regional cooperation on shared water resources. Several bilateral and multilateral agreements between UNECE countries are based on the principles and provisions of the Convention, including, in SEE, the Danube River Protection Convention and the Framework Agreement on the Sava River Basin.

Under the Convention, the Protocol on Water and Health and the Protocol on Civil Liability were adopted in 1999 and in 2003, respectively.

The programme of work adopted every three years by the Meeting of the Parties to the Convention is a useful tool to support Parties' and non-Parties' implementation, identify joint priorities and address emerging challenges. SEE is considered a priority action area, thus the 2007-2009 programme of work includes a number of activities to support ratification by non-Parties and foster cooperation on transboundary waters in the region.

Other international legal instruments under the **UNECE** which are relevant to transboundary cooperation for the management of international water bodies are:

- The 1992 Convention on the Transboundary Effects of Industrial Accidents. Its aim is to help its Parties to prevent industrial accidents that can have transboundary effects, to prepare for them and to

respond to them. The Convention also encourages its Parties to help each other in the event of such an accident, to cooperate on research and development, and to share information and technology.

- The 1991 Convention on Environmental Impact Assessment in a Transboundary Context - the 'Espoo (EIA) Convention'. It sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries. A multilateral agreement for implementation of the Espoo Convention was signed among the countries of Southeastern Europe in Bucharest Romania on 20 May 2008.

For more information visit www.unece.org

The **Global Environmental Facility Strategic Partnership for the Mediterranean Large Marine Ecosystem (GEF SPM)** is an initiative primarily funded by GEF aiming to assist Mediterranean basin countries in implementing reforms and investments in key sectors that address transboundary pollution reduction, biodiversity decline, habitat degradation and living resources protection. It will serve as a catalyst in leveraging policy, legal and institutional reforms as well as additional investments necessary for reversing degradation of damaged large marine ecosystem and their contributing freshwater basins, habitats and coastal areas. The GEF SPM is linked to an Investment Fund for the Mediterranean, managed by the Word Bank. Overall, the activities will be implemented over a period of 5 years (2008 to 2012).

An Integrated Water Resources Management (IWRM) component of the GEF SPM has been prepared under the lead of GWP-Med that involves the promotion of IWRM planning at transboundary, national and regional levels as a means to reduce pollution from land based activities in the Mediterranean. It aims to support targeted countries in the progressive adoption of IWRM policies, the implementation of IWRM practices in pilot areas and associated capacity building. Providing assistance for the development of Integrated River Basin Management (IRBM) plans in globally important river basins and adjacent coastal areas is one of the activities anticipated to be implemented within the project. The possibility of Drin river basin to be one of the areas of focus is being explored.

For more information visit www.medsp.org

The **Mediterranean Component of the EU Water Initiative (MED EUWI)** constitutes an integral part and one of the geographic Components of the overall EUWI. It represents a strategic partnership among all related stakeholders (national, regional and international) in the Mediterranean region, aiming at contributing to the implementation of the water-related MDGs and WSSD targets. It, thus, seeks to make significant progress in poverty eradication and health, in the enhancement of livelihoods, and in sustainable economic development in the Mediterranean and Southeastern Europe, providing a catalyst for peace and security in the region which is a vulnerable and sensitive one from both an environmental and political view point.

MED EUWI is led by the government of Greece (Ministry for Environment, Physical Planning and Public Works and Ministry of Foreign Affairs). The MED EUWI Secretariat within the Global Water Partnership-Mediterranean Secretariat, provides technical support and day-by-day running. The Euro-Mediterranean Water Directors Forum, serving as institutional support of the implementation of MED EUWI, provides advice and guidance on the MED EUWI further development and implementation. MED EUWI develops its activities through annual work programmes, supported and with the participation of a variety of institutions and stakeholders.

For more information www.euwi.net, www.minenv.gr/medeuwi

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Abbreviations

ALL	Albanian Lek (currency)
ADA	Austrian Development Agency
CAC	Command and Control
CARDS	Community Assistance for Reconstruction, Development and Stabilization
CETI	Center for Ecotoxicological Research (Montenegro)
EAR	European Agency for Reconstruction
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EU	European Union
EUWI	European Union Water Initiative
FYR Macedonia	The former Yugoslavic Republic of Macedonia
GDP	Gross Domestic Product
GEF	Global Environment Facility
GTZ	Gesellschaft fur Technische Zusammenarbeit (Germany)
GWP-Med	Global Water Partnership – Mediterranean
IBRD	International Bank for Reconstruction and Development
ICPDR	International Commission for the Protection of the Danube River
ICT	Information and Communication Tools
ICZM	Integrated Coastal Zone Management
IDA	International Development Association
IDA	International Development Association
IHP	International Hydrological Programme of UNESCO
INWEB	International Network of Water Environmental Centres in the Balkans
IPA	Instrument for Pre-Accession Assistance (European Union)
IPPC	Integrated Pollution Prevention and Control (Directive of the European Union)
IUCN	World Conservation Union
IW	International Waters
IW:LEARN	International Waters Learning Exchange and Resource Network
IWRM	Integrated Water Resources Management
KAP	Kombinat Aluminijuma Podgorica
KfW	Kreditanstalt Fór Wiederaufbau (German Development Bank)
LOCP	Lake Ohrid Conservation Project

LOMB	Lake Ohrid Management Board
LOWC	Lake Ohrid Watershed Committee
MAFCP	Ministry of Agriculture and Food and Consumer Protection (Albania)
MAFWE	Ministry of Agriculture, Forestry and Water Economy (the former Yougoslav Republic of Macedonia)
MAFWM	Ministry of Agriculture, Forestry and Water Management (Montenegro)
MDGs	Millennium Development Goals
MED EUWI	Mediterranean Component of the European Union Water Initiative
MedWet	The Mediterranean Wetlands Initiative
MEFWA	Ministry of Environment, Forests and Water Administration (Albania)
MEPP	Ministry of Environment and Physical Planning (the former Yougoslav Republic of Macedonia)
METE	Ministry of Economy, Trade and Energy (Albania)
MH	Ministry of Health (Albania)
MI	Ministry of Interior (Albania)
MIA	Ministry of Internal Affairs (Montenegro)
MIO-ECSDE	Mediterranean Information Office for Environment, Culture and Sustainable Development
MoU	Memorandum of Understanding
MPWTT	Ministry of Public Works Transport and Telecommunications (Albania)
MTCYS	Ministry of Tourism, Culture, Youth and Sports (Albania)
MTE	Ministry of Tourism and Environment (Montenegro)
MTE	Ministry of Tourism and Environment (Montenegro)
NGO	Non-governmental Organization
NIVA	Norwegian Institute for Water Research
NWC	National Water Council (Albania)
ODA	Official Development Aid
OECD	Organization for Economic Cooperation and Development
OSCE	Organization for Security and Co-operation in Europe
PCB	Polychlorinated Biphenyls
PDF-B	Preparation Development Facility –B grant (GEF)
PENP	Public Enterprise for National Parks (Montenegro)
PPCC	Prespa Park Coordination Committee
PPMC	Prespa Park Management Committee
PPP	Purchasing power parity
REC	Regional Environment Centre
REReP	Regional Environment Reconstruction Programme
SAP	Strategic Action Plan
SAp	Stabilization and Association Process

SDC	Swiss Agency for Development and Cooperation
SEE	South Eastern Europe
SLMNR	Shkoder Lake Managed Natural Reserve
SLNP	Skadar Lake National Park
SNV	Netherlands Development Organization
TWIEN-SEE	Targeted Information Exchange Network on Transboundary Waters in South Eastern Europe
TWRM	Transboundary Water Resources Management
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WB	World Bank
WFD	Water Framework Directive (of the European Union)
WRM	Water Resources Management

Executive Summary

The "extended" Drin River Basin comprises the watersheds of the Prespa, Ohrid and Shkoder Lakes and Black Drin, White Drin, Drin and Buna/Bojana Rivers. The Basin spreads in a geographical area (see maps 1-4, tables 1,6) of 19,582 km² that extends in Albania, Greece, the Former Yugoslav Republic of Macedonia (from this point forward referred to as FYR Macedonia), Montenegro and Kosovo (*UN administered territory under UN Security Council resolution 1244*) [1]. The Drin River is the "connecting body" of this water system, linking the lakes, wetlands, rivers and other aquatic habitats into a single ecosystem. Each of the components of the system is of paramount ecological importance as it hosts unique biotopes, with many indigenous species, which are important also from a European and international conservation perspective.

The "extended" Drin River Basin - Baseline Situation

Parts of the watershed are quite developed whereas others are virtually undisturbed. The primary is the main economic sector; agriculture and livestock raising are the most important activities. Timber exploitation is locally important while collection of non-timber forest products supplements the income of a portion of the population in many areas. Fishing is a significant source of income for population groups in the three lakes. Gravel extraction, is one of the activities in the area although not so extensively practiced. Copper and chromium ore is still extracted in the Drin basin, in Albania, and a number of enrichment plants are in operation but at reduced capacity. "Heavy" industries exist in the Shkoder lake watershed in Montenegro - the industrial sector is also present in FYR Macedonia (medium and mainly small size enterprises) in Prespa lake watershed and in Albanian part of the Ohrid lake and Drin river watershed. The significance of the Drin river in terms of hydroelectricity production is major, especially for Albania where hydropower plants installed produce 85 percent of hydropower and represent 70 percent of the total hydro and thermal installed capacity in the country. In Albania, there are 44 dams in total (4 for energy production and 40 for irrigation purposes) with a capacity that varies from 70 10^3 m^3 up to 2.7 10^6 m^3. Two major dams and associated reservoirs have been constructed in the Black Drin in FYR Macedonia with the main purpose of hydroelectric power generation. There are plans for the construction of additional dams in the riparian countries. Tourism is of varied importance in different parts of the sub-basins; it is of particular significance for the FYR Macedonian part of the Ohrid. According to strategic documents, development in certain parts of the basin is planned to be based in this sector.

Hydrological interventions such as dam construction have had impacts in the distribution of sediments resulting, in several cases, in the destruction of wetlands in lakes and coastal erosion in the Adriatic coast; bio-corridors have been interrupted and disturbances have been caused to ecosystems. Unsustainable agricultural practices and inefficient irrigation systems have led to erosion and an increase of non-point pollution (nutrient and pesticide) that is "exported" to the Adriatic sea. In addition, agriculture seems to be by far the major water consumer. According to available information, nitrogen and phosphorus source distribution varies from site to site. While in the lower parts of the drainage system, in the Buna/Bojana river, most of the phosphorus load derives from agriculture, sewage is more important in the upper parts of Black Drin. Unsustainable management of domestic liquid and solid waste exerts pressure in the water quality in other parts of the basin as well. The riparian countries are taking measures to address this issue through the construction of waste management schemes and facilities for major towns. Insufficient treatment of industrial wastes and mining activities has caused heavy metal pollution in many cases. A well established trend in this regard has not been established; there are moderate or high concentrations of metals monitored at specific sites of the sub-basins e.g. of Shkoder and Ohrid lakes. Unsustainable fishing practices have resulted in the deterioration of the ecosystems. Uncontrolled development has caused deterioration of the shoreline habitats in large areas of the three lakes while unsustainable forest management, resulting to soil erosion, land degradation, flooding etc., is an issue in parts of the "extended" Drin basin.

The Drin regional transboundary system is a fine example illustrating the interdependences created between different uses (environment, agriculture, hydropower generation, industry, fisheries, urban, tourism etc.) in four major inter-connected inland water bodies and a receiving sea (the Adriatic).

[1] Our analysis focus mainly on Albania, FYR Macedonia and Montenegro, and will refer to Greece where relevant. The document avoids to make reference to Kosovo since its status is still pending at the UN level (it currently is UN administered territory under UN Security Council resolution 1244).

These interdependences are obvious. For instance Lake Ohrid is profoundly affected by activities both upstream and downstream; the connection of Drin River with the Buna River which drains Lake Shkoder affects the hydrological regime of the area favoring, in some cases, flood incidents in the Montenegrin part of the Lake, and also the morphology and original function of the Buna Delta in the Adriatic Sea.

Trade-offs such as between industrial and agricultural growth sometimes at the expense of the water quality, biodiversity and the natural values of the water bodies, and often undermining the developmental potentials of the surrounding area are present.

Drin can also be used to illustrate the complexity of the management of water resources in the region which goes beyond the possible achievement of a suitable and effective management in a single country. It extends to the importance of a coordinated management among countries sharing the resource, taking into account the social and economic situations, the different legal and institutional frameworks, policies, capacities, priorities and interests.

Apart from Greece, the rest of the riparian countries are in comparable levels of economic development; their economies are still in transition period. Related challenges are considerable and discrepancies in economic power among regions and citizens are evident and in some cases growing.

Albania, FYR Macedonia and Montenegro are undergoing a reform process at all levels driven mainly by the EU accession prospect[1]; in fact they stand at the beginning of a long process concerning sustainable development as a whole. Although progress has been accomplished the reality is still far from being satisfactory. Among the three countries, FYR Macedonia may be considered as the most advanced case.

The institutional framework for environmental and natural resources management varies across the three countries. In all cases though, there is a ministry which is the primary body for the development and implementation of policies in the area of its competence and the preparation of the relevant legislation. Nevertheless, competences in each area are spread among different institutions and authorities. The same general trend applies for the water resources management. The competent ministry shares responsibilities with a range of institutions and authorities with competences that touch upon natural resources management and environment in general.

With regard to the water and environmental policies and their implementation in the three countries, overall, these are at varying stages and still weak. Steps have been made for the integration of environmental and water considerations into other policy areas, but the actual use made of them appears to be still limited.

The progress in the drafting of new legislation, mainly in accordance with the EU *acquis communautaire* is considerable; FYR Macedonia is ahead with Montenegro and Albania following. Nevertheless, the new laws do not always transpose all the obligations stemming from the EU *acquis* and their implementation remains limited, especially in areas that require major investment.

The reasons for the deficiencies in the area of implementation of the policies and the laws as well as the enforcement of the latter are manifold. In some cases even new laws lack fundamental elements such as definitions, precise rights and obligations for legal and natural persons, setting of standards and thresholds and they fall short to determine procedural stages. Many of the new horizontal laws require the adoption of secondary legislation; steps have been made but there is still a long way ahead.

The overall administrative capacity is another important reason despite the on-going reforms, having a major adverse effect in the efforts towards sustainable management of the natural resources. Overlapping competences or even lack of clear delegation and fragmentation of responsibilities among different institutions and management agencies is often the case. This is causing lack of consistency in management and frequent institutional conflicts regarding specific issues. Effective communication and coordination among the different ministries and bodies is also an issue. The situation gets more complicated while efforts are made for more decentralization. Insufficient human, financial and technical resources in order for the new institutional settings to function in an effective way represents a challenge both for the local authorities and the competent ministries.

[1] Greece is an EU member country while the FYR Macedonia has been granted a candidate status. The SAA with Albania was signed on 12 June 2006. The SAA with Montenegro was signed on 15 October 2007. Stabilisation Association Agreements (SAAs) are the contractual basis for relations between each individual country and EU.

The aforementioned do not come as a surprise since the setting up of a properly functioning institutional and legal framework needs considerable time and resources. Reforms have started in the near past in an environment of transition, instability and limited resources. The previous conditions and the related human and technical capacities constitute an additional barrier. While making any analysis someone has to keep in mind that even countries members of the European Union (EU 15), although much ahead, are still strangling with similar issues. The overall workload involved is enormous.

With regard to the shared water bodies, the countries of focus have pursued their management from a predominantly national perspective, generally in accordance with the respective policy, legal and regulatory frameworks and institutional settings.

Integrated water, and furthermore, ecosystem/natural resources management at basin level has only partially been adopted. There is a history of legislation adoption and the undertaking of efforts at the level of strategic planning (strategies, action plans, spatial plans etc.) that provide a basic framework for the management of the basins and include provisions for integration. Implementation and enforcement, due to the reasons already referred to, is an issue. The transposition of the EU WFD in FYR Macedonia and the relevant attempt in Montenegro is part of these efforts and is expected to greatly contribute in the adoption of integrated approach with regard to the basin management. Albania is planning to revise its water law accordingly.

Available information suggests that at the absence of River Basin Management Plans, the major efforts for on-the-ground management of natural resources in the Drin sub-basins, that include elements of integration, have focused on designating protected areas.

The management of these areas, that include in some cases the whole part (e.g. Greek and Albanian part of Prespa Basin) or the entire littoral zone (e.g. Montenegrin part of Shkoder Basin) of a basin within the territories of a country, may be seen as a component within the framework of integrated basin management, offering a “core” minimal management framework also for water resources. There is a number of existing and proposed protected areas, under different protection status (see respective maps and tables 20, 21). Different administrative schemes can be found with different responsibilities and operational capacity. Again, insufficient administrative capacity is a major problem in most of the cases -especially the most recently established ones- and needs to be strengthened. Countries are making efforts, also in the framework of on-going internationally supported projects, to address this issue and prepare integrated management plans.

In the absence of the latter, the management instruments in use are mostly “in line” with the sectoral management in the countries of focus. Although both Command and Control (CAC) and economic instruments exist, the former seem to dominate. Zoning systems for protected areas, spatial planning (where these exist) and the respective regulations as well as rules and procedures applied for the sustainable management of natural resources (from water use permitting, level of quality of wastewater disposed and fishing regulations, and reforestation obligations to environmental impact assessments) do not always serve the objective of a balanced approach between the need for the conservation of the ecological system and the need for economic development, consistent with the prevailing socioeconomic situation in the area. With respect to the economic instruments, used at the riparian countries, a number of them can be identified such as fees, charges and taxes (see Table 22) indented to provide incentives and disincentives. It is not clear whether the nexus of economic instruments adopted satisfy the objectives. Overall, information is scattered and sometimes controversial and is not sufficient in order to assess with precision the real effect of the combined application of CAC policies and economic instruments in terms of contribution to the sustainable management of the basins. Challenges with regard to their efficient application are linked with the insufficient designing of the systems, the lack of their integration in the economic, environmental and development policies, and the regulatory and institutional framework limitations at all levels.

The evolving national management frameworks constitute one component of the baseline framework on which the efforts for sustainable basin management will build on. The achievements in terms of cooperation, is the other.

Cooperation between the riparian countries has been initiated and evolved, at different levels in each case, following different courses which have been subject to given opportunities or even coincidences, always in consistence with the local realities. It has been influenced by the developments at the

political and socio-economic scene at national and regional level and the bilateral or multilateral relations of the riparian countries. In an environment - throughout the European Continent - in which cooperation is being promoted at all levels, the involvement of several UN agencies, the EU and as well as other international organizations, bilateral donors and NGOs apart from being catalytic until now, is expected to further catalyze joint action. At the level of international legal frameworks the UNECE involvement assisting countries to enhance cooperation on the basis of the Water Convention which provides for the negotiation of the parties, through appropriate mechanisms, over disputes that may arise, is crucial. At the level of catalyzing the appropriate investments that would facilitate official on-the-ground cooperation to be established, the GEF involvement may be seen as the most important.

Lake Prespa Basin is the oldest case. It was the first shared lake in the SEE to be declared as transboundary protected area by the Prime Ministers of the riparian countries, and an informal multi-stakeholder joint body –the Prespa Park Coordination Committee- has been functioning facilitating a level of joint action. These have set the basis for enhanced coordinated/cooperative management; the initiated GEF "Integrated Ecosystem Management in the Prespa Lakes Basin of Albania, FYR Macedonia and Greece" Project is expected to further contribute towards this cause. A relevant agreement is under consideration by the riparian countries. A joint management institutional structure has been envisaged to be established in the future as a formal trilateral institution under international law.

Lake Ohrid basin can be considered as the most advanced case in terms of formal cooperation. The GEF Lake Ohrid Conservation Programme (1998 – 2004) and the political commitment ever since had as an outcome the signing of the "Agreement for the Protection and Sustainable Development of Lake Ohrid and its Watershed" (17.06.2004). The Lake Ohrid Watershed Committee was established in November 2005 empowered with legal authority in Albania and FYR Macedonia. Still, much effort is needed until actual cooperative management is reached.

With regard to ***Lake Shkoder***, an Agreement between the Government of the Republic of Montenegro and the Council of Ministers of the Republic of Albania for the Protection and Sustainable Development of the Skadar/Shkodra Lake and its Watershed was signed in 2008. The GEF supported "Lake Skadar/Shkoder Integrated Ecosystem Management Project" was initiated in 2008 and is expected to enhance the cooperation between the two countries and assist in the sustainable use of the natural resources of the lake and its watershed. A bilateral Skadar/Shkodra Lake Commission will soon be established.

Transboundary cooperation on the Buna and Drin rivers (including its tributaries, Black Drin and White Drin) is limited until now at the scientific/research level under internationally, mainly, financed projects.

The cooperation in place reveals the actual existence of two key prerequisites for every relevant activity in the field of shared water resources management: ***Political will*** of the governments and ***trust*** between riparian countries. These provide a basis for coordinated/cooperative and eventually joint management to be extended in the other sub-basins of the Drin basin and cover the whole system.

Moving forward

Establishing cooperative management of a complex system such as the "extended" Drin Basin is a challenging task. Nevertheless, it is an imperative if sustainable development in the area is to be achieved. International experience suggests that although demanding and time consuming, it is feasible – Sava and Danube River Basins are such examples from the Southeastern Europe providing experiences to follow. It involves efforts to be undertaken at many levels by a range of actors.

Action at national level for the establishment of integrated water and natural resources management is crucial. Evidently, the countries will proceed with the on-going reform process; the eventual adoption and implementation of legal instruments that fully transpose the EU WFD is of special importance in this regard. Moving in parallel the on-going reforms can benefit the cooperation between the countries for the management of the shared water bodies while international cooperation could speed up national reforms.

Taking into consideration the different level of the approximation process in each country, commonly agreed standards for the management of the shared basins on the basis of EU WFD and international

conventions such as the UNECE Water Convention may be used for the design of rules and regulations specifically for the management of the basins in a coordinated and consistent manner.

The establishment of harmonized monitoring approaches and data collection methods and eventually harmonized monitoring and information systems would create the basis for the establishment of a common understanding regarding the issues and their root-causes. This would facilitate more efficient collaboration and further building of trust as wells as the design of solutions on the basis of commonly agreed objectives. The experience developed in Ohrid can be further used in this regard.

A critical issue is the empowerment and upgrading the role of the joint structures in the area -in place or to be established soon- to prepare and implement plans and become financially sustainable. Securing financial sustainability would be a decisive factor for the implementation of the activities towards sustainable management of the sub-basins in the long term. Establishment of regional funding mechanisms, introduction of innovative financing tools (e.g. Inter-riparian financing, Trust funds, Levying Taxes etc), generation of new income from ecotourism and alternative activities would provide a more stable and continuous financing and allow management to become gradually independent from the assistance of the international community. The latter has been up to date the main source of financing in the countries of focus for investments linked to the sustainable management also of the Drin sub-basins.

The existence of the joint structures can greatly facilitate activities towards cooperative management for the "extended" Drin Basin. A mechanism for effective communication among them may be the first step of a process to reach eventually to a joint body. It will secure the involvement of all major stakeholders and a minimum level of cooperation among the countries in a trust building process.

The collaboration, compromise and consensus-building necessary for coordinative/cooperative and eventually joint decision making depends upon open dialogue, goodwill and trust among the key stakeholders. Sustaining and enhancing as appropriate their involvement in the sub-basins would be crucial in this regard. The establishment, at national level, of clear rules and procedures for public participation in the decision making and systematic awareness raising would greatly assist the overall process.

A structured, coordinated dialogue process, a "Drin dialogue", moving in parallel with and building on the outcomes of the on-going activities at sub-basin level may involve the key stakeholders and the existing joint structures in establishing the basis for cooperative activities for the extended Drin Basin system: A strategic Common Vision for the management of water resources in the greater region including the coastal zone. The dialogue process will identify pressing issues and relevant challenges and propose priority measures to address them. Experience from Prespa and Shkoder shows that cooperation has been largely benefited by similar processes; lessons from these cases should be used.

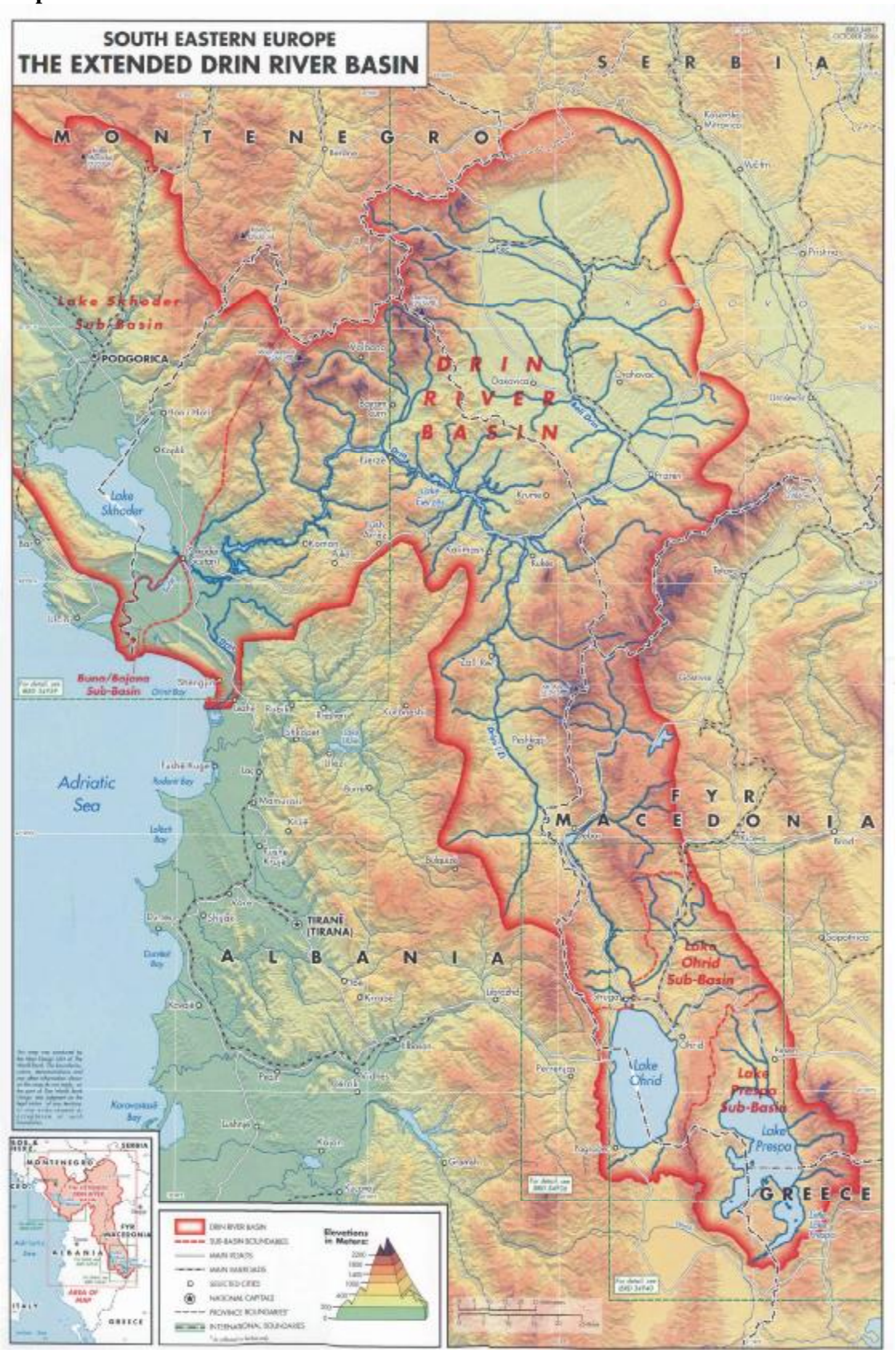
The involvement of the Petersberg Phase II / Athens Declaration Process would facilitate the process. The implementation of the UNECE Water Convention by the riparian countries would provide an added value. A possible future GEF involvement could further catalyse developments.

The ultimate goal will be to create the conditions to reach a point in the future where the scale of coordinative/cooperative management could move from single water bodies to the hydrological interconnected system of the Drin Basin, eventually leading from the sharing of waters between countries and conflicting uses, to the sharing of benefits between stakeholders in an area that is physically, culturally and historically interconnected.

Map 1. Transboundary rivers in Europe - The "extended" Transboundary Drin Basin

Source: (Adopted from) First Assessment of Transboundary Rivers, Lakes and Groundwater, UNECE, 2007

Map 2. The "Extended" Drin River Basin



Prepared by the World Bank Group, October 2006

Map 3. The Prespa Lake Basin

Prepared by the World Bank Group, October 2006

Map 4. The Ohrid Lake Basin

Map 5. The Shkoder Lake Basin

Prepared by the World Bank Group, October 2006

Introduction

The "extended" Drin Basin (Basin) comprises the watersheds the Prespa[3], Ohrid and Shkoder[4] Lakes and Black Drin[5], White Drin[6], Drin[7] and / Buna/Bojana Rivers.

The Drin River is the "connecting body" of a water system, linking the lakes, wetlands, rivers and other aquatic habitats into a single ecosystem of major importance. The water bodies and their watersheds (see maps 1-4, tables 1,6) are spread in a geographical area[8] that includes Albania, Greece, the Former Yugoslav Republic of Macedonia (from this point forward referred to as FYR Macedonia), Montenegro and Kosovo (*UN administered territory under UN Security Council resolution 1244*). Flowing from Lake Ohrid, which itself receives about 50 percent of its waters from Lake Prespa through underground karstic formations, the Black Drin eventually leaves FYR Macedonia and enters Albania. The White Drin rises in Kosovo and flows into Albania where it meets the Black Drin to form the Drin River. Flowing through Albania, one arm of the Drin joins the Buna/Bojana River (a watercourse which drains Lake Shkoder and, shared between Albania and Montenegro forms part of their border before finally flowing into the Adriatic Sea) near the city of Shkodra and the other arm drains directly into the Adriatic Sea south of Shkodra near the city of Lezhe. Each of these water bodies has a number of tributaries, small rivers and streams.

Large freshwater rivers and lakes, and even more complex systems of many water bodies, deliver a large number of environmental services which are dependent upon sufficient "environmental flow" of water, in terms of both quality and quantity. The system in focus consists of water bodies (both lakes and rivers of great ecological importance and complex hydrology) with different characteristics and varied vulnerabilities. Pressures e.g. excessive use of the water and other natural resources to meet the different needs and/or pollution of surface and groundwater sources at sub-basin or local level, might undermine the potential for delivering the environmental services but also the potential for social and economic development. The fact that the system drains to the Adriatic further complicates the situation.

Box 1. Lake basins

Lake basins have special characteristics such as their integrating nature, long water retention time, and complex response dynamics. The combination of these characteristics which can individually be found elsewhere as well (e.g. groundwater and estuaries) is what distinguishes lakes from other water bodies. This fact often affects the way that their basins need to be managed (ILEC, 2005[9]) and has to be taken into account while respective policies and subsequent laws and management instruments are being planned and implemented, and institutions are set up. It is essential to understand that the implications of these characteristics mean that management institutions and their policies and plans need to be established and funded on a long term basis; that scientific knowledge is particularly important for unraveling the complex responses of lakes to exogenous changes; and the management instruments need to be adapted to the integrating nature of lakes (ILEC, 2005). It can be easily understood that this is a rather difficult task to be accomplished for lakes that lie in the territories of developing countries facing a series of challenges.

[3] The Prespa basin includes two lakes separated by a naturally formulated narrow strip of land: Macro Prespa and Micro Prespa. From this point forward we will be referred to the system of the two lakes as Prespa.
[4] The Lake is called "Skadar" in Montenegro and "Shkodër" or "Shkodra" and also sometimes "Scutari" in Albania. From now on the English name of the lake –Shkoder – will be used to avoid the usage of different names when referred to it.
[5] The River is called Drin i Zi in Albania and Crn Drim in FYR Macedonia. From now on the English name –Black Drin– will be used to avoid the usage of different names when referred to it.
[6] The River is called Drin i Bardhë in Albania and Beli Drin in Kosovo. From now on the English name –White Drin– will be used to avoid the usage of different names when referred to it.
[7] The River is called Drin i madh or Drini in Albania. From now on the name "Drin" will be used to avoid the usage of different names when referred to it.
[8] Our analysis will focus mainly on Albania, FYR Macedonia and Montenegro, and will refer to Greece where relevant. The document avoids to make reference to Kosovo since its status is still pending at the UN level (it currently is UN administered territory under UN Security Council resolution 1244).
[9] Available also at www.watersee.net

Table 1: The "extended" Drin Basin system – Shared sub-basins

Water bodies	Prespa Lake	Ohrid Lake	Drin River	Shkoder Lake	Buna/Bojana River
Physically interconnected (through surface waters flow)		← →			
Physically interconnected (through ground-water flow)	← →				
Shared by:	**Albania, FYR Macedonia, Greece**	**Albania, FYR Macedonia**	**Albania, FYR Macedonia, Montenegro, Kosovo (***UN administered territory under UN Security Council resolution 1244***)**	**Albania, Montenegro**	
	Agreement between Yugoslavia and Albania on "Questions of Water Management" ratified in 1956				
Agreements / Memoranda of Understanding	Declaration of Prespa as Transboundary Park signed in February 2000 by the Prime Ministers of the countries	Agreement for the Protection and Sustainable Development of Lake Ohrid and its Watershed between the Albania and FYR Macedonia was signed on 17.06.2004 by the Prime Ministers and ratified by the Parliaments of the two countries in March 2005.	Protocol on cooperation on Water Management between Albania and Montenegro signed on 31/10/2001 entered into force in 2005 (in force until 2013).		
	Agreement between the governments of the Republic of Albania and the Republic of Greece for the setting-up of a permanent Albanian- Greek commission on trans-boundary fresh waters" signed on 3 April 2003 in Athens and entered into force on 21/5/2005.		Memorandum of Understanding for Cooperation in the Field of Environment Protection and Sustainable Development Principle Implementation Between the Ministry of Environment of the Republic of Albania and the Ministry of Environment and Physical Planning of the Republic of Montenegro - signed on 8 May 2003.		
				Agreement for the protection and sustainable development of Skadar/Shkoder Lake - signed between the line ministries for environmental protection of Albania and Montenegro in 2008	
GEF Projects	Initiated	Ended	-	Initiated	

The riparian countries are in different stages of development with the economies of most of them being still in a transition period towards market economy. A history of fragmented, sometimes overlapping or even contradictory legislation, in general weak environmental administration, limited financial resources as well as low public participation and awareness, affects also the current situation. Non-sustainable management of the environment and the natural resources as a result of strangling for economic growth has added to the picture. Nevertheless, the policies as well as their legal and institutional frameworks are undergoing a revision process driven mainly by the EU accession prospect. These countries have declared accession to the EU to be their main strategic goal, accepting the EU Sustainable Development Strategy as a guiding framework for their development. This is the main political driver for changes in the countries of focus structured around the Stabilization and Association Process. This process runs on a country by country basis depending on the individual fulfillment of the Copenhagen criteria for EU membership. Evidently, the re-organisation and furthermore the full approximation to the EU standards will need time and resources.

The Drin, extending across national boundaries, is being managed through a series of quite different and often incoherent management approaches. Cooperation among the countries at many levels is essential for its sustainable management.

Importantly, a level of cooperation is in place in many of its sub-basins providing a basis for further developments. The Prespa Lake has been declared at the highest possible political level as a trilateral protected park; an Agreement[10] for the cooperative management of the Lake and its basin is in place for Ohrid and; an Agreement for the protection and sustainable development of Shkoder Lake has been signed.

Moreover, the on-going reforms in the countries which have the approximation of the EU *acquis communautaire* as a common driving force, will gradually lead to a *de facto* harmonized legal framework. This provides a golden opportunity for the promotion of the cooperation in the different sub-basins.

In addition, the GEF projects in Ohrid (ended), Prespa and Shkoder (recently initiated) make the initial investments -that otherwise would be difficult to be made by the countries alone- for addressing issues at transboundary level, creating the conditions for the enhancement of cooperation towards the integrated management of the Drin Basin.

Finally initiatives such as this under the Petersberg Phase II / Athens Declaration Process and the UNECE Water Convention facilitates the creation of a “common vision” among the stakeholders of the riparian countries for the management of the Basin. Still, a long way is ahead till Integrated Water/Natural Resources Management is applied.

[10] Text available at the website of the Ministry of Environment and Physical Planning of FYR Macedonia at http://www.moepp.gov.mk/default-en.asp?ItemID=CDE7A3014A70FC4E94B4CE1C5F22E159

1. Socio-economic characteristics of Albania, FYR Macedonia and Montenegro

The three countries are in comparable levels of economic development, as illustrated in Table 2. Montenegro has the higher rate of economic growth followed by Albania and FYR Macedonia. In 2006, Albania's GDP growth reached an annual average of 5.5 percent due to broadly successful stabilisation programmes, a sound structural environment and domestic demand fed by booming credit and significant remittance inflows. The GDP growth rate slightly increased in for 2007 (6.0 percent). Montenegro's high GDP growth rates in 2006 and 2007 (8.2) are due to a boom in investment and services, in particular in the tourism sector. In FYR Macedonia the main sectors contributing to economic growth (5.1 percent) were the manufacturing and mining, wholesale and retail, transport and telecommunications

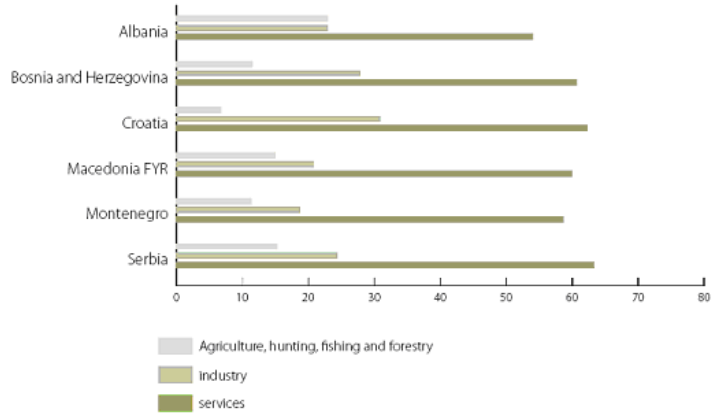
Table 2. An overview of economic fundamentals in Albania, FYR Macedonia and Montenegro.

Country / territory	Albania			FYR Macedonia			Montenegro		
	2006	*2007*	*2008 [4]*	*2006*	*2007*	*2008 [4]*	*2006*	*2007*	*2008 [4]*
Population, (1000 persons)	3153	3170		2040	2045		624	625	
GDP, EUR mn	7239	7945		5081	5607		2149	2423	
GDP, real change in percent against previous year[1]	5.5	6.0	5.8	4.0	5.1	5.0	8.6	8.2	6.0
GDP per capita, EUR at PPP	4930	5370		6680	7360		8140	9040	
Gross monthly wages, avg., EUR	175	188		376	395		377	497	
Annual inflation, % [2]	2.4	2.9	4.1	3.2	2.3	6.0	3.0	4.2	5.0
Unemployment rate, based on Labour Force Survey – rate in % annual average [3] [5]	13.8	13.2	13	36.0	34.9	35	29.6	19.3	18
FDI[6] inflow, EUR mn	259	477		345	239		644	1008	

PPP: Purchasing power parity
FDI: Foreign Direct Investments
[1] 2.9, 2.7 and 1.7 for 2006, 2007 and 2008 respectively in EU 15 / 2.3 , 3.0 , 2.0 for 2006, 2007 and 2008 respectively in EU 25 (wiiw estimates) / 3.3 , 3.1 , 2.1 for 2006, 2007 and 2008 respectively in EU 27 (wiiw estimates)
[2] 2.2 , 2.1 , 3.2 for 2006, 2007 and 2008 respectively in EU 15 /, 2.2 , 2.3 , 3.4 for 2006, 2007 and 2008 respectively in EU 25 (wiiw estimates) / 2.3 , 2.2 , 3.6 for 2006, 2007 and 2008 respectively in EU 27 (wiiw estimates)
[3] 7.7 , 7.0 , 6.8 for 2006, 2007 and 2008 respectively in EU 15 / 8.2 , 7.2 , 7.0 or 2006, 2007 and 2008 respectively in EU 25 (wiiw estimates) / 8.2 , 7.1 , 6,9 for 2006, 2007 and 2008 respectively in EU 27 (wiiw estimates)
[4] Forecast
[5] For Albania: Registered unemployment rate
[6] Foreign Direct Investments

Source: The Vienna Institute for International Economic Studies - wiiw

Figure 1. Structure of GDP – comparison with other countries of the Western Balkans



Source: (adapted from) UNDP. 2007

The contribution of the agricultural sector to GDP in Albania is the highest among the three countries with the lower being this of FYR Macedonia's. The service sector is the largest contributor to GDP in all three countries. In Albania, the growth of the services and industrial sectors has increased while growth has remained unchanged in the agricultural sector.

As for the income per capita, measured in purchasing power, this is higher in Montenegro (9,040 €). It is lower in FYR Macedonia (7,360 €) and even lower in Albania (5,370 €). The monthly gross average salaries follow the same trend. The income per capita in Albania, measured in purchasing power, amounted to around 20 percent of the EU-27 average while in FYR Macedonia is 27 percent of the EU-27 average (http://ec.europa.eu/enlargement).

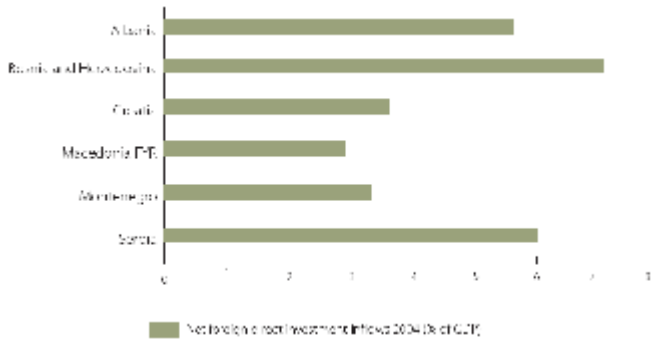
Table 3. Quality of life - key indicators

	Albania	FYR Macedonia	Montenegro
Life expectancy at birth (years)	75.5	73.9	73.2
Adult literacy rate (% ages 15 and older)	98.7	96.1	96.4
Infant mortality per 1000	14.9	11.3	7.8
Poverty (% of population below national poverty line)	25	30.2	10.9

Source: UNDP. 2007

The economies of the countries are still in transition period and economic problems still exist. Unemployment is high in Albania and even higher in Montenegro and FYR Macedonia. Discrepancies in economic power among regions and citizens are evident and in some cases growing. There are fears that the ongoing global economic crisis will affect the countries of focus as well.

Figure 2. Foreign Direct Investments – comparison with other countries of the Western Balkans



Source: (adapted from) UNDP, 2007

Strong economic growth and progressing integration of the region into the EU are set to bring the stability, security and prosperity in the long term. However this process will only be successful, if it preserves and enhances the environmental and social capital rather than sacrificing it. The countries in the region need increasingly to use their unique positive characteristics to build a competitive advantage in Europe beyond low cost labour and resource extraction (UNDP, 2007).

2. Water Profile of Albania, FYR Macedonia and Montenegro [11]

Albania is rich in water resources. The total watershed surface is 43,305 km^2; 14,557 km^2 out of it, are spread out of the country's borders. Rivers discharge into the Adriatic and Ionian seas an average of 1308 m^3/sec. The 65 percent of the renewable resources (13,300 m^3 per capita) is generated within the country, with the remaining coming from neighboring countries. Albania is crossed by several rivers (152) rivers and has a number of lakes (247) and reservoirs (640) which form part of six main basins. Hydropower contributes to over 90 percent of energy production in the country; it is evident that much of Albania's economic activity is dependent on the utilization of water resources. Available data suggests that irrigation (on which agriculture is critically dependent on) and mining rely mostly on surface water, while households (at a rate of about 80 percent) and industry depend primarily on groundwater from aquifers. About 70 percent of the population has access to piped water (planed for 98 percent until 2015) with an on average 9.7 hours per day of water supply (planned to be 18 hours per day across the country by 2015). Drinking water standards exist since 1997 being similar to these of WHO. Domestic water demand is increasing not only because of population growth but also because of the increase of water losses; estimated to be greater than 50 percent in all cities. Water supply systems in Albania are plagued by diverse problems: rampant construction, illegal connections and contamination due to infiltration from parallel sewer lines. Nevertheless, some improvements have been recorded. Losses in water distribution systems have been reduced by 6 percent since 2001, while revenues increased by 9 percent for the same period. Collection rate has reached about 75 percent while many enterprises have achieved a collection rate of as high as 97 percent. Regarding sewage, less than 40 percent of the population has connection (planned for 80 percent until 2015) and sewage treatment continues to be very limited. Despite some investment in the municipal wastewater treatment, water pollution remains a severe problem at the country level. Uncontrolled waste disposal sites pose an additional threat to surface and groundwater quality; there are cases where large amounts of solid material traveling up to the sea. Water pollution from industrial activities, is still an issue.

Table 4. Selected water related performance indicators – Albania

INDICATORS (2008)	**Average Value**
Hours per day of water supply	9.7h/d
Water Quality Compliance Rate- E coli	91%
Water Quality Compliance Rate- Chlorine Residual	48%
Water coverage:	73%
Urban	*85%*
Rural	*49%*
Sewerage coverage:	43%
Urban	*67%*
Rural	*1.4%*
Non-revenue water (Produced but Not Sold)	63%
Metering of customer connections	34%
Collection rate	77%
Coverage of Direct Operating Cost -Collections	66%
Staff per 1000 water and sewerage connections	13 staff/1000c

In FYR Macedonia the overall water resources amount to 6.4 10^9 m^3 (during a normal year and 4.8 10^9 m^3 during a dry year) of which the 5.4 10^9 m^3 is generated within the country, with the remaining coming from neighboring countries. Annual per capita availability is about 3,150 m^3. FYR Macedonia is "hydrographically" divided in four river basin districts: the Vardar (is the largest, with 80 percent of the water flow in the country), Black Drin (13 percent of the country's water flows), Strumica and Juzna Morava. Approximately, 49 percent of the territory of the country is agricultural land. Two (2) percent is covered by lakes, 37

[11] For more information see Aquastat (http://www.fao.org/nr/water); World Bank, 2003b.

percent by forests while 3 percent is urban or industrial land. About 98 percent of the country falls within shared basins. Water resources are unevenly distributed over time and space; about 40 percent of the demand is not met during an average dry year. About 70 percent of the population has access to piped water supply with close to 100 percent connection for the urban population and 28 percent for rural population. Low user charges, which are often uncollected, make it difficult for some of the utilities to maintain adequate technical standards. The quality of drinking water is a concern in some rural settlements. Hydropower accounts for 20 percent of the total electricity generated; 30 percent of the hydropower potential in the country has been developed. The irrigation systems consist of 17 high dams with a total reservoir capacity exceeding 500 10^6 m^3 of water and 8,110 kilometers of pipes and canals covering 1266 km^2, supplying 899,335 10^3 m^3/year. However, due to system inefficiencies (20-40 percent losses), 500 km^2 to 600 km^2 are irrigated (Spatial Plan of FYR Macedonia, 2004). According to the Agriculture Development Strategy, the irrigated area will be doubled by 2020 (World Bank 2003b) - this equals to an additional 1397 km^2 (Spatial Plan of FYR Macedonia, 2004). Agriculture seems to be an important pollution factor in some cases. There are examples of agriculture originated pollution in Prespa and Ohrid. However, the quality of water resources in general is satisfactory to moderate.

Table 5. Water consumption in FYR Macedonia

Population	207,994 10^3 m^3/year
Tourists	6,258 10^3 m^3/year
Industry	274,147 10^3 m^3/year
Total	488,399 10^3 m^3/year

Source: Spatial Plan of FYR Macedonia, 2004

Montenegro, as it is the case with the other two countries of focus, is rich in water. However, this is unevenly distributed through space. Waters in the country are, generally, drained into two catchment areas – of Adriatic and Black-Sea. Seventy two (72) percent of the overall water resources is generated within the country, with the remaining 28 percent coming from neighboring countries (Bošković M. et al). More than 95 percent of the people in urban areas and about 75 percent of the households in the rural areas are supplied with some form of piped drinking water. The per capita water consumption is high - 300 liters per capita per day, whereas the average in Europe is 180-200. Among reasons is the lack of demand management and misuse of the water supply for non-household activities such as irrigation. The irrational use is partially caused by the low prices of water and low collection rates - as low as 50 percent. The water losses in the supply system, estimated to 50 percent (or more in some cases), adds to the picture. Groundwater is the main source for drinking water supply (70 percent - primarily from springs) and industrial uses (50 percent). Drinking water quality is an issue; it hardly meets the required standards of the WHO or EU. This is partly attributed to the old pipeline infrastructures and lack of finance for treatment and maintenance of the system. The problem is of particular concern at coastal areas (during the summer the tourists more than double the area's population to over 500,000 persons) and comes in addition to the frequent interruptions in water supply and shortages in the coastal cities. Sixty (60) percent (as for 2006) of residents are connected to the public sewage system, with large regional differences. In small towns and rural settlements, sewage systems are almost nonexistent, with around 28 percent of the population using septic tanks and absorbing wells (the contents of which are not always disposed off properly). The existing wastewater treatment plants are heavily overburdened and often discharge untreated sewage. Nevertheless, there are steps made for addressing this challenge. Despite these issues, available information suggests that, in general, water quality of both surface and groundwater is in good condition.

3. Description of the water bodies of the extended Drin System

The distinction of the basins made in the following pages, hence the information presented for each basin, does not necessarily follow the geographical distinction of the watersheds of the water bodies of the "extended" Drin Basin. The latter is complex its-self. One could consider the Black Drin - White Drin - Drin, Shkoder Lake, Ohrid Lake, and Prespa Lake as separate sub-basins. The Buna-Bojana river could be treated either as part of the Shkoder Lake basin or the Drin River basin. The Prespa and Ohrid Lakes may be considered as part of the Drin Basin whereas the Prespa part of the Ohrid Basin.

The authors had to collect information from various and scattered sources and deal with the fact that different authors distinguish and group the basins in different ways. The information provided in these sources "follow" the "grouping" that the authors chose to make.

The authors chose to present separately, without implying that this is "the" correct distinction, the Drin River (Black Drin - White Drin - Drin), Prespa Lakes, Ohrid Lake and Shkoder Lake - Buna/Bojana Rivers sub-basins. This enabled the authors to "group" the available information to best describe the extended Drin Basin. In order for the reader to have a complete picture for each water body and its basin, the chapters that describe the sub-basins have to be red "in combination". As an instance, information about the Black Drin basin can be found both in the "Drin River Basin" chapter and the "Ohrid Lake Basin chapter"; information about Buna/Bojana River can be found both in the "Shkoder Lake Basin" chapter and the "Drin River Basin" chapter.

The characteristics of the shared water bodies are presented in the next page, table 6.

Table 6. Characteristics of the shared water bodies

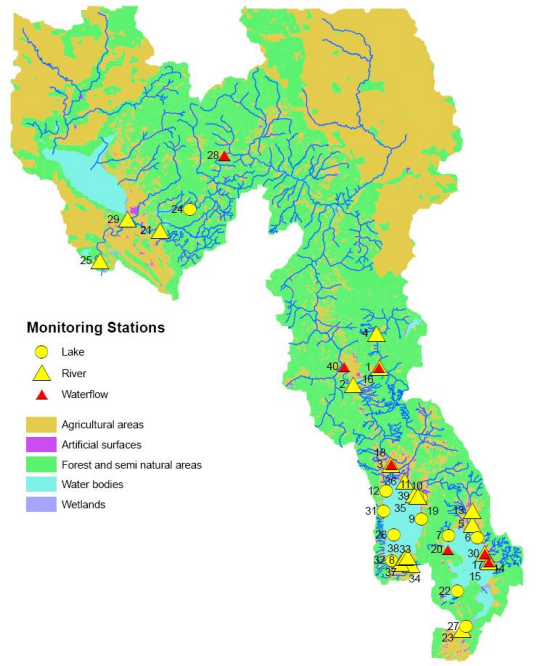
	Prespa Lake	Ohrid Lake	Drin River	Shkoder Lake	Buna/Bojana River
Origin	Tectonic	Tectonic	-	Tectonic-Karstic	-
Catchment area (km^2)	1349 Macro Prespa: 1100 Micro Prespa: 262	1432	14,173 (including the catchments of White Drin and Black Drin plus Ohrid and Prespa lakes)	~ 5500 (including Buna/Bojana river) Montenegro: ~4400 Albania: ~1100	19,582 (including the catchments of Drin and Shkoder)
Lake's Surface Area (km^2)	Macro Prespa: 253.6 – 259.4 (282)[a] Micro Prespa: 47.4 FYR Macedonia: 59% Albania: 16% Greece: 25%	348.8 FYR Macedonia: 70% Albania: 30%	-	353 - 500 Montenegro: ~ 65% Albania: ~ 35%	-
Lake's Volume (km^3)	3.6 (4.8)[a]	55.4	-	1.7 - 4	-
Lake's Mean Depth (m)	14 (19)[a]	155	-	5 - 6	-
Lake's Maximal Depth (m)	Macro Prespa: 48 (54)[a] Micro Prespa: 8.4	288	-	10	-
(Maximal) Length (km)	*	30.8	285 FYR Macedonia: (45 – Black Drin) Albania: 245	44	44
Lake's Maximal Width (km)	*	11.2 - 14.8	-	14	-
Shore Line (km)	*	87.5 Albania: 31.5 FYR Macedonia: 56	-	207 (including the islands) Albania: 57.5 Montenegro: 110.5	-
Natural Trophic State	Macro Prespa: Oligotrophic Micro Prespa: Mesotrophic	Oligotrophic	-	Oligotrophic - Mesotrophic	-
Total water volume exchange rate (years)	~ 10-12 (17)[a]	~ 70 - 85	-	2 – 3 times per year	-
Discharge	There is no surface discharge	22 m^3/sec (lake outlet - average)	351 m^3/s (before lake confluence)	~ 300 m^3/s (lake outlet)	682 m^3/s

Note: Data provided here must be treated with caution since differed figures were provided by different authors.
* There is no available data - [a]Value in parentheses: in the 1980s before recent water level decline of Lake Prespa

Source: Matzinger et al., 2005, Ganoulis and Zinke, 2004, http://www.ilec.or.jp/database/eur/eur-09.html (accessed on 21/6/2006), Shkoder TDA, Project Brief "Lake Skadar/Shkoder Integrated Ecosystem Management Project", The Strategic Action Plan for Skadar/Shkoder Lake, Albania and Montenegro

3.1. The Drin River Basin: The "connecting agent" of the hydrological system in the South Western Balkan Peninsula

Figure 3: Land-cover in the "extended" Drin River Basin



Note: the map shows also the stations for surface water quality and quantity used for the DRIMPOL project – more information in Annex 5.

Source: Boravana S. et al. . 2008

Figure 4: The Albanian Drin River Basin

Source: Hoxha, Hasa, 2008

Black Drin flows north from Lake Ohrid through FYR Macedonia and enters Albania. The White Drin enters Albania from the northeast, from Kosovo. Their "product", the Drin, proceeds westwardly to the Sea. The old Drin channel empties into the Adriatic just south of the Buna/Bojana River near the city of Lezhe, but the Drin's major channel is the 11-km Drinasa which joins the Buna/Bojana just 1 km beyond the latter's outlet from Skadar Lake near the city of Shkodra. The Drin delta is located 20 km south of the Buna/Bojana Delta.

The topography of the watershed is characterized by mountainous relief, with mean average height of 971 m above the sea level (the highest picks are over 2500 m), and flat land in the coastal area in Zadrima, Dajci and Velipoja.

The 285 km long Drin has a catchment area of 19,582 km² of which about 5,409 km² is of the Shkoder Lake/Buna River. From the remaining 14,173 km^2, the 5,973 km^2 are inside the territory of Albania while the other part is found in Kosovo, FYR Macedonia and Greece (catchments of Black Drin, White Drin, Ohrid and Prespa Lakes). The length of Black Drin, from Ohrid Lake to Kukes, where it joins the White Drin, is 149 km (of which the 44.5 km in FYR Macedonia). The White Drin, from its source up to the joining point with Black Drin, has a length of 136 km.

Half of the water quantity discharged in the sea from Albania is flowing in the Drin basin. The basin covers an area of 8,200 km^2 or a quarter of the surface of the country.

The average annual flow of Black Drin is 116 m^3/sec while this of the White Drin is 66.4 m^3/ sec. The average annual flow of Drin in its estuary is 350 m^3/sec. The module of annual flow for the whole watershed is 24.7 l/sec per km^2.

3.1.1. Socio-economic characteristics

The population of the Albanian Drin Basin is about 570,000 inhabitants distributed in 4 Regions: Korca (85,000), Kukesi (114,000), Dibra (125,000) and Shkodra (256,000). The majority of the population lives in the major cities of the area.

This area is the poorest in Albania. The per capita income ranges from $1000 /year to $1165 /year; 43 -56 percent of the families are receiving financial support from the government.

Land use in the watershed is mixed and comprises mainly agricultural and urban uses. Parts of the watershed are quite developed whereas others are virtually undisturbed.

Cultivation of crops, collection of medicinal and aromatic plants, breeding domestic animals, timber and mining exploitation are the main activities. About 77 percent of the labour force in the Albanian part is working in agriculture while the rest in other sectors of the economy. The agricultural land is around 900 km^2, or 15.33 percent of total agricultural land in the country, of which 50 percent is irrigated. Large areas are also irrigated in FYR Macedonia and Kosovo. Livestock is the second important activity, at least in the Albanian part of the watershed. Gravel extraction, is one of the activities in the area although not so extensively practiced. Copper and chromium ore is still extracted in the Drin basin, in Albania, and a number of enrichment plants are in operation but at reduced capacity.

Hydroelectricity production is a major activity. The significance of the Drin river in this respect is major, especially for Albania where three hydropower plants are installed: the Vau i Dejes, the Fierza[12], and the Koman hydropower plant with an installed capacity of 250 MW, 500 MW and 600 MW respectively. These three power plants produce 85 percent of hydropower and represent 70 percent of the total hydro and thermal installed capacity in the country. The hydropower potential of the river has not been fully exploited. There are plans for the construction of additional plant, one of which in the Black Drin River in Albania – the initiation of the process for the call of interest has begun. The Bushati hydropower project, involving the construction of additional dams in the Drin River, started in 2002 but it is currently on hold due to potentially significant negative impacts on the wetlands surrounding Lake Shkoder and Buna/Bojana River. There are 44 dams in total in the Drin basin in Albania (4 for energy production and 40 for irrigation purposes) with a capacity that varies from 70 10^3 m^3 (Berisha 1 in Tropoja - for irrigation) up to 2.7 10^6 m^3 (Fierza - for energy production). Two major dams and associated reservoirs (Globochica and Spilja) have been constructed in the Black Drin at FYR Macedonia with the main purpose of hydroelectric power generation. The Spilja reservoir was constructed in the confluence of the Black Drin and Radika rivers; the latter is the main tributary of Black Drin.

Climate variability has influenced the flows of the River in the last decades and thus its hydropower potential. If the situation and trend will not change significantly through time – a probable scenario for the area according to studies – water allocation between different uses, such as irrigation, hydropower generation, water supply etc. may become an issue of great concern since the potential for conflicts across sectors and countries will be exacerbated. In

[12] The bigger of the reservoirs, Fierze, was created on the Drin River in 1978. Its maximum depth is 128 m. The total surface of the reservoir is 11.8 km^2 and its total volume is 2.7 10^6 m^3.

this respect, a water balance for the entire River watershed is needed in order to develop a rational basis and scenarios for water allocation decisions.

3.1.2. Pressures and Impacts

The main impact in the area (having also socio-economic characteristics) has been caused by the construction of the dams. The alteration of the physical characteristics of the Drin seems to have an impact in the distribution of sediments and subsequently cause coastal erosion, as well as disturbances to the ecosystems supported. The bio-corridors in this area have been interrupted exerting major pressure to biodiversity.

Most of the heavy metal pollution (iron, copper and other) in the watershed originates from the enrichment process through the discharge of waste water and from the leaching of "inert" materials deposited around the plants.

Unsustainable agricultural practices and inefficient irrigation systems have led to an increase of non-point pollution (nutrient and pesticide) and erosion.

Box 2. Nutrient loads in the Drin Basin

The result of the modeling provided a total nitrogen load for the entire catchment of 31,580 tones, of which more than 30,000 tones, or about 95 percent, derived from anthropogenic sources. This total load corresponds to an area-specific load of about 17 kg/ha. As a comparison, the corresponding figure for the Danube basin is only 7.5 kg/ha (Screiber *et al*. 2003). The total phosphorus load for the Drin amounted to about 2020 tones, of which 1970 tones, or 98 percent, derived from anthropogenic sources. This corresponds to an area-specific load of 1.1 kg/ha. This is somewhat higher than the corresponding figure for the Danube basin (0.7 kg/ha; Schreiber *et al.* 2003).

Source: *Borgvang S. , et al. , 2008. Note: These numbers should be treated with caution since according to the paper authors, should be adjusted as new information is obtained. Nevertheless, these numbers give a level of magnitude regarding the nutrient discharge in the Adriatic Sea*.

Whereas agriculture is the main source of nitrogen and phosphorus in the river system as a whole, the source distribution varies from site to site. While in the lower parts of the drainage system, in the Buna/Bojana river, most of the phosphorus load derives from agriculture, sewage is more important in the upper parts of Black Drin. Increasing the number of wastewater treatment plants in the upper parts of the catchment should therefore be a prime priority in order to reduce nutrient loads to the river system. The low nutrient yields from agricultural activities in the upper parts are probably linked to low levels of fertilizer use. Unsustainable management of domestic liquid and solid waste exerts pressure in the water quality in other parts of the basin as well (more information can be found in the respective parts of the document for Shkoder/Buna and Ohrid basin). The riparian countries are taking measures to address domestic wastewater pollution. For instance, in Albania waste water treatment plants have/are being constructed for major towns (see table bellow).

Table 7. Constructed/Planned wastewater treatment plants in the Albanian Drin Basin

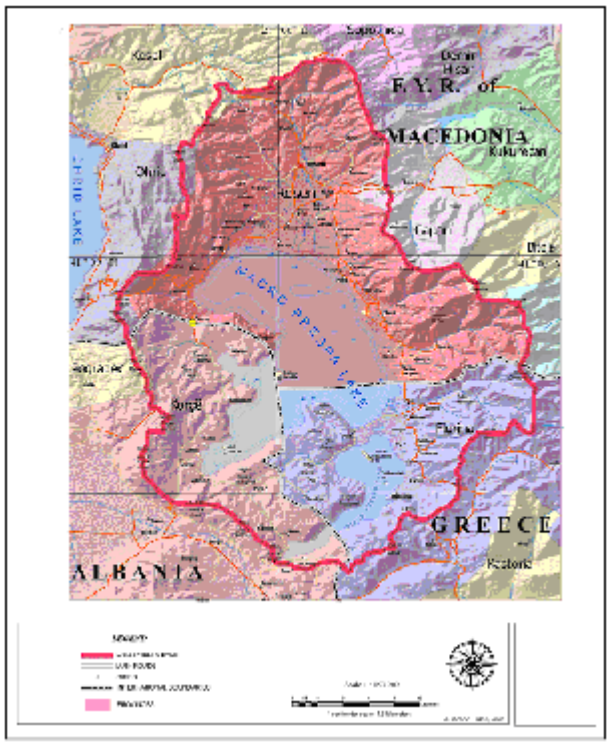
Town	Donor	Technology used	Cost	Population served	Complet.
Lezhe-Shengjin	WB/LUX/EIB	Constructed wetland	€ 3,2 M	42,000	Mar 09
Pogradec	KfW	Constructed wetland	€ 5 M	54,997	Apr 08
Korca	EIB/KfW	Conventional	€ 6.7 M	86,000	Dec 09

High forests in the Albanian part of the basin are generally in good condition, but forests in lower areas as well as shrubs are overexploited as fuel wood and livestock food. This has been causing high erosion in the Drin basin, land degradation, flooding etc.

3.2. The Prespa Lake Basin

The Lake Prespa Watershed is located at the eastern part of Albania, north-western part of Greece and south west part of FYR Macedonia. The plain areas are rather limited and are predominantly located close to the shores of the Prespa Lakes. The basin is surrounded by the forested mountains Pelister, Galichica and Sfika. The highest peaks of the surrounding mountains reach about 2,600 m. It is sited about 850 m above sea level. Prespa comprises of two Lakes separated by a naturally formulated narrow strip of land: Micro (Small) Prespa and Macro (Big) Prespa. Micro Prespa is 8 m higher than Macro Prespa. An artificial canal connects the two Lakes. Micro Prespa is shared between Albania and Greece while Macro Prespa is shared between Albania, Greece and FYR Macedonia.

Map 6. Prespa Basin – Administrative Division



Source: Presentation Alvin Lopez, Integrated Management of Shared Lake Basins Capacity Building Workshop, Ohrid, 16-18 July 2008

The main water inflow to the Macro Prespa Lake comes from FYR Macedonia through the Golema, Brajcinska and Kranska Reka (River)[13]. Agios Germanos, the fourth stream, is located in Greece. Few ephemeral streams discharging in the Lake are located in the Albanian territory. There is no surface outflow; there is though an underground outflow through karstic formations to the Ohrid lake. There is no major natural surface inflow in the Micro Prespa except of two small perennial streams in the Greek side[14].

The water level of the Macro Prespa Lake is subject to considerable fluctuations. A decline[15] of the water level of about 8 m has been observed in Macro Prespa during the last 50-year observation period. Increased water abstractions in combination with the dry period after 1987 and possible alterations of the underground outflow to Lake Ohrid might be some of the reasons that have caused this decline. Overall, the hydrology of the two Lakes is complex. For

[13] The largest tributary to Lake Prespa is the Golema River. The River has a catchment area of 231 km^2 and flows through the town of Resen, the largest settlement in the region, as well as several rural villages. Two other tributaries, the Brajcinska and the Kranska rivers, drain forested and agricultural areas in the eastern shores of the Prespa.

[14] Devolli River in the Albanian side was artificially linked to the Micro Prespa, in 1976, in order to discharge winter and spring rainfall and draw off water from the Lake during summer for irrigation purposes in the Korcha plain. This has increased the catchment area Micro Prespa (255 km^2) by 1070 km^2. In the early years of diversion it is estimated that, in wintertime, approximately 30 10^6 m^3 /year of free-flowing water were temporarily stored in the Lake, to be abstracted from the Lake during the irrigation period. Over the years, suspended sediments carried by Devolli deposited and filled up the shallow southern end of Micro Prespa, sealing the lakeside and blocking underground freshwater springs. The abstraction of water from the Lake became increasingly difficult due to increasing siltation. Since 2003, the water works were abandoned, and the channelling of part of the River flow into the Lake ceased. The diversion of River Devolli has significantly degraded the southern end of Micro Prespa causing severe environmental and socio-economic impacts in the Albanian local society.

[15] Macro Prespa Lake suffered especially from three sharp water level drops that took place during the following periods: 75/77 (1.2 m), 87/90 (3.7 m) and 00/02 (2.2 m). The water level either recovered between these periods, as is the case during the early 80'ies or basically stagnated, as prior to the year 2000. The three periods of sharp water losses are relatively short. During these periods even normal seasonal fluctuation vanished. The described drop of water level is a consequence of inflow and possibly of outflow variations.

a complete interpretation of the observed phenomena and for the management of the water regime a comprehensive study of the hydrogeology of the region is deemed necessary (Strategic Action Plan for the Sustainable Development of the Prespa Park, 2002).

The Prespa lake system is of paramount ecological importance as it hosts unique biotopes that are important also from a European and international conservation perspective. The FYR Macedonian and Greek sides of the lake system have been designated as wetlands of international importance under the Convention on Protection of Wetlands of International Importance (Ramsar, 1971). The Ramsar designation in Greece is based primarily on breeding and wintering populations, whereas in FYR Macedonia the designation is based on feeding species. The region hosts globally endangered bird species e.g. the Dalmatian pelican and the Pygmy cormorant both of which breed and winter in the Greek section of Prespa. This is also the only breeding area of the White pelican in the European Union, while the globally endangered Ferruginous duck breeds in the Ezerani Lagoon in FYR Macedonia and in Micro Prespa in Greece. All these and many other bird species use the entire surface of the two Lakes in all three countries as feeding grounds (UNDP, Project document. GEF "Integrated Ecosystem Management in the Prespa Lakes Basin of Albania, FYR Macedonia and Greece" Project). Of the 11 indigenous fish taxa identified, 8 species are endemic to the Prespa Lakes, 7 of which are threatened. The area hosts also endangered mammal species.

The hydrometric and climatologic observation systems of the Prespa area are mostly run by state organisations or authorities of riparian countries. Financial and organisational issues have led to the deterioration of the system over the last 15 years. A number of rainfall gauges that are mostly located at lower elevations close to the lakes and few climatologic stations, comprise the –inadequate- observation system. There is lack of river gauging stations and water quality monitoring posts. There has been also lack of systematic and regular monitoring of water abstractions in the entire catchment as well as groundwater surveys. The only really measured data available relate to the canal flows from the Devoli River to the Micro Prespa.

3.2.1 Socioeconomic situation

The region is of great cultural/historic importance. There is a number of pre-historic settlements, archaeological sites and Byzantine and post-Byzantine monuments.

The total population is estimated at 28,900 inhabitants. The 75 percent of the population live in FYR Macedonia in one town (Resen) and 40 villages. The rest of it is found in Albania (17 percent) in 12 villages mostly located at the coast of Macro Prespa and Greece (8 percent) in 13 villages. There is a decrease of approximately 20 percent in the population of the basin in FYR Macedonia over the past thirty years. The main reason is immigration following the bad economic situation and the very high unemployment rate - the highest among the three littoral countries with the Albanian side coming second. Population, according to estimates is steady or growing in the Albanian part of the basin and steady or in slight decline in the Greek part. In the latter, movement of population, especially of young people, towards the nearby urban centers resulted in a decrease of birth rates.

Table 8. Selected socio-economic data for Prespa Lake Basin

Part of the basin	Albanian	Greek	FYR Macedonian
Average per capita income in the Basin (in US dollars)*	700	10,000	2,000
Unemployment (%)*	23	12	32
Population living below the poverty line (%)	30 (estimation for 2001)	**	**
Population*	5,200	1,500	17,500
Density of population – persons/km^2 *	20 (UNDP, 2005) 26 (Malakou, 2000)	6	28 (UNDP) 31 (Malakou, 2000)

*Estimation, **No data available for the region

Note: Data provided here must be treated with caution since differed figures were provided by different authors.

Source: Malakou, 2000 , UNDP, Project document. GEF "Integrated Ecosystem Management in the Prespa Lakes Basin of Albania, FYR Macedonia and

The average annual per capita income in Greece (considered to be rather low for the standards of the country itself) is the highest among the three basin countries. In the FYR Macedonian part of the basin, the population relies heavily on pensions, government employment and employment from occasional jobs.

The primary sector is the main, in terms of employment, in the region. In Albania, 70 percent of the labour force is occupied in this sector; livestock and farming are the most important sources of income. There is information indicating that most of the production is used for home consumption by the producers; this is not the case for the region that is next to the borders with Greece. The farming land is fragmented and agriculture is labor intensive. In FYR Macedonia, agricultural activities play an important role in terms of employment; 60-70 percent of the population of Resen municipality is dependant on apple production (annual production is over 70.000 tons).

Box 3. Land coverage in the Prespa catchment area

− The Eastern catchment (272 km^2) stretches along the western slopes of the Pelister Mountain. The total forest cover amounts to 36 percent of the area. The 208.8 km^2 are covered by forest and semi-natural areas and the 5.1 km^2 (20 percent) by agricultural areas. Water bodies cover 4.6 km^2.

− The almost 30 percent of the Northern catchment (302.1 km^2) is covered by agricultural areas (90.2 km^2). Forest (152 km^2) and other natural vegetation dominates the catchment (in total 204.7 km^2). Wetlands cover 4.2 km^2 .

− The Southern catchment has a total area of 254 km². Of this about 24 percent is covered by forest. The Micro Prespa wetlands cover the 15.2 percent. Agricultural areas cover the 10.6 percent.

− The Western catchment of the Macro Prespa Lake covers 272 km^2. Forests and natural areas are dominant with 250 km^2 (92 percent). Agricultural and artificial areas cover the rest (8 percent of the area).

In Greece, agricultural activities employ more than 80 percent of the population; approximately 50 percent are involved in cultivation of land and about 30 percent in livestock raising.

Table 9. Demand for water supply in Prespa region in FYR Macedonia (quantities in 10^3 m^3/year) – Projection for 2020

	Population	Tourists	Industry	Fish ponds	Total
Prespa	2.800	924	1.435	9.000	14.159

Source: Spatial Plan of FYR Macedonia, 2004

There are 107 km^2 of cropland in the FYR Macedonian, 200 in Albanian and 200 in Greek side of Prespa. In FYR Macedonia, the irrigated area has been decreased in the 90s to reach 70 km^2 in 2004. However, as a consequence of the low efficiency of the dilapidated irrigation infrastructure, annual irrigation water demand remains high with approx. 7-10 million km^3 drawn from

Macro Prespa[16]. Somehow contradicting to these data, other available information suggests that an irrigation system (Prespansko Pole irrigation system) cover irrigation needs for 363.5 km^2 in total. There are also private owned wells abstracting groundwater. An area of 180 km^2 is covered within a drainage network. More than seventy percent (75.4 percent) of arable land is irrigated in the Greek part of the Lake and only 7.3 percent in the Albanian (in 1985 it was 54 percent) due to the destruction of the relevant infrastructure (Strategic Action Plan, 2002).

Fishing seems to be an important income source for the Albanian side (Grazhdani D. , 2008). There is limited number of persons in the two other countries that earn a significant portion of their income from fishing. The industrial sector is present only in FYR Macedonia with 11 medium-size and over 100 small-size enterprises. Nevertheless, they operate at or below 20 percent of their production capacity. Non-timber forest products, forest fruit, mushrooms, medical plants, are collected and used to supplement the income of a portion of the population in both Albania and FYR Macedonia. According to a rapid survey done by KfW, it is estimated that 5 percent of the population generate more than half, and an additional 21 percent supplement their income through these activities in FYR Macedonia (UNDP, Project document. GEF "Integrated Ecosystem Management in the Prespa Lakes Basin of Albania, FYR Macedonia and Greece" Project).

The tertiary sector is largely confined to tourism, which represents an important economic activity at least in the FYR Macedonian side which accepts a large number of visitors per year (reliable data are not available) having a capacity of approximately 7,000 beds (this number has to be treated with caution since it includes caravan and camping sites). In Greece, the respective capacity is 300. In the Albanian side, there is small-scale rural and family tourism. There are few small hotels (34 beds capacity) but also private accommodation (500 beds capacity). The occupancy rate for the few hotels ranges from 9 – 20 percent and for private accommodation between 0.02 and 3 percent (Grazhdani D. , 2008).

3.2.2. Pressures and Impacts

Unsustainable practices in key productive sectors across the basin, strongly linked to the prevailing socio-economic situation in the region, have had an impact in the Lakes system and its habitats[17].

Hydrological interventions go back in time e.g. the diversion of the stream of Agios Germanos from Micro to Macro Prespa took place back in 1936. Another example is the diversion and linkage of the Devolli river to the Micro Prespa in the 70's. As a result, a considerable amount of solid material has been deposited along the coast of Micro Prespa covering a zone of 1-1.5 km. At present, underground springs have been blocked. The diversion caused an abrupt alteration of the character, ecology and functions of the site, transforming it from a shallow lake into a marshland dominated by expanding emergent vegetation. Micro Prespa is a lake of Tertiary origin (> 5 million years) and is slowly going through a natural aging effect (filling up). The Devolli diversion has actually speeded up dramatically a natural phenomenon, which would have taken several hundreds years or more to be realised (SPP, 2006). Recent hydrological interventions[18] in the Greek part of the lakes

[16] Continuous and regular observations of water abstractions are not available in none of the three countries. For the later water balance long-term time series of water extractions are required to reflect their development over time, i.e. over and during the years.

[17] Actions to prepare preliminary conservation action recommendations and to further outline a science-based and consensus driven process for the development of conservation action plans for selected priority habitats and species in the Prespa Lakes basin, have been initiated under the GEF Prespa Project. It is anticipated that the actual development of these action plans and its pilot implementation would occur after April 2009.

[18] In 2002, the Society for the Protection of Prespa (SPP – Greek NGO) undertook the re-construction of the sluice between the Micro and Macro Prespa; the activities were financed by an EC LIFE project. The aim was to conserve and protect the

had as a result the improved management of the water level of the Micro Prespa. In many cases wetlands had been drained to be used as farmland e.g. 1,000 ha of wetlands had been drained in Greece.

Management of reed beds is an issue. In the Greek part of the Lake, abandonment of traditional activities had led to an expansion of the reed beds resulting in the disappearance of wet meadows that are currently restored through reed bed management and water level regulation in the context of a LIFE project[19]. On the contrary, in the FYR Macedonian part of the Lake reed beds have been destroyed to improve access to beaches.

Extensive forest destruction because of lopping of fodder (branches and leaves) for livestock, overgrazing of animals (goats, sheep, and cows) inside the forest land, uncontrolled collection of firewood and subsequent erosion along the Albanian side, along with the diversion of the Devolli River into Micro Prespa, form additional reasons for the destruction of the wetlands. Destructive harvesting of medicinal plants and other non-timber forest products has been recorded. An issue is also the alteration of the structure of the forest ecosystem through the monoculture aforastation at the FYR Macedonian part of the Lake which has caused the simplification of the forest species composition and degraded forest habitats e.g. the loss of nesting trees for globally threatened species such as the imperial eagle. There are plans for the rehabilitation of the deforested areas e.g. according to the Spatial Plan for FYR Macedonia a total of 1160 km^2 in Bitola and Resen areas will be subject to reforestation until 2020.

Agriculture is by far the major water consumer– 90 percent of the total water demands. Drinking water supply demands in FYR Macedonian side accounts for 10 percent of the irrigation demands. Water abstraction for irrigation purposes is uncontrolled in the same country resulting in significant pressure in the Lake basin water system and thought to contribute to localized water shortages. Seasonal irrigation withdrawals render stream - harboring native species of trout-sections dry or warmer in streams. In Albania, the pressure exerted in this respect is lower although irrigation is not controlled. In Greece, although irrigation is fully controlled, water abstraction exceeds the actual needs.

The majority of the impacts in the system derive from pollution sources located within the catchment area / basin although there is some evidence of moderate long range trace metal pollution from the large thermal power stations of Ptolemais, Greece, via atmospheric transport and depositions.

Agricultural runoff – mostly from the FYR Macedonian part of the Lake - is one of the major pollution sources. In Albania, farming is labor intensive with low use of pesticides. Herbicides and pesticides use at the Greek and FYR Macedonian side of the basin is substantial. In the latter, pesticides seem to be overused as much as 50 percent (UNDP, Project document. GEF "Integrated Ecosystem Management in the Prespa Lakes Basin of Albania, FYR Macedonia and Greece" Project) mainly at the Golema River sub-watershed[20]

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biodiversity of the area while taking into account the irrigation needs of the farmers in Prespa. The re-construction plan was largely based on studies provided by the SPP and additionally included the results of discussions with the local people, the local authorities and the LIFE project Scientific Committee. The sluice construction was completed in December 2004 and today provides very efficient functionality so as to allow for a more effective and ecological management of the water level of micro Prespa. (www.spp.gr)

[19] For more information see www.spp.gr

[20] The "Restoration of the river Golema Reka" and "Reducing environmental impacts of agriculture" in the FYR Macedonian side of Prespa are two of the interventions of the Project "Integrated Water Resources Management in the Prespa region through participatory processes and dialogue". The first is on-going (expected to end in 2010) and it aims in the improvement of environmental conditions of Golema Reka through restoration activities and introduction of sustainable practices to a wide range of river users and affected communities through participatory consultation processes to ensure the reflection of local community interests in project activities and long-sustainability of the project outcomes. It is implemented by UNDP in partnership with the Municipality of Resen financially supported by the Swiss Agency for Development and Cooperation. More information at www.waterwiki.net

affecting both the river and the northern end of the Lake. Inappropriate types of pesticides and practices of their application along with the overuse of fertilizers aggravate the situation. This seems to have an impact to the ecosystem: it altered aquatic plant community dynamics; reduced reproductive success rates in fish larvae; altered sex ratios and; slowed growth of fish larvae and increased mortality of benthic and fish fauna.

The discharge of waste (such as apple pulp from food processing plants) and untreated domestic and industrial wastewaters combined with agriculture land washout, contributes to the alteration of the nutrient levels of the Macro Prespa Lake. Half of phosphorous inputs in Macro Prespa are estimated that are contributed by household detergents from FYR Macedonia. As an outcome, the natural oligotrophic state of the Macro Prespa has changed to mesotrophic state showing tendency towards eutrophic. Recent measurements (Skarbøvik E., et al, 2008) and an incident of mass deaths of fish in the July 2007 suggest also the aforementioned tendency. The situation of the Micro Prespa Lake is comparatively better.

Comparing the current situation regarding municipal wastewater treatment with the one in the past, when treatment was practically absent, we can see that progress has been achieved: a facility that will treat 95 percent of the total wastewater in the Greek side will be constructed[21]and a 20 percent of wastewater will be treated in the Albanian[22] side (UNDP, Project document. GEF "Integrated Ecosystem Management in the Prespa Lakes Basin of Albania, FYR Macedonia and Greece" Project). The town of Resen[23] has a secondary sewerage system, but according REC (2006) its operation does not fully satisfy environmental standards.

With regard to the management of solid wastes, the Albanian Prespa lacks a solid waste storage facility. The construction of a regional solid urban waste in Korce is planned to be initiated in 2009. In the FYR of Macedonia, two landfills exist, one is a communal landfill for the town of Resen and the other is an industrial waste landfill (Strategic Action Plan, 2002). As a result, the four surface streams of the Basin have been used for waste disposal, being a main reason causing deterioration of the riverine and subsequently the Lake system. The National Strategy for Waste Management in FYR Macedonia provides for a regional landfill that will cover the needs of the Prespa and Ohrid areas to be constructed outside the boundaries of the respective basins.

Unsustainable fishing practices (over-fishing, usage of dynamite, fishing during spawning season, introduction of exotic species) in the past have resulted into the degradation of the ecosystem. Over-harvesting of fish has caused the decline of populations during the past 20 years, including those of endemic species. Eleven non-native species have been introduced mainly in the effort of the countries to restock the Lake resulting in considerable alterations of the structure of the lake's eco-system.

Measures for addressing some of these issues are planned or underway by the littoral countries, also through the GEF Prespa Project.

[21] Most of the villages in the Greek side have a sewage collection network but no treatment plant. However, the Integrated Rural Development Programme of the Regional Authority of Western Macedonia, Greece, will fund the consolidation of all wastewater collection networks and the establishment of four units of wastewater treatment using artificial wetlands, which will cover all settlements disposing their effluents in Micro Prespa, including Lemos and Ag. Germanos. The National Foundation of Rural Research is conducting the technical study for this work with funding from the Local Development Fund.

[22] A sewer system with sewage collection and septic system constructed with KfW funds has been operating for the town of Liqenas (Pustec), the commune center and largest town in Albanian side of Prespa basin, since November 2004. The approximately 4,000 people living in the remaining seven villages have no sewage collection or treatment systems. Individual households sometimes have primitively constructed septic tanks, which do little to reduce impacts on water quality.

[23] KfW financial cooperation supported the rehabilitation of the large-scale treatment plant and the collection network - the facility commenced operations in May 2005 - covering Resen town and several villages of the region.

3.3. The Ohrid Lake Basin

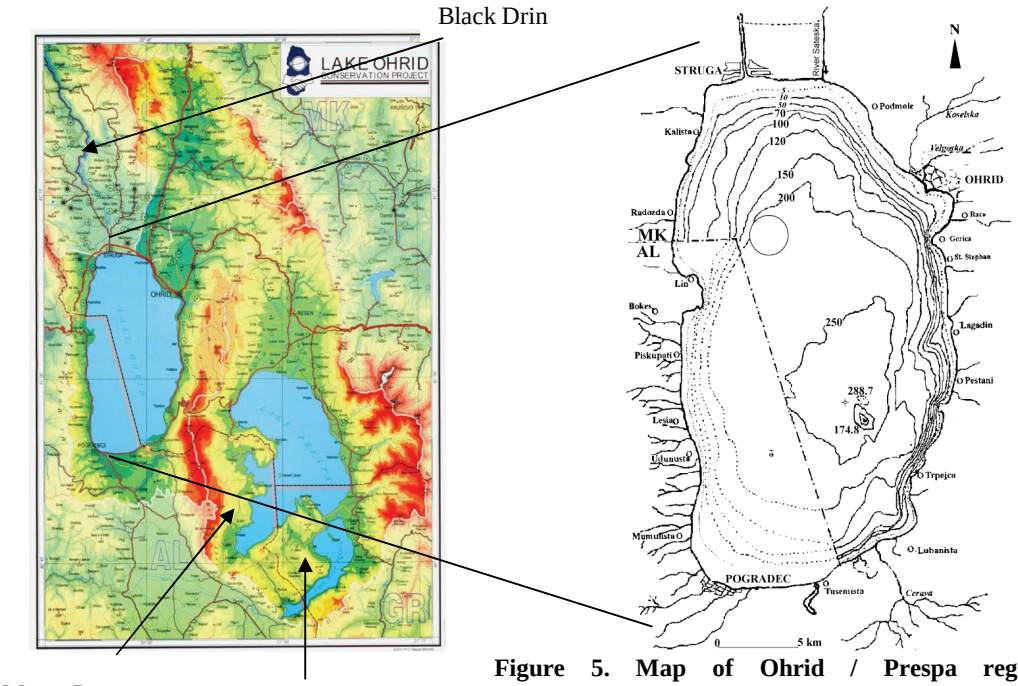


Figure 5. Map of Ohrid / Prespa region - Hydrographical map of Lake Ohrid based upon detailed bathymetric measurements made by the Smithsonian Institution, USA and the Hydro biological Institute, Ohrid in 1975 (map drawn by Aleksandar Patcev).
Source: Lake Ohrid Conservation Project, 2002

Ohrid Lake is shared by Albania and FYR Macedonia. It sits at an altitude of 690 m above sea and is the largest in volume Lake in SEE. The lake is almost surrounded by mountains[24]. The Ohrid - Struga Valley is located in the central part while Debarca Valley in the north part of the watershed.

There is very little variability in the water level of Lake Ohrid. Under normal conditions, the annual amplitude varies from 30 to 80 cm. For the long-term period, the amplitude has varied up to 150 cm. A little less than half of the water in Lake Ohrid comes from its surface tributaries - Sateska[25] and Koselska[26] Rivers (flowing from the FYR Macedonian side) are the main. River flow is substantially less from the Albanian side. Pogradec and Verdova Rivers are the major tributaries from the Albanian side. The rest of the inflow comes from both orographic surface water flow, and underground flow from the Lake Prespa system.

The Lake Prespa basin sits southeast, at an elevation of about 850 m, about 150 m higher than Lake Ohrid. The Saint Naum and Tushemisht springs on the south-east coast of Lake Ohrid is fed mainly by water flowing out of the porous karst mountains to the east, Galicica and Mali i Thate, coming from the Prespa basin. Hence, Lake Prespa watershed could be considered to

[24] Galicica (Magaro 2252 m), Stogovo (2242 m), Karaorman (2145 m), Jablanica (2257 m), Ilinska (1909 m) and Plakenska (1999 m).
[25] In 1962 the Sateska River, flowing until then into the Black Drin River (about 3 km beyond its outflow from the Lake), was diverted to drain the Struga marshland and create arable land, to make use of Lake Ohrid water for hydroelectric power generation, to ensure that the flow of water in the River Crn Drim was continuous, and to reduce the amount of sediment flowing down the River Crn Drim. This diversion increased the water inflow by 25-30% and the Lake Ohrid sub watershed by about 174% (Watzin et al. 2005). It has also significantly increased sediment inputs to the lake.
[26] The Koselska River is formed on the east slopes of Plakenska Mountain. The upper part consists of a well-developed hydrographic system, and this is the area where major water masses emerge. The flow direction is east-northeast starting from its springs all the way to the inflow area into Lake Ohrid.

be a part of the Lake Ohrid watershed. This connection makes the Prespa-Ohrid water system to be if not unique, one of the few in the world, yet making the hydrology of the lake a complicated one.

Figure 6. Groundwater flow from Prespa basin to Ohrid Lake

Note: The grey arrows indicate flow direction (the broken arrow indicates underground flow).
Source: (adapted from) Matzinger et al., 2005

Table 10. Preliminary water balance for Lake Ohrid

	Inflow in 10^6 m^3/year	Outflow in 10^6 m^3/ year
Surface water: Rivers The rest of catch. area.	 380.6 75.7	693.8
Groundwater: Known springs Unknown springs	 323.6 ?	
Precipitation	276.6	
Evaporation		408
TOTAL	1056.5	1101.8

The difference between outflow and inflow – 45.3 10^6 m^3 or 1.4 m^3/s – may be considered as the contribution of the unknown springs (underwater springs).

Information provided by the FYR Macedonian Ministry of Environment and Physical Planning

Water flows out of Lake Ohrid near Struga, into the Black Drin River at an elevation of 694 m above sea level with an average discharge of 22 m^3/sec. The Black Drin, is 44.5 km long (within FYR Macedonia) and has an average flow of 48 m^3/sec. It flows through the town of Struga and the agricultural area further north. An overflow structure –constructed in 1962- regulates the outflow to the Black Drin in consistence with the needs of the "Globocica" and "Spilje" electrical power generation stations, and the need to maintain the level of water in the lake within accepted levels.

Table 11. Demand for water supply in Ohrid – Struga (in Black Drin Watershed) regions in FYR Macedonia (Quantities in 10^3 m^3/year) – Projection for 2020

	Population	**Tourists**	**Industry**	**Fish ponds**	**Total**
Ohrid – Struga area	20,695	6,791	5,740	22,000	55,226

Source: Spatial Plan of FYR Macedonia, 2004

The Lake and the rivers in the basin are sources of irrigation and drinking water. There is not currently a high level of demand and it doesn't seem to grow substantially. Nevertheless, two additional dams are planned to be constructed until 2020 in the Ohrid - Struga area in Sateska and Vapilica with a capacity of 2.5 and 1.1 10^6 m^3 respectively for the purpose of irrigation, floods control and sediments retaining. An area 26,8 km^2 is covered within drainage network; an additional area of 60 km^2 will be covered until 2020.

The evolution of a unique collection of plants and animals in the Lake has been favored by its physical isolation. It includes a number of relict species, or "living fossils", and many endemic species. For example, 10 of the 17 identified fish species of the Lake Ohrid are endemic, as are many of the Lake's snails, worms, and sponges. The lakeshore reed beds and wetlands provide critical habitat for hundreds of thousands of wintering water birds, including rare and threatened species such as the dalmatian pelican, ferruginous duck, spotted eagle, and imperial eagle. The diversity of invertebrate species on a relatively limited surface at some

sites can be compared to the diversity of coral reefs (REC 2006). Because of its high biodiversity and unique cultural heritage, Ohrid is a Lake of tremendous local, regional, and international significance (Watzin et al, 2005).

Three hydrological stations exist in the FYR Macedonian part of the lake.

3.3.1. Socioeconomic situation

The region of Ohrid basin has a long history and a significant cultural heritage, while evidence of human settlement dates back more than 9,000 years. In 1980, the FYR Macedonian side of Lake Ohrid was designated as a "site of cultural and natural values of the global patrimony" under UNESCO.

The population of the Ohrid watershed (Prespa sub-watershed is not included) comprises about 115,000 residents in the FYR Macedonian part (2002 census - Ganoulis and Zinke, 2004) and about 61,000 residents in the Albanian part (Watzin at al. 2005). The total population has been increased 5 or 6 times since the end of World War II. Most of them live in large towns -Ohrid and Struga are the biggest towns in the FYR Macedonian side and Pogradec in the Albanian side- but there are also many small villages and communities scattered throughout the watershed in both countries. There is no information available about the number of inhabitants in the Black Drin area.

Unemployment and/or underemployment are high in both parts of the basin and is equal or above the national rates. Only outdated official data are available; these are given here as indicative. In Albania, according to data compiled by the Albanian Institute of Statistics in 1998, between 28 and 46 percent of the working age population in the Ohrid basin is practically unemployed. In FYR Macedonia, employment data collected by the Institute for Statistics for the working age population, in 1994, suggested that more than half of the population in the administrative units of Ohrid, Belcista, Kosel, Meseista, Resen, and Struga may be unemployed or underemployed (working in seasonal or other positions without benefits) (Watzin at al., 2003). There are estimates (Ganoulis and Zinke, 2004) reporting unemployed to be about 25,000 in Ohrid, 20,000 in Struga and 1,300 in Belcista.

Table 12. Selected socio-economic data for Ohrid Lake Basin

Part of the basin	Albanian	FYR Macedonian
Population*	115,00**	61,000
Land use*	Arable land: 2,500 ha (1,500 are irrigated) Pasture: 1,367 ha Forests: 10,248 ha Economic enterprises: 1,396 ha Built land (building, roads): 672 ha	Arable land: 53,303 ha (50% is irrigated) Pasture: 27,319 ha Forests: 61,225 ha Water: 41,000 ha

*Estimation - ** 2002 census - *** Land use data on the Macedonian side are incomplete. Information was provided by the Macedonian Institute for Statistics and the forest enterprises (Watzin et al., 2004)
Source: Watzin et al., 2004

In the Albanian side, the most important economic activity is agriculture; generating 55 percent of the GDP in the area (Watzin at al., 2005). The pastureland is used for a variety of livestock, as well as for harvesting medical plants - 100 species of plants are gathered for medical uses. In the FYR Macedonian side, agriculture is less important in terms of economic activities practiced; it generates 12 percent of the GDP in the area (Watzin at al., 2005). The pastureland supports a variety of livestock.

Tourism is an important activity in especially in the FYR Macedonian part of the lake, despite the decline that has been observed in the past. Since 1991, the foreign tourists' overnight stays

had been reduced up to 70 percent, due to political instability. However, an increase in tourist arrivals has occurred since.

Although statistics e.g. people employed in the sector or GDP share are not available, fishing seems to be a significant activity at least in terms of pressure exerted to the Lake system, leading to the deterioration of ichthiofauna populations – especially the more commercial ones.

3.3.2 Pressures and Impacts

Hydrological interventions have impacted the Lake system at many levels. The diversion of Sateska River, has increased the area of the watershed and the agricultural runoff entering the Lake. Limited anti-erosion measures have caused the gradual increase of sediment input in the Lake. The uncontrolled extraction of sand and gravel from the riverbed aggravates the situation. The re-diversion of the Sateska river has been under consideration[27].

Uncontrolled development has caused the deterioration of shoreline habitats. Characteristic example is the alteration of the reed zones especially in the Albanian side – in the area around Pogradec and Tushemisht village but also around Ohrid, Struga, St. Naum in FYR Macedonia.

Unsustainable agricultural practices exert a pressure to the Lake system being also a significant source of pollution. Runoff enters directly or indirectly through its tributaries into the Lake. Irrigation of farmlands, with water abstracted from the Lake and its tributaries, increases the load to the Lake. A variety of agrochemicals are used in both countries with no or little control. In FYR Macedonia, some types of pesticides are banned but still they are illegally obtained and used. Traces have been found in the tissues of fish threatening also human health. Uncontrolled and excess fertiliser use is the cause of nutrient pollution and hence eutrophication. Nutrient loading exerts pressure in the system accelerating the "aging" of the lake causing eutrophication phenomena. In 2005 (according to Watzin et al. , 2005), the concentration of phosphorous in the middle of the lake was 3-4 times the concentration measured in before World War II. Considering the volume of the lake this is a significant change. It is worthwhile mentioning that the load of phosphorus coming from the Sateska River may be about the same as that coming from the Pogradec in Albania (Watzin et al. , 2005) .

In Pogradec only approximately 30 percent of the wastewaters of the city were collected and simply discharged into the Lake until 2004. The operation of collection and treatment facilities in Pogradec[28] is expected to improve significantly and rapidly the situation in the Albanian side of the Lake. In the FYR Macedonian side there is a regional sewerage system[29] protecting Lake Ohrid[30]. It collects wastewater from shoreline communities to a treatment facility; about 65 percent of wastewater (as for 2006) of the Ohrid – Struga region (in the

[27] A project proposal had been prepared by the Water Development Institute in FYR Macedonia for the restoration/re-diversion of river Sateska River. There isn't further available information in this regard.

[28] In 2001, the Pogradec Water Supply, Sewerage and Drainage Management Project started to be implemented. A grant (about 19 million Euros) by KfW is used for the rehabilitation of main and secondary networks of water supply and sewerage in the city of Pogradec and the construction of sewerage treatment plant (constructed wetland). The activities began in 2004 and finished within 2008 with the construction of a sewerage treatment system for the city covering a population of about 60,000 persons. According to Watzin et al., 2005, the treatment system has been designed to remove the 80% of the phosphorous load resulting to a discharge concentration that would comply with the relevant EU discharge requirements for treated wastewater in sensitive bodies.

[29] It is still not fully developed. There are plans for the construction of additional sewerage systems in the area. For instance there are plans for building sewage systems in settlements in the Struga area within 2008. (ADA, 2008b)

[30] Managed by the intermunicipal public enterprise "Proaqua," founded by the municipalities of Ohrid and Struga. Proaqua is also responsible for management of the water supply systems of Ohrid and Struga.

Black Drin watershed[31]) were treated (in a 120,000 pe capacity plant) and discharged in the Black Drin.

Untreated industrial effluents from metal parts industry in Pogradec are discharged directly into the Lake. A number of mines in the same area – only one in operation (as for 2006) – having exposed waste material remains, are sources of pollution after every rainfall through washout and runoff resulting in localised zones of metal (e.g. iron, chromium, copper, cobalt, nickel etc.) pollution near the shore. Waste produced by several industrial activities in the FYR Macedonian part of the watershed may be contaminating some of the Lakes' tributaries. The industrial wastewater in the Black Drin area is treated (information provided by the MEPP). Uncontrolled waste disposal at both parts of the watershed might be a source of pollution for the underground water and, hence, for the Lake. Efforts[32] to address this issue have been initiated.

Water quality in the Black Drin is an issue. According to the Spatial Plan (2004) of FYR Macedonia Black Drin is among the watercourses of the country that shows "permanent deterioration of their quality".

On both sides of the watershed, eroding forestlands can be significant sources of sediment to the rivers and lake. In the Albanian part, fires, indiscriminate cutting of trees for fuel wood and production of lumber, and the use of the forest for pasturing goats have resulted in erosion. In FYR Macedonian part, reforestation activities have resulted in a better situation in this regard. Unfortunately much of the reforestation has been done with exotic species – used because their growth rate is higher than the indigenous ones. According to the Spatial Plan for FYR Macedonia a total of 42,5 km^2 in Ohrid and Struga regions will be subject to reforestation until 2020.

Unsustainable exploitation of fisheries has caused the decline of fish stocks. The impact is bigger on the more commercially valuable species such as the Lake Ohrid trout (*Salmo letnica*). Fishing pressures are different in the two sides reflecting both the socio-economic and the relevant regulatory regime differences between the two countries. It was only in 2002 when limits to the catch of trout have been set in the Albanian side.

Strategic policy papers, such as the Spatial Plan of FYR Macedonia (2004), documents the aforementioned issues and provide for priority actions; see table bellow.

[31] Nevertheless not all sewage is collected and treated in the Black Drin possibly undermining, through nutrient pollution, the quality of the river and the artificial lakes Globocica and Spilje. Unsustainable agriculture practices and management of solid waste posse additional threats.

[32] A feasibility Study for the construction of landfill for Pogradec, Korca and some Communes has been prepared with the support of KfW. The National Strategy for Waste Management in FYR Macedonia provides for a regional landfill that will cover the needs of the Prespa and Ohrid areas but will be constructed outside the boundaries of the respective basins.

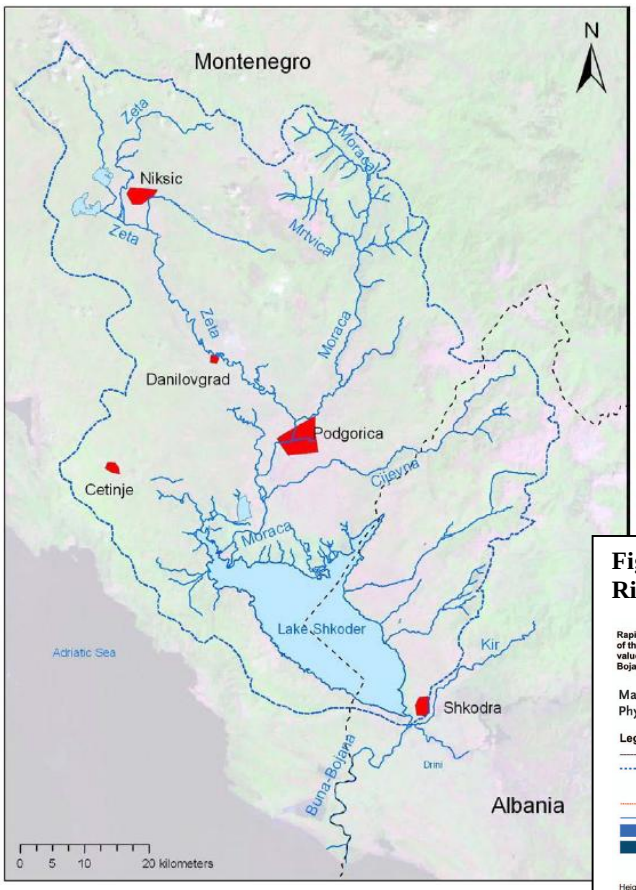
Table 13. Priority issues and short term plans for addressing these in the Prespa / Ohrid / Black Drin areas in FYR Macedonia

Region		Black Drin, Ohrid-Prespa
Remedy and reclamation of degraded areas	Landfills for solid and liquid wastes	*By 2010: Reclamation of municipal landfills in Ohrid, Struga and National Park Mavrovo.*
	Open pits and burrows	*After 2010: Regulation of the tailings disposal site of the coal mine "Piskupstina".*
Protection of permanently endangered development resources	Zones and measures for arable areas protection	*By 2010: Controlled use of chemicals in agriculture in eastern parts of the municipality of Meseista. Establishment of soil quality monitoring and heavy metals concentrations monitoring.*
Protection of permanently endangered development resources	Zones and measures for springs and ground water resources protection	*By 2010: Establishment of protection zones around Biljanini Izvori (springs), Radolista, Radozda, Vraniste, springs Sum, Vevcani springs.*
		By 2010: Establishment of protection zones around geothermal resources in Debar area and springs Rosoki and Studena Voda.
	Surface water resources protection	*By 2010: Completion of the waste water collector for Ohrid Lake and connection of surrounding settlements to it. Reversion of Sateska river in its former bed and application of anti-erosion measures. Reconstruction of waste water treatment plant for Resen.*
		By 2010: Treatment of industrial waste water running towards Grasnica river.
Preventive protection of potentially endangered areas	Zones for tourism	*By 2010: Till the completion of waste water collection system for Ohrid and Prespa Lakes, aimed at full connection of tourist facilities, continuous water quality monitoring and interventions in case of exceeded MPC. Establishment of seasonal regimes of transport in tourist zones and measures for more intensive use of public transportation. Regulatory measures in tourist zone of Mavrovo and treatment of waste waters from settlements.*
	Forests	*By 2010: Intensive forestation in the municipalities of Delogozdi, Meseista, Kosel, northern part of Resen, north and south of Debar Lake. Measures for protection of endangered forest species in Struga, northern parts of Galicica, municipality of Rostuse.*
	Ground and surface water resources	*After 2010: Protection of lower course of Radika.*

Source: Spatial Plan of FYR Macedonia, 2004

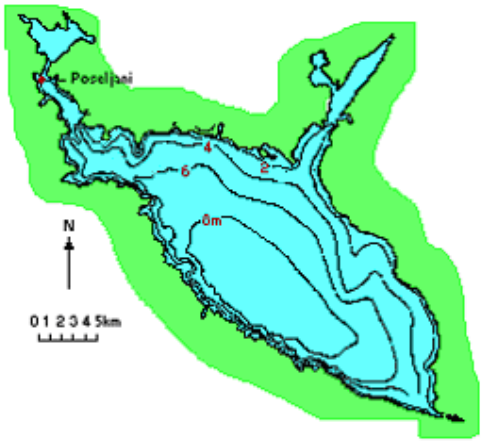
3.4. The Shkoder Lake - Buna/Bojana River Basin

Map 7. The Lake Shkoder drainage basin with the main rivers and streams



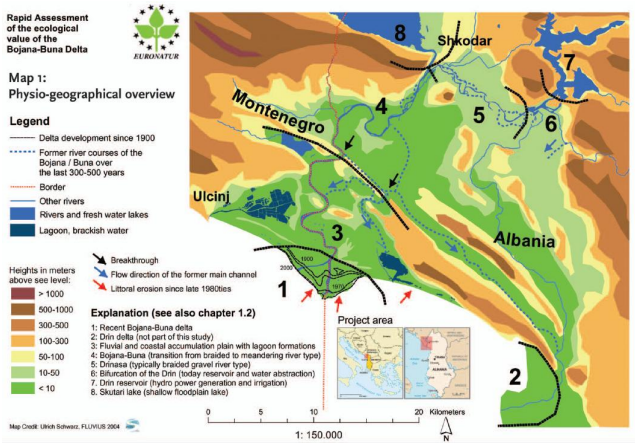
Source: Royal Haskoning, 2006

Map 8. Bathymetric map of Lake Shkoder



Source: http://www.ilec.or.jp/database/eur/eur-09.html

Figure 7. Physio-geographical overview of the Buna River and Delta



Source: Schneider-Jacoby M. et al., 2006

Shkoder Lake[33] and Buna/Bojana River basin is sited at the Montenegrin-Albanian border in the karst terrain of the south-eastern Dinaric Alps. The basin is located in south-eastern Montenegro and in the northwest of Albania – it is a depression oriented northwest-southeast, parallel to the Adriatic coast.

The Lake is the largest by surface area in SEE, and sits 6 m above sea level. Its depth fluctuates from 4,6 to 9,8 m due to the discharge capacities of the Buna/Bojana River and the very varying rainfall (Banja M., 2004). About thirty underwater spring halls ("oka" - at the southwest, northwest and northern side of the lake) are significantly deeper – up to 60m. The lake's water changes completely 2 to 2.5 times per year.

The main tributary of the Lake is River Moraca, having two tributaries its-self: Zeta and Cijevna/Cemi rivers. The 99 km long river flows through the capital Podgorica, drains about 32 percent of the territory of Montenegro and contributes 62 percent of the Lake's water (with a flow of 210 m^3/s). It is altered by 4 hydropower plants. Other important tributaries are

[33] The lake is sited 20 km from the Adriatic Sea

Crnojevica, Orahovstica, Karatuna, Baragurska Rivers in Montenegro, and Perroi I Thate, Rjolska and Vraka Rivers in Albania. On the west side, many small streams flow into Lake Shkoder. Two main groundwater sources can be distinguished, contributing 30 percent of the Lakes' water: aquifers in the Zeta Plain and karstic springs, mainly on the south-western side of the lake. All water inflow is precipitation-dependent. The groundwater depth on the Zeta plain near the lake is at about 8-10 m below the ground, with a flow gradient from northeast to southwest. River deposits and the lower edge of the plain have created a wide marsh belt in the north-west side of the Lake that is regularly flooded.

The 44 km long river Buna/Bojana drains the Lake into the Adriatic Sea with an average outflow of 300 m^3/s. Buna/Bojana forms the border of the two countries on the lower half of its length. The delta of the River is also shared between the two countries. Drin River, flows into the Buna/Bojana less than a kilometer from the Lake's outlet. The combined flow drains into the Adriatic Sea with a combined flow of 682 m^3/s.

The Buna/Bojana river region comprises a small and recent river delta, several different lagoon complexes and freshwater lakes, as well as typical riverine and coastal landscapes. The connection between Drin River - Buna/Bojana River - Shkoder Lake determines the hydrologic regime of the latter, Buna/Bojana River itself and their tributaries in their catchment area and has an important impact on the morphology of Buna/Bojana delta in the Adriatic Sea (Dedej Z. and Beqiraj S., 2005). The development of the whole delta complex could be described as a dynamic process based on high sediment loads from the mountainous catchment of the Drin River, the hydrographical variability of Shkoder Lake and the Drin River, and the variability of the wave activity and sea level in combination with short-term events (storm waves and tides) and long-term processes (sea transgressions).

The River has a low transport capacity for sediment due to the low gradient of its channel. As an outcome, sediments accumulate around the intake leading to frequent flooding of nearby land. The outlet has also been narrowed in recent years due to land filling for new construction.

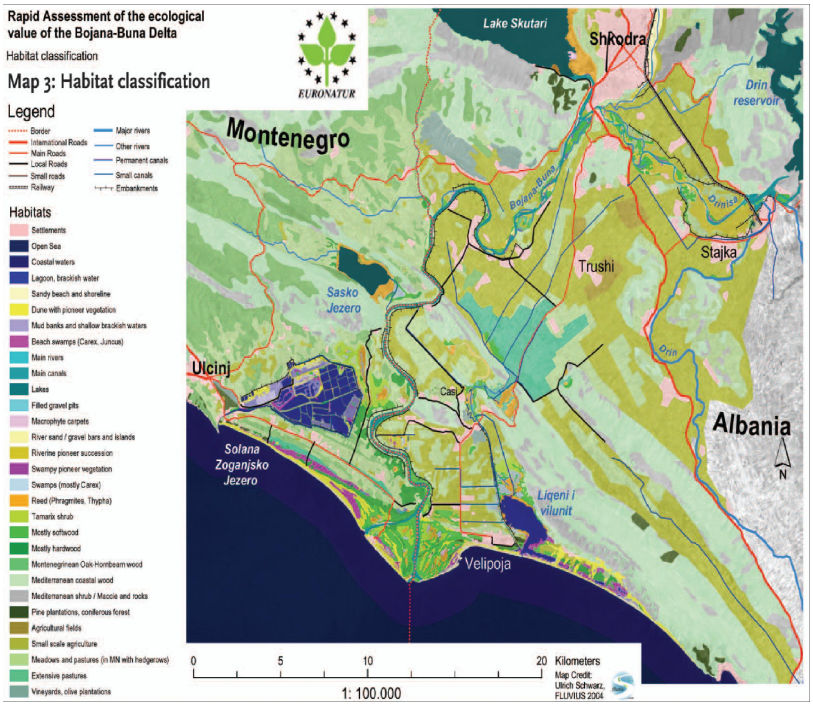
Before the intensive drainage and melioration of the area, almost 50 percent of the whole Buna/Bojana River and Delta region was regularly flooded (over 280 km^2). Nearly 90 km^2 are still regularly flooded; flooding in coastal and lagoon areas depends on regional precipitation in the lowlands.

The lake's outflow through the Buna/Bojana River is sometimes impeded due to high water levels in the Drin River. There are times that the Buna/Bojana River reverses flow hence, Drin enters the lake – the level of the lake increases significantly during this phenomenon. This occurs mainly during the period December – February but it may occur also in other months depending on the water released from the hydro-power dams that have been constructed in the Drin. The management of the dams depends upon the rainfall and the electricity demand. Floods occur most frequently and intensively in November and December. Flooding in the Montenegrin parts of the Lake (flooding is not a major issue in the rest of the country) has detrimental effects on hygiene for the local population. In some regions the surface run-off reaches figures which are about 6 times greater than the world average (World Bank, 2003b).

Groundwater is the main source for drinking water supply and is also used for irrigation purposes in the Montenegrin side. A regional drinking water supply system will transfer water from the Shkoder basin to cover the needs of several cities in the coastal area of Montenegro. According to available information, the project is not expected to have impacts in the Lake's system.

The large, geographically and ecologically connected complex system of wetlands (Lake Shkoder, Velipoja Reserve, Domni marshes, Buna/Bojana River delta and Veluni Lagoon) has been identified as one of the 24 transboundary wetland sites of international importance known as "Ecological Bricks Sites" (Europe's Environment, Dobris Assessment, 1995). The part that lies at the territories of Montenegro was included in the list of Wetlands of International Importance (Skadarsko Jezero, Ramsar site No 184, 200 km^2) in 1996. The Albanian part and the wetlands along the Buna/Bojana river, including the Viluni lagoon near Velipoja at the Adriatic coast (total area of 495 km^2), were designated for inclusion to the Ramsar List in 2/2/2006 (Shkodra and River Buna, Ramsar site no. 1598).

Figure 8. Habitat classification and land uses in the Buna River and Delta



Source: Schneider-Jacoby M. et al., 2006

The Shkoder Lake – Buna/Bojana area provides a variety of habitats supporting a high number of flora and fauna species many of which are relict and/or endemic; some are endangered. Total biodiversity is high, and the region is considered to be a biogenetic reserve of European importance. It is one of the most significant wintering sites for water birds in Europe, some of which are globally threatened e.g. Dalmatian pelican. Scientists argue about their number, to be about 25,000. Ninety percent of the bird species are migratory. The total number of known bird species in the Buna/Bojana Delta is 237. About 257 invertebrate species and 51 species of amphibians and reptiles are known until now in the area. Ichthiofauna is rich in diversity as well. The Lake supports the populations of 60 species of which the 14 (species and subspecies) is of global conservation interest; 10 species are commercially exploited. About 20 percent of fish species in the Lake migrate towards the sea. In Buna/Bojana Delta 143 fish species and sub-species have been listed by experts from Albania and Montenegro.

3.4.1. Socioeconomic situation

Coexistence of groups of different ethnic and religious background for a long period of time has influenced the history, culture and development in the region. The basin has rich cultural heritage and history of more than 2000 years.

The population in the area is about 500,000 people (65 percent of the inhabitants live on the Montenegrin side). More than 60 percent of the population is urban (this percentage has been

increased during the past 10 years) and live in a few cities - Shkodra and Malesi e Madhe (Albania) and Niksic, Danilovgrad, Podgorica and Cetinje (Montenegro).

Parts of the territories of the Podgorica, Bar and Cetinje municipalities (Montenegro) are included in the Lake Skadar National Park in which the lake and its surrounding areas fall entirely in. The total population of 40 settlements inside or at the edge of the park is about 12,500 inhabitants. Of these, only about 4 percent live in the relatively urbanized settlements of Virpazar and Rijeka Crnojevica, while the remainder (96 percent) live in rural areas. Regarding unemployment rate in the area, data varies among different authors. Some report that is high, about 40 percent higher than in 1991, and it seems to be increasing, whereas others report that is about 11 percent. Average per capita income in the Lake's rural areas is 3,500 Euro on average; the number increases in the cities with this in Podgorica being significantly higher.

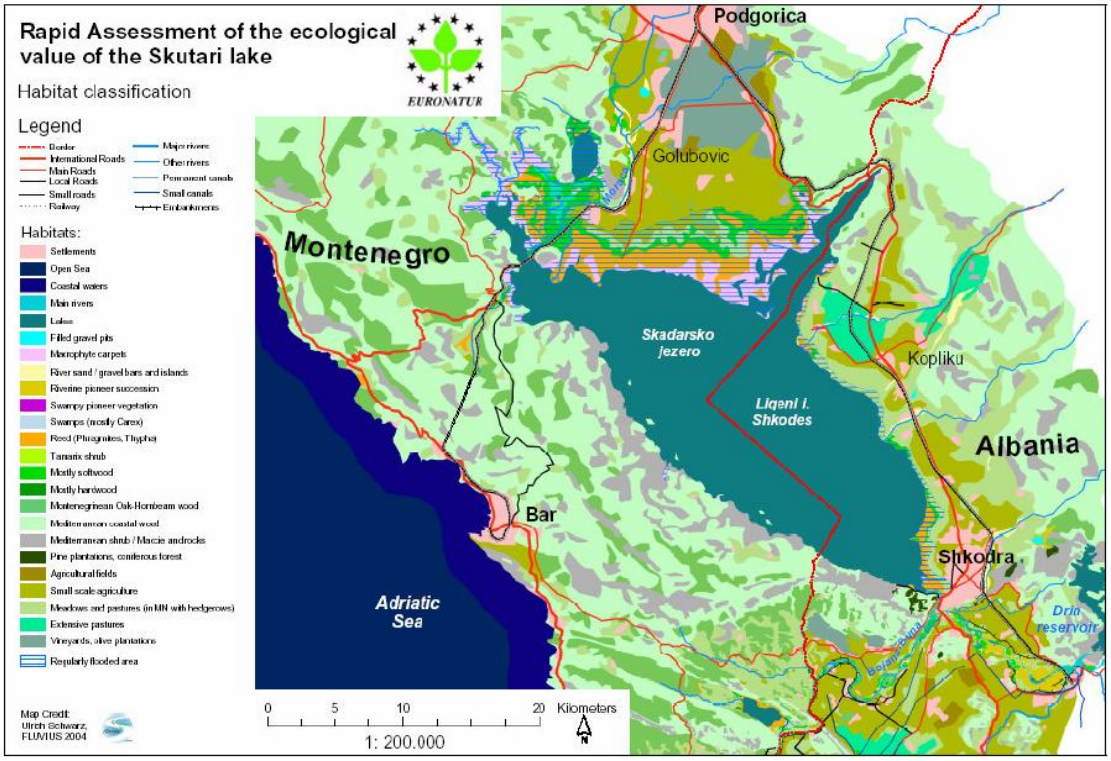
Table 14. Population of principal cities or towns in the Shkoder Lake Basin

Montenegro		Albania	
Town	**Population (estimation)**	**Town**	**Population**
Podgorica	167.000	Shkoder	110,000 (estimate, 2005)
Niksic	73,000	Koplik	14,000 (estimate, 2005)
Cetinje	22,000		
Danilovgrad	15,000		

Source: Ganoulis and Zinke, 2004 , Dedej Z. and Beqiraj S. , 2005

In Albania, the basin falls within three Regions of the Shkodra District (Shkodra, Malesia e Madhe and Puka). There are around 20 villages in the lake area and 2 municipalities - Shkodra is the only main town. From those, 10 villages with 300-1000 inhabitants are located more closely to the lake. Unemployment in the area is high. Data shows that the unemployment rate in the regions in the north of Shkodra district (Albania) is about two times higher than the national unemployment rate. This district is among the four in Albania with the highest poverty headcount, with over one third of the population living below the poverty line. The population also suffers from a lack of access to basic public services.

Figure 9. Habitat classification anf land uses in the Shkoder Lake area



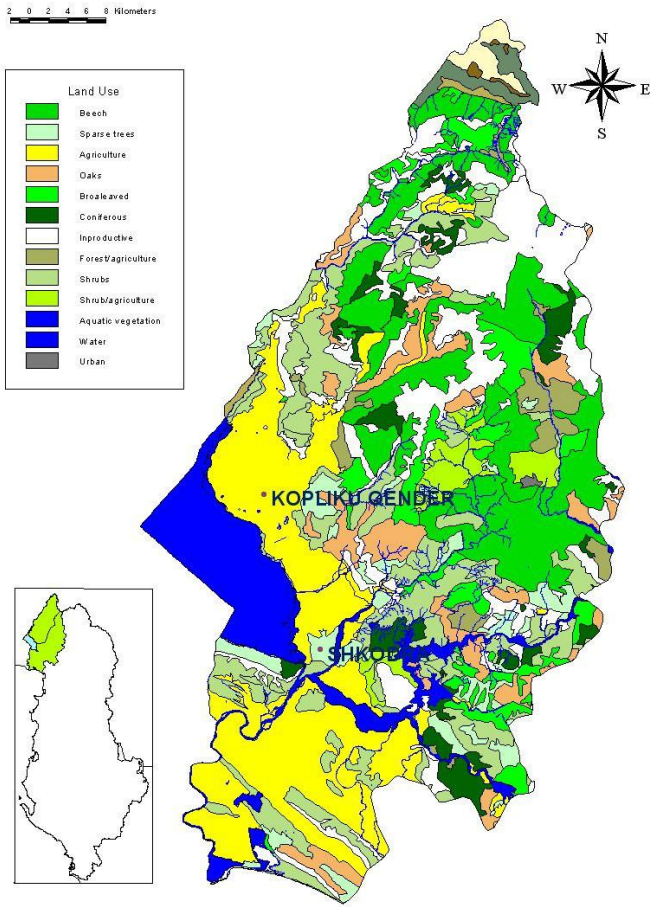
Source: Schneider-Jacoby M. et al., 2006

Both governments are trying to create the conditions for economic development in the area. Housing construction has been increased significantly, particularly on the Albanian side.

The main human activities are agriculture, livestock raising, tourism, fishery, and industry (including agro-industry).

Figure 9 shows the land use in the vicinity of the lake. In the Montenegrin part, arable land and pastures equals to the 50 percent of the area of the basin (40 and 10 percent respectively).

Figure 10. Land use in the Shköder and Malësi e Madhe districts



Land use	Area (ha)	Land use	Area (ha)	Land use	Area (ha)
Beech	80,346	Coniferous	11,389	Water	73,210
Sparce trees	14,962	Inproductive	51,680	Urban	189
Agriculture	59,844	Shrubs	41,405	Mixed	13,070
Oaks	19,371	Aquatic veg.	2,338		
Broadleaved	15,825			Total	383,629

Source: Royal Haskoning, 2006

While the tertiary sector is the most important in the cities, agriculture is an important economic activity in rural areas, exercised mainly in valleys along the Zeta River, on the plain areas around Lake Shkoder in the southwest, and near the town of Cetinje. Irrigated agriculture is limited. There are plans to lower the table of the lake in order to increase the cultivated land in the area by 140 km^2; the total area of intensively cultivated area in Montenegro now is 350 km^2. In the Albanian part, 13 percent of the land is used for agricultural activities while the 64 percent is forests, pastures and abandoned land. Figure 10 shows the land use on the Albanian side of the basin, which lies within the Shkodër prefecture. Agriculture is the main activities also here and so is livestock raising. Fifty (50) percent of the agricultural land is used for fodder. Practically "non-mechanical" and "chemical" agricultural activities are exercised since not all the farmers can afford to invest on mechanical equipment or use fertilizers and pesticides. Combined with lack of irrigation and drainage system and the fragmentation of land it has as an outcome low production hence, low income for the farmers. The share of stockbreeding (in economic terms) in the agricultural production equals to 50 percent; public owned pastures are used for this purpose as well.

Heavy industries exist in the Montenegrin part of the basin. These contribute to the pollution load of the water bodies and use a significant amount of water resources; the Aluminum Plant

Podgorica (KAP) uses about 2,000 m^3/h water from Moraca River and 3,000 m^3/h from 8 wells.

According to the Social Assessment for Lake Shkoder, 20 percent of households in the lake area derive their annual income from tourism[34] related activities; a growing proportion of the local population is involved in tourism-related enterprises. At present, however, tourism is growing rapidly in the Lake Shkoder area in an unplanned and unregulated way which makes it an increasingly serious threat to the lake. In Montenegro, excursive tourism in the national park is the main form of tourism; tourists from the sea coast visit the lake (the number for tourists was 15,500 in 2005 and 7,000 in 2006). Accommodation capacity is modest; there are 3 hotels and a number of rooms are offered for rent – most commonly these are non-registered. Twelve hotels and 350 beds is the accommodation capacity in the Shkodra town, in the Albanian part. Tourism has been developed mainly in the west part of the basin near the delta of River Buna/Bojana. Tourist settlements are of small and medium size, but in some specific areas, like Velipoja coast in its northern part and toward Viluni lagoon in the west, tourist settlements are hugely expanding.

Fishing is an activity exercised by less than 15 percent of the families of the coastal zone villages in both countries, mainly in the lake. Decrease in the commercial fishes stock and competition by illegal fishermen has an impact to the fishermen's income.

3.4.2. Pressures and impacts

Unsustainable management practices pose a threat to the basin and the water bodies' environment. The quality of the water of Moraca is in general in good condition from its sources up to Podgorica; it gets worse downstream. Available information suggests that a well defined pollution trend has not been established for the lake due to the lack of continuous data. The same information suggests though, that water quality has been varying in space and time. While pollution (heavy metals, PAHs, PCBs, etc.) has been observed in the period prior to 2000, in the most recent analysis made the water quality seems to be improved. Moderate or high concentrations of heavy metals and nutrients have been monitored at specific sites of the lake while, during periods of high water levels in its tributaries, pollution increases and water quality worsens. Nevertheless, in general, the quality of the lake's water is considered to be reasonably good due to the high refreshment rate (2-3 times per year), the inaccessibility of the higher parts of the catchments and the sharp reduction in inflowing industrial effluents and agricultural run-off (owing to collapse of industries and large agricultural enterprises in the basin). Generally speaking, the Lake Shkoder is in better environmental condition than the Prespa lake (*Skarbøvik E. et al, 2008)*. Buna/Bojana's water quality seams to be in the same generally good condition of the Shkoder Lake. Incidents of high nutrient values correlate with the discharges of waste water form Shkodra town.

Heavy metal pollution on sentiments on specific sites of the water bodies have been observed in some cases. Available information suggests that the pollutants reached the lake in the past

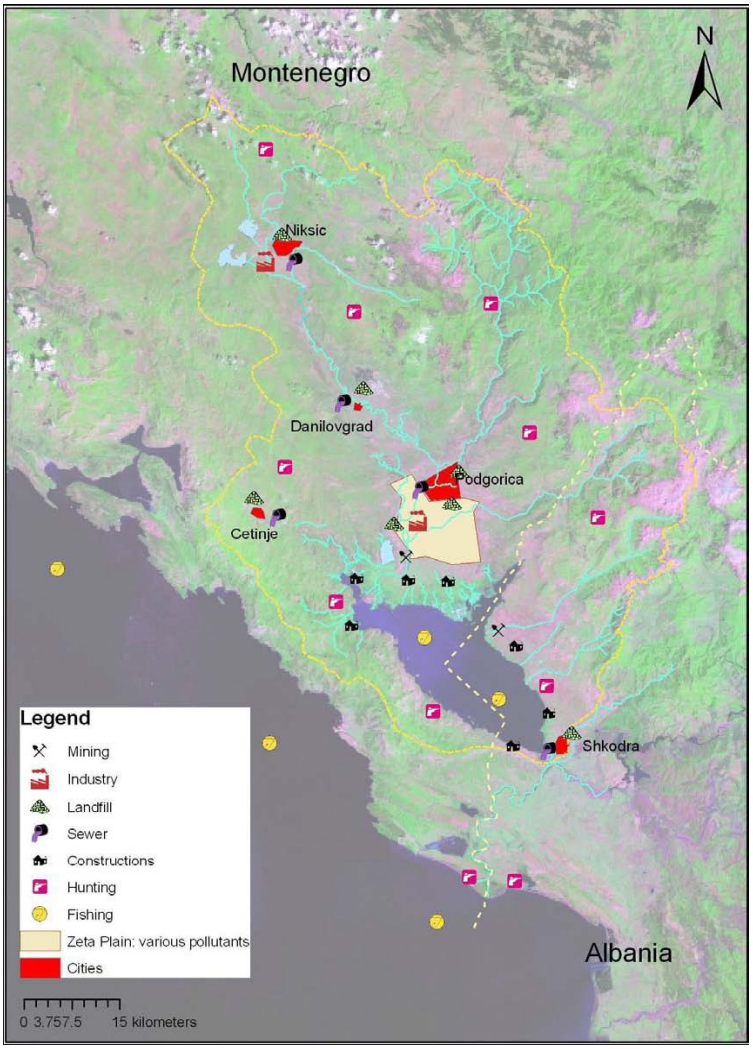
[34] Tourism is proposed to be a major economic driver. For example, the Montenegro Master Plan for Tourism Development designates Lake Skadar as a tourism development zone, with cultural tourism and sailing, walking and fishing as the main potential attractions. Similarly, the Strategy and Action Plan for the Development of the Albanian Tourism Sector Based on Cultural and Environmental Tourism (2005) outlines a new orientation towards cultural and environmental tourism with an emphasis on nature and cultural heritage. The Strategy of Economic Development of Shkodra Municipality (2005) identifies tourism development as a priority strategic objective and sets out action plans for eco-tourism development based on the lake and cultural attractions. However, to achieve these objectives the current trend of uncontrolled construction of residences, restaurants and other facilities along the lake shore will have to be replaced by well planned development and effective regulation. The challenges are similar to those of the coastal areas in both countries, but at a less advanced and perhaps more manageable stage. (World Bank, 2007)

seem to have been accumulated in the sediments (different sampling points present varying concentrations of pollutants) posing a potential risk for the lake's ecosystem.

Pollution in the basin is mainly generated in the Montenegrin part. The Moraca and Crnojevica Rivers are the main ways of entry of pollutants into the lake; these rivers and their tributaries have been common places of disposal for poorly treated wastewater from cities, communes and industries. For instance in Podgorica, the wastewater treatment plant has a capacity to treat only about the 50 percent of the city's wastes. Wastewaters in Cetinje and Niksic are discharged in open drains without any treatment. Shkodra city area appears to be the main source of pollution from the Albanian side. The majority of sewage generated in Shkodra city and the lakeside villages and communities is discharged untreated into the lake or small tributaries of the lake as well in Drin River and some into the Buna/Bojana River.

The Drin contributes, to some extend, to the pollution in the lake with trace metals originating from the disposal of iron and copper mines (situated up-steam) by-products.

Figure 11. Indicative location of the main pollution sources and pressures in the Shkoder Basin



Source: Royal Haskoning, 2006

Due to the karstic geological formations, agricultural and industrial wastewater pollution enters the lake through groundwater e.g. wastewater from Cetinje drains through sub-lacustring springs in the west side of the lake. The pollution coming from the Zeta Plain[35] through groundwater is rather important. The inappropriate technologies for aluminum and metal processing, in industrial sites in Montenegro i.e. the KAP and the Steelworks Niksic, as well as the improper storage of toxic waste, has been causing pollution of groundwater (as well as the Moraca river through the Bistrica and Zeta rivers in the case of Steelworks Niksic) with a range of toxic substances that includes alkaline hydroxides, fluorides, PCBs, PAHs, phenols, mineral oils, cyanides, heavy metals etc.

[35] Zeta Plain, includes a confluence of the rivers Moraca, Zeta and Rijeka Crnojevica, and is the most polluted area of Montenegro due to the concentration of population and industry.

Agricultural activities are exercised in the lower part of the Zeta Plain and the east side of the lake. Agricultural run-off is an important source of nutrient and pesticide (although the use of the latter is low) pollution. The concentrations of the nutrients in the northern and north-west part of the Lake and near the entry points of the Moraca are higher than in the southern part. Eutrophication characteristics are evident in these parts of the lake.

Insufficient solid waste management in both countries[36] has led, in many cases, to the use of lakeshore, canals, and river banks as convenient sites for illegal disposal of wastes. In Albania only 50-70 percent (figures as for 2005) is deposited in official waste disposal sites. The landfills used in both countries lack environment protection systems. Efforts are undertaken to address the aforementioned issues[37].

Deforestation –illegal logging and tree cutting for fuel wood are common practices in the basin, including in protected areas and especially in the Albanian side– favors erosion and thus increases transportation of soil and sedimentation. Over-grazing that has caused degradation of the mountain pastures on both sides and sand and gravel extraction further contribute to the problem. In Albania, sand and gravel is extracted from two streams between Shlkodra and Hani I Hoti while in Montenegro in the Moraca riverbed in an area between Podgorica and Shkoder Lake.

Box 4. Main reasons for the fish stock degradation in Lake Shkoder

- Water regime disturbances along the migratory routes;
- Destruction of the reproduction sites;
- Increased fishing as a result of the growing populations in coastal settlements and growing tourism;
- Uncontrolled fishing especially of the most economically valuable species;
- Sedimentation in the Buna River and manmade barriers for fishing purposes along the migration routes to the Adriatic Sea;
- Introduced species (1/3 of the species and subspecies of the lake are alocthone);
- Potential toxic contamination;
- Habitat alterations.

Land reclamation for agricultural purposes and illegal hunting are important factors that have led to the decrease of biodiversity. The Lake shores in the Albanian section have been heavily modified and have lost part of their original natural value. Particular concerns revolve around the bird populations that use the Lake for wintering or for breeding.

Uncontrolled development is an issue being an important reason of deterioration of the shoreline habitats causing also further implications in the Lake. Illegal construction exerts pressures on the immediate shore zone - most of the new constructions are very close to the Lake. The problem is bigger in the Albanian side - 32 percent of the population of the area lives in illegal settlements.

Unsustainable legal and illegal hunting and fishing practices used exerts pressure in the ecosystem of Shkoder Lake and the Buna/Bojana River and delta. The first has affected the birds and mammals populations. There are violations with regard to both the hunting period

[36] Shkodra city has an established (though inadequate) waste collection system; such systems in villages and communes on either side of the lake are absent.

[37] An amount of 130 million ALL is planned to be spend for the first phase of a project for the construction of a solid waste landfill for Shkodra Region (at Bushat) in 2008; the second phase is planned for 2009. The landfill will be processing 47,000 ton waste/year of urban solid waste in a sanitary and controlled manner, following the requirements of EU directives. The closure of the existing solid waste dumpsite in Shkoder is planned for 2010; the relevant feasibility study and detailed design is planned for 2009. The estimated cost is 520 million ALL. The IDA-financed Montenegro Environmentally Sensitive Tourism Project (MESTAP) is funding two regional municipal solid waste landfills, one of which covers Bar municipality which borders the Shkoder Lake. KfW and ADA will support the construction of a sewerage system and treatment facilities in Shkodra Municipality. The European Agency for Reconstruction (EAR) will financially assist Montenegro with the rehabilitation of an existing wastewater treatment plant for Podgorica.

and the protection status of areas. The exact impact can not be assessed since data on the status of several fauna groups are limited, due to the lack of a regular and coordinated monitoring both at national and transboundary levels. In Albania, hunting, also during the hunting ban area, seems to be also a tourism related activity.

The latter concerns over-harvesting of commercial species and the use of non-discriminatory and destructive fishing methods (including explosives and high voltage electrical shock). These in combination with the reasons indicated in Box 3 have caused fish stock degradation both in the Lake and the Buna/Bojana River and Delta. The commercially valuable fish populations have declined in favor of less valuable species and there was also a significant decline on migratory fish in the overall production.

Interventions in the watershed, especially in Drin River, is the main reason for the high oscillations in the lakeshore causing an unstable situation and frequent alterations of the habitats. This situation is directly reflected in the state of flora and fauna, as well as in the agriculture and microclimate for the local communities around the lake.

The effects of economic development proposals in both countries -involving alternative uses of the waters and the water bodies[38]- on the lakes-rivers-wetlands-groundwater system need to be clearly understood before any decision is taken. The interventions could potentially seriously affect characteristics of the system, such as the lake level, groundwater regime, lake flushing, pollution buffering, water temperatures, fish migrations, etc.

[38] These include hydropower development of the Moraca River and dredging of the Buna/Bojana River, lowering the water table (up to 1.5 m), converting a substantial portion of the lake on the Montenegrin side into dry (proposed agricultural) land. This dredging would also potentially open up the river as a passageway for larger boats to pass from the Adriatic to the lake.