



## **How to Plan a Sustainable Fishery When Environmental Goals Conflict with Existing Practices in a Trans-Boundary Protected Area**

Spase Shumka<sup>1,\*</sup>, Iain Wilson<sup>2</sup>, Spiro Grazhdani<sup>1</sup>

<sup>1</sup>*Agriculture University of Tirana, Albania;* <sup>2</sup>*Rr. Dibra, No. 261/1, PO Box 8291, Tirana, Albania*

*Received November 20, 2008; Accepted March 2, 2009*

**Abstract:** Concerns over the relationship between environmental protection, prevention of loss of biodiversity and protection of habitats and of internationally important species of flora and fauna on the one hand and sustainable economic activities and recreation in a protected area on the other can all be dealt with effectively by appropriate regulatory and policy measures, particularly with the support of local actions that strive to preserve local biotopes and conditions. The aim of the present paper is to provide information on the current situation of the fisheries on the Albanian side of the lakes Macro and Micro Prespa, along with the existing practices and regulations, and to offer views from an Albanian perspective that will help resolve some of the current difficulties. In doing so this paper also presents to a wider public the economic, ecological and evolutionary importance of these lakes. The fish fauna of the Prespa lakes comprises 23 species or forms of species (Society for the Protection of Prespa, 2003), of which five are endemic to Prespa and another two are endemic to the Balkans. This level of biodiversity and endemism makes these lakes special by any standards. Fishing is one of the main economic activities in the area. On the Albanian side some 100 fishermen from the villages around the lakes regularly fish these waters. Unfortunately, their activities are disorganised and carried out on an individual basis, while half of them fish informally, i.e. without a licence. The water and fishery policies and practices applied in Albania over the last fifty years have negatively affected the region's biodiversity in general and its fish species in particular. Lake Micro Prespa especially has suffered substantial, though reversible, damage from a policy that turned this internationally important lake into little more than a reservoir for the local, albeit nationally economically important, irrigation system. It is very important for the future of the species found in the Prespa region, as well as for the communities that depend upon them, to strive, through best practices, analysis of policy and positive actions of trans-boundary cooperation, to improve the current situation. Some remedies are presented in the present paper.

**Keywords:** *Fishery, Prespa Lake, Sustainable development, over fishing, biodiversity,*

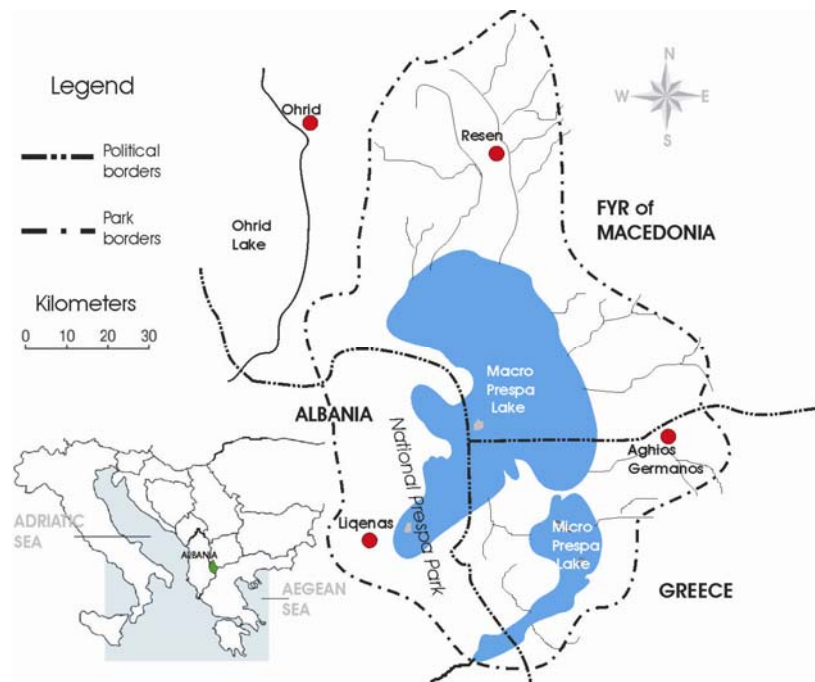
### **Introduction**

During the long period of the country's political isolation up until the end of the twentieth century, freshwater resources in Albania were used primarily for electricity production and as supplies for irrigation and potable water. During the 50 years of communism that ended in Albania in 1991, the availability of water supplies for domestic consumers and agricultural and industrial production was largely ensured by diverting natural water flows into reservoirs and smaller storage facilities. The motto 'not a single drop of freshwater should reach the sea' was adopted as a strategy by the country's policymakers and as a standard against which to measure the level of water infrastructure and efficiency of use. This strategy encapsulates worldwide concerns over whether it is possible to maintain both environmental protection, prevention of loss of biodiversity and protection of habitats and of internationally important species of flora and fauna on the one hand and sustainable economic activities and recreation in a protected area on the other. However, such concerns can all be dealt with effectively by appropriate regulatory and policy measures, particularly with the support of local actions that strive to preserve local biotopes and conditions.

---

\* Corresponding: E-mail: [sprespa@yahoo.co.uk](mailto:sprespa@yahoo.co.uk); Tel: +355 68 2351130; Fax: +355 4 249571

Albania's freshwater fisheries are spread across much of the country, and comprise a mix of private and public property, the latter of which includes the large public reservoirs and the country's major lakes. Albania has many natural lakes and often these are connected to irrigation systems, comprising some 670 canals irrigating a combined surface area of about twelve thousand hectares. During communism, these lakes were important for the country's aquaculture industry but following the collapse of the system, of government and of the economy, the lakes are currently regarded as under exploited (Directorate of Fishery Policy at MoEFWA). Many problems exist concerning the re-establishment of lake fisheries in the form they were in prior to 1991, and they may never recover their former importance. Nevertheless, they may yet play an important role in the development of a domestic market for fresh fish products, creating economic opportunities for poor rural areas.



**Figure 1.** Location of Prespa Lakes

The three major natural lakes (Ohrid, Shkodra and Prespa) that lie in the territory of Albania are all shared with other countries, and all are of tectonic origin. The Albanian government has set quotas for the annual stocking of these lakes with millions of fry and fingerlings. Breeding stocks of common carp are taken from the respective lake to produce the fingerlings used to restock it. Despite such management, there has been a decline in fish populations in the lakes, particularly those of Prespa and Ohrid, mostly as a result of over fishing and the illegal methods sometimes employed, such as the use of dynamite; the country's unstable long transition to democracy has aggravated such problems.

In addition to these large lakes, there are some 6,000 small reservoirs in Albania, covering between them a total surface area of 2,700 ha. In addition to providing a source for irrigation, these reservoirs have provided the means for the development of a large extensive aquaculture sector and production of Chinese carps (particularly silver carp and big head carp), at one time ranging from 500 to 800 ton/year; the current estimated production is about 200 ton/year.

Under Albania's current circumstances the whole of this economic sector is suffering from (a) a lack of maintenance and funds, (b) damage to some dams, and (c) problems related to agricultural structure, land distribution and policy.

Until 1990, central government, the owner of all the country's fish farms, comprising a total surface area of 215 ha, took responsibility for restocking the reservoirs, both natural and artificial. The most important species stocked were Chinese carps (*Hypophthalmichthys molitrix*, *Aristichthys nobilis*, *Ctenopharyngodon idella* and *Megalobrama amblycephala*), common carp (*Cyprinus carpio*) and the trout of Lake Ohrid, koran, *Salmo letnica*. After 1990, given the limited public funds available, only the restocking of natural lakes was taken on, while individual or groups of fishermen stocked the reservoirs.

The Prespa region (~41°N, ~23°E) is located on the borders between eastern Albania, Greece and the Republic of Macedonia. It is a high-altitude basin and includes two connected lakes, Macro Prespa and Micro Prespa and the surrounding mountains. Lake Macro Prespa (surface area 253.6 km<sup>2</sup>) is divided among the three states, while Micro Prespa Lake (47 km<sup>2</sup>) is shared between Albania and Greece. The smaller lake has a maximum depth of 8.4 m, collecting water from a granite and karstic catchment 189 km<sup>2</sup> in size, including snow-capped mountains that rise to more than 2,000 m. There has been considerable human modification of the local hydrology with the diversion of the Agios Germanos stream from Micro Prespa to Macro Prespa on the Greek side and of the River Devoll into Micro Prespa on the Albanian side.

The two Prespa lakes are situated at an altitude of 850 m above sea level and have a combined drainage basin area of size 2,519 km<sup>2</sup>. The highest peaks of the surrounding mountains reach 2,600 m, with the Baba Mountain Range bordering the lake basin to the east and with Pelister Mountain as its highest peak. To the north, Plakenska (1,998 m) and Bigla (1,656 m) dominate the landscape, while on the Greek side, Lake Micro Prespa is bordered to the south by the Triklarion Mountains, rising to 1,750 m.

Until the 1980s, the hydrological conditions in these lakes were excellent for natural reproduction of native species, including for example *Chondrostoma nasus prespensis*. However, subsequent interventions have impacted the natural reproduction of this endemic subspecies, probably as a result of the decrease in the level of water that has taken place in the Prespa lakes as well as the loss of habitats. The most economically important fish species in Prespa are cyprinids, including bleak (*Chalcalburnus belvica*) and carps (including Chinese species introduced widely into Albania in the 1960s and 1970s during the flourish in relations with that country). In another, but man-made, lake, the hydro-electricity reservoir of Fierza (of size 5,000 ha), two other species with natural European distributions were also introduced at the beginning of the 1980s: pike perch *Sander lucioperca* and perch *Perca fluviatilis*.

Fishing is one of the main economic activities of the Prespa area. At the moment, there are some 100 fisherman from the Albanian villages who fish the lake. However, they are not organised and their activity is carried out on an individual basis. Moreover, half of these fishermen are not licensed.

High value fish caught locally are, in decreasing order of percentage of catch (Table 1), common carp, bleak, the endemic nase (njila e Prespës, skobust or sirtari: local names, Albanian, Slavic and Greek, respectively, of *Chondrostoma nasus prespensis*) and endemic barbel (mërena e Prespës and prespanska mrena: Albanian and Slavic, respectively, for *Barbus prespensis*). Before 1990 about 200 tons were caught each year, but the recorded catch has been falling ever since (Table 2). The whole produce is destined for the local market. There is one local hatchery, in Zagorcan that produces carp fingerlings, and has a working capacity of 300,000 fingerlings per year. There are no storage facilities on the lakeshore and no processing machinery.

**Table 1.** Percentage contribution of different fish species to total annual catch

Common name	Contribution to catch (%)
bleak	80
common carp	8–10
nase, barbel	10–12

Source: Fishery Policy Directorate

**Table 2.** Structure of fish yield in Prespa lakes over 15 years, from 1981 until 1995

Years	Yield (kv)	Total yield	Yield kg/ha	Total yield
1981–1986	22,415	2,241.5t	112	112*30 = 3,360t
1987–1990	12,177	1,217.7t	60	60*30=1,800t
1991–1995	6,933	693.3t	34	34*30=1,020t

Source: Fishery Policy Directorate

In 1976, the River Devoll was redirected into Lake Micro Prespa as a means of compensating during winter for the large amount of water used for irrigation in the rest of the year. Unfortunately, the filtering system was inadequate and subsequently the lake has silted up with a huge amount of solid material brought in from the surrounding mountains. The consequent colonization of open waters by emergent vegetation in the southern end of Micro Prespa, in Albania, has been spectacular. From 1984 to 1991, the colonisation was eleven ha/year, and this continued from 1991 to 1994 at a rate of thirteen ha/year. However, between 1994 and 2001, a decrease of 4.1 ha/year was observed. Direct observations in the field made in 2005 confirm that this downward trend continued from 2002 to 2005 (Crivelli, 2006).

### Policy framework in the fishery sector

The legislation in the field of fisheries is based on both the exploitation of fish resources in a responsible way and the development of the sector. Fishing activity is regulated by Law No. 7908, dated 5.4.1995, 'On Fishery and Aquaculture', by Law No. 8763, dated 2.4.2001 'About the supplement on the law No. 7908, dated 5.4.1995, 'On Fishery and Aquaculture'' and by Law No. 8870, dated 21.3.2002 'On amendments to Law No. 7908 dated 5.4.1995, 'On Fishery and Aquaculture' and Regulation No. 1 in implementation of this law''.

The general principle of this Legislation is to support the FAO Code of Conduct for Responsible Fisheries. The laws prescribe the functions of central and local consultative organs, scientific research, the manner of practise of fishing or aquaculture activities, or both, the management of lagoons and the manner of control. It also includes contraventions, sanctions and responsibilities.

Theoretically, there is good coverage of all relevant issues in the sector and EU guidance in drafting the new legislation has been successfully adopted.

### Water policy

The National Water Strategy (Ministry of Agriculture and Food, 2001) promotes water resource conservation and the sustainable use of water resources in harmony with the environment and other natural resources. It defines the national objectives of water uses and water resources management, as well as the appropriate institutional structures for implementing the strategy.

The 1996 Law No. 8093, 'On Water Resources' is the main legislation on water resource management in Albania. This law established the National Water Council (NWC) and its Technical Secretariat, as well as other water institutions in place today. It provides for the protection, development and sustainable use of water resources, and organizes water resource management and administration by river basin according to its uses and purposes. It introduces permits, concessions and authorizations for use of water and for discharging waste water. Although this Law is concerned with controlling and preserving the quality of water resources, it does not define very strict conditions for the discharge of pollutants. Meanwhile, there are no regulations for securing minimum water flow for the lakes or for collecting waste, in contrast to the USA 1972 Clean Water Act and the 1973 Endangered Species Act (Tarlock, 1997).

The Law 'On Water Supply and Sanitation Sector Regulation' (No. 8102) was also issued in 1996. This Law is concerned with securing a safe and reliable drinking-water supply and domestic waste-water treatment, and promoting private investments in the sector. The Law on the Construction, Administration, Maintenance and Operation of Water and Drainage Systems (1994, No. 7846) concerns the irrigation and drainage systems. Its implementation is under the responsibility of the Ministry of Agriculture and Food. The 1999 Law for Irrigation and Drainage (No. 8518), which updates the Law of 1996, essentially provides for the decentralized management of irrigation and drainage infrastructure, and paves the way for their privatisation or for concessions and management by water users' associations.

Starting in January 2002, the Law 'On the Organization and Functioning of Local Government' (2000, No. 8652) gives full administrative, service, investment and regulatory powers for water supply, sewerage and drainage systems and flood protection canals to local governments (municipalities and communes). This increase in responsibilities also requires that local administrations should improve their capacity for water management and urban planning. International organizations and the European Union are helping Albania to face this challenge.

### *International agreements*

Albania has been a Party to the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution and to four of its protocols since 1990. Albania also ratified the UNECE Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes in 1994, and signed its London Protocol on Water and Health in 1999. Further development of bilateral agreements on Trans-boundary Rivers is the task of the NWC, but no significant action has yet been taken.

### *Institutions*

According to the 1996 Law on Water Resources, the management of water resources is as mentioned above entrusted to the NWC, the former Water Authority and its Technical Secretariat (implementing body) at the central level, and to water basin authorities at the local level. As many strong sectors were benefiting from free use of water, the NWC was set up at a very high level to ensure that it had sufficient powers.

In 1998, the NWC delineated the boundaries of six river basins: Drin–Buna, Mat, Ishëm–Erzen, Shkumbin, Seman and Vjosë. Two years later, a decision called for the establishment of a water basin council and implementing agency for each of these six basins. However, this decision has never been implemented.

### **Prespa Park and the aim**

Prespa Trans-national Park was established through a joint Declaration of the prime ministers of Albania, Greece and FYR of Macedonia in Agios Germanos, Greece, on the occasion of the World Wetlands Day, on 2 February 2000.

The formulations of the Strategic Action Plan for the Conservation of Prespa Park (Society for the Protection of Prespa, 2003; Shumka & Roumeliotou, 2004) state that Prespa Park 'is a means, additional to those already available, that enables actions, functions and initiatives with a spatial perspective for the entire Prespa region. Its main aim is the preservation of the valuable natural and cultural characteristics of the whole of Prespa through management methods and development initiatives that enhance the standard of living of its inhabitants, as well as to promote peace and friendship among the three peoples, and lead to economic and social prosperity and convergence.'

Following the initiatives of the Prespa Park Coordination Committee (a body initiated and created by the Ramsar Convention and respective governments) the Strategic Action Plan for the conservation of Prespa Park was prepared and approved.

### Practices and impacts on ecology of the lakes

The development of irrigation and drainage schemes was pursued aggressively in Albania during the 1970s and 1980s and for which a series of design standards and criteria were prepared. The main source of water for irrigation of the main crop production in SE Albania was based upon Lake Micro Prespa.

Surface irrigation from tertiary canals was predominantly undertaken via a *brazda* canal system. In the original design a tertiary canal usually supplied up to four channels at a time as part of a 16-day rotation system, but this practice is largely discontinued and application is arranged on an ad hoc basis.

Where the *brazda* channel system is employed, individual plots are arranged typically in a size of approximately 200 m in length by 20 m in width, with the canal running alongside a central ridge. The land slopes down from the central ridge to a small field drain on either side. As water passes along the *brazda*, the farmer irrigates the land on either side. When the plot has been irrigated, the gate in the tertiary canal is closed and water diverted to another plot. This system of irrigation suits small land holdings but efficiency of water application may be very low if the farmer is not in continuous attendance.

### *Diversion of River Devoll into Lake Micro Prespa*

In the mid-1970s, Albanian authorities planned an irrigation scheme that would use water from Lake Micro Prespa for irrigating arable land in a region of size about 22,500 ha. The authorities calculated that if they used the difference in water level from between 852.5 m to about 850.2 m a.s.l., they could access about 90 million m<sup>3</sup> of water for irrigation. To make up for this loss, in 1976 they opened a supply channel to feed Lake Micro Prespa from the River Devoll during winter.

At the point where a canal from the River Devoll feeds into Lake Micro Prespa, authorities opened a second channel (running at a lower level) that allowed free flow of water from the lake into a lower part of the river. During summer months, authorities planned to open the same gate so that clean water from the lake would freely flow into the second channel providing freshwater for the river and the irrigation scheme. Thus, this lake, of global importance, was to be used as a common, but massive, irrigation reservoir.

The authorities also constructed a decanter, so that river sediment would not pass into the lake. However, the project was badly located, poorly planned and failed right from the beginning.

In the early years, once the irrigation scheme was implemented, about 80–85 million m<sup>3</sup> of free-flowing water was available for agriculture. During subsequent years, however, providing water from Lake Micro Prespa became more and more difficult: Just less than four million m<sup>3</sup> water from the lake was available during the year 2000, but even this amount was not obtained through free flow but instead had to be pumped electrically to the irrigation canals. It is now obvious that an alternative irrigation system has to be designed.

### *Environmental impacts*

Since the time some 40 years ago when the natural flow of the River Devoll was diverted, the river has constantly poured silt-laden water into Lake Micro Prespa during winter, transforming it into a muddy swamp. Although the decanter had been constructed to prevent sedimentation in the lake, the work was done poorly and improperly maintained. The river carries alluvium of very small size. Water ought to flow through the decanter several times slower than initially planned, allowing small particles to sediment. Such water ought to stay in the decanter for nearly four hours, instead of the 10 to 20 minutes that was typical once the project was initiated. Moreover, for several years now, the decanter has not functioned at all.

Currently, all that remains of the facility are a few scattered concrete blocks, and the water flows at nearly the same pace as the river. Under such circumstances, Lake Micro Prespa, especially the Albanian part, has simply become a huge natural decanter for river-borne silt.

We collected samples from the irrigation system. Analysis shows that most (47–53%) of the sediment in the lake is loam, followed by clay (23–29%) and then sand (14–23%). Chemical analysis found that the enrichment ratio, calculated as a ratio between the concentration of phosphorus in the particulate matter found in the runoff and that found in the source soils, is 2–3.5 for sediment 10 m from the dam and more than 3.5, 50 m from the dam. Analysis of the latter samples found that P is transported not only in soluble form (as in the case for the sediment 10 m from the dam) but also bound to finer-sized soil particles.

Data from the Regional Department of Water indicate that roughly 40,000 m<sup>3</sup> of alluvial sediment (about 60,000 tons of solid matter) are deposited annually in Lake Micro Prespa. Therefore, in the time since it has been diverted, the River Devoll has deposited some 1.2 million m<sup>3</sup> of alluvium in the lake, covering all the shallows and shores and blocking the inflowing underground freshwater sources, as well as the natural mechanism for water circulation. Alluvial sediments are particularly heavy at the point where the river flows into the lake, with a thickness of more than one meter, with the sediment found up to 1.5 km from this point.

The flow of the River Devoll has drastically reduced the quality of water in the lake. At one time the stony bottom could be seen clearly from the surface several meters above. Currently, the water is brown in colour, and visibility is just a few centimetres. Clean karstic waters flowing into the lake through limestone channels is mixed with the muddy waters of the river, changing the natural water supply system.

Intensive agriculture is another activity that has had a major impact on the area's water resources. Livestock grazing (mostly by goats and sheep) inside the already heavily denuded mountain woodlands has caused widespread soil erosion and compaction, prevention of natural tree regeneration and removal of the water-retaining vegetative ground layer. Support for this view is provided by local inhabitants who report that local potable water resources are diminishing. Moreover, this practice has reduced the habitat available for the region's native populations of bear and wolf, both threatened in Europe.

The hydrology of Micro Prespa Lake is a major factor in controlling the wetland ecosystems of Prespa with its internationally important avifauna, which includes the world's largest breeding colony of Dalmatian Pelican, and significant fish populations. Diverting the River Devoll into the lake has caused a reduction in both depth and surface area of the lake with land surface expansion, decreasing the carrying capacity of the lake and changing its species composition. The Albanian part is currently heading towards complete eutrophication.

There are at least five fish species or forms of species endemic to the Prespa lakes. Despite this indicator of ecological importance, fish populations have suffered over the last thirty years as a result of the habitat changes and over-fishing. The deposition of alluvium over the past 40 years has had a devastating impact on fish species, affecting both fish stocks and species composition. While annual fish harvests once reached 500 kg/ha during the late 1960s, they have since declined drastically, so that by the beginning of the 1990s the catch in Albania dropped to 114 kg/ha.

Local residents have noticed a drop in economically valuable fish species but also an increase in less valuable species. Thus, until the 1960s, carp (*Cyprinus carpio*) accounted for about 55 per cent of yields on average, while after the 1980s, the species accounted for merely between eight and ten per cent of the catch. In contrast, invasive species such as *Lepomis gibosa*, *Carassius* sp., *Silurus glanis*, etc., have thrived in the relatively new conditions of the lake, while the large deposition of alluvium and changes to the vegetation, with a near-complete cover of reed beds, have damaged the native fish populations. With the reed beds now very dense and the level of inflowing clean fresh water very low, carp are unable to find flooded meadows, their favourite spawning grounds.

## Fisheries

Until 1991, the fishery sector of the Prespa lakes fell under the administrative responsibility of the state enterprise NRZP Korça. This structure was organised into two groups, concentrated on Gorica and the Liqenas villages. Fishing activity in the lake started as an organised activity in 1948. In the 1960s, new developments were introduced, including improvements in fishing techniques and the use of fingerlings to enrich fishery production in the lake. After 1965, improvements in fishing equipment were introduced: cotton nets were substituted by synthetic nets, and vessels were equipped with engines of up to 80 hp, while for the first time fishing was carried out at night.

### Current situation

At present there are around 100 fishermen active on the Albanian waters of the Prespa Lakes, of which only 50 are licensed. They use small wooden boats, with a total of 76 boats among them, 39 of which are without an engine and 37 have an outboard motor, of 5–15 hp. Synthetic nets of a range of sizes are used to catch carp, nase and barbel (see Table 1); special nets are used for bleak. There are no storage facilities on the lakeshore, nor are there organised means of transport, so all the fishermen sell their catch locally.

The fish are caught in the lakes by the following methods (see Table 3):

- Nets*. The legal net mesh size is 22–36 mm. Fishing with nets includes selective fishing, where nets are set in a circular pattern, or as corridors, where the nets are set out in a line.
- Lights*. This is a specific kind of fishing and is used only for bleak. It is carried out at night with lights and targets the diurnal vertical migration of the fish. Fishermen use specific nets to catch a shoal of bleak at a time attracted by the lights.
- Hooks*. Hooks are used to catch the larger individuals, but this method is now rarely used and its contribution to the total catch is low.

The traditional, sustainable method of fishing, used from time immemorial, called by locals, *namet*, *llovishte*, etc., has been virtually abandoned and is used only rarely.

**Table 3.** Contribution of fishing type to total annual catch

Type of fishing	Contribution to total catch (%)
Nets	50
Lights	40
Hooks	10

*Source, Fishery Policy Directorate*

### Fishing effort

In the Prespa lakes one Unit Effort (UE) is defined as one fisherman with one boat and two nets, of dimension 200 m in length and 1.5 m in depth. The average fishing time is around 10 hours per day for 120 days per year. Daily Catch (C) varies from 30 to 40 kg. There is a difference in the C/UE between boats without an engine and with one. For the former group the value is estimated to be one half of the latter.

## Priorities

Albania's lake fishery authorities need to consider some specific priorities concerning the present constraints and problems. These problems can be divided into the following areas:



- a) *Infrastructure.* One major problem is the lack of storage facilities. These need to be set up to enable the produce to be stored prior to going to market. Another problem is lack of stocking facilities, and finally there is a need to improve the agricultural drainage system and introduce new working processes in order to maintain the waters flowing in to and out of the lake basin at an acceptable level. In addition, the damage caused by the inflow of massive quantities of silt into Lake Micro Prespa must be reversed. Dredging and redirection of the river back on to its original course, or installation of appropriate, efficient silt collectors would be two obvious interventions.
- b) *Legislation.* Half of the fishermen are fishing illegally, without licence. They also use a range of illegal methods of fishing. In such a situation it is very difficult to see how the local fisheries can be organised. Local economic conditions are very poor, conditions are tough and the quality of life is of a low standard. There are many social problems and the lake provides one of the few means of feeding the local population. The existing fishery law gives some general guidelines but is open to misunderstanding and abuse. A specific regulation should be implemented in order to control the fishing effort and manage the resources in a better way.
- c) *Economics.* A disproportion exists between supply, which is bigger in winter, and demand, which is higher in summer, and market fluctuations are high. Moreover, because of the absence of an organised marketplace, fishermen are compelled to sell their produce locally without the opportunity to add value at their catch.

## Prospective

The Trans-boundary Prespa Park initiative has, via the Coordination Committee, become over the last five years a main tool toward achieving sustainable goals in all aspects of life in Prespa. Given the fact that these two lakes are shared among three countries, there is need for a system of integrated lake basin management. This system will include strategic approaches to addressing the driving forces of overexploitation and to providing sustainable livelihoods for the people of the area.

Given the relevant legislation on water use and administration, fisheries, nature conservation and biodiversity there is a need for integration of the different sectors. While a broad legal framework covering all issues exists, there is a need for setting up priorities for securing a healthy environment for future generations.

The water-related issues, including water quality and monitoring, have to be considered and dealt with seriously according to the EU Water Framework Directive, especially given the obligations of two of the countries that have started the process of European integration and those of one country that has been a member for 25 years.

There is an urgent need for implementing a better control and rational utilisation of the lakes' resources. Implementation of the licensing system would be the first step towards a rational exploitation of fish stocks. Furthermore, a set of rules should be introduced to set up a sound management policy. These rules must include the following:

- prevention of fishing during the natural reproduction period
- reduction in the maximum limit of catch per unit effort
- prevention of fishing in specific parts of the lake throughout the year
- support for sustainable traditional fishing methods

To achieve the targets set by such a policy, there will be a need for involving the local fishermen, associations, authorities and environmentalists. The promulgation of administrative guidelines for a common strategy in protecting the local ecosystems should raise the awareness of local authorities and fishermen for a further and more effective future co-ordination and co-operation.

The fishery authorities have to be oriented towards protection and enrichment of autochthonous fish stocks, such as local forms of common carp, barbel and nase, absolute exclusion of stocking by non-native fish species and forms of species, and protection and maintenance of winter refuges for the lakes' fish species.

## References

- Agjencia Kombetare e Mjedisit, (1999) *Strategy for Biodiversity Conservation and Action Plan*. Tirana.
- Crivelli A, (2006) Recording of significant ecological characteristics of Devolli river catchment basin and correlation with those of Lake Micro Prespa and assessment of impact of existing management of the river on Micro Prespa. Report on the project activities supported by Hellenic Development Aid Program – SPP, Ag. Germanos, pp. 22.
- Maragou P, (2003) *Prespa in River Basin Management*. WWF Greece.
- Miceli T, Segerson K, (2001) Government and Compensation for Taking: implications for Agriculture. *American Journal of Agriculture Economics*, 77, 1177–1182.
- Miho A, (1998) Contribution on microalgae of Ohrid, Macro and Micro Prespa lakes. In: Proc. Intern. Semin. *Towards Integrated Conservation and Sustainable Development of Transboundary Macro and Micro Prespa Lakes*, Korça, Albania, 102–107.
- Ministry of Agriculture and Food, (2001) *National Water Strategy*, Tirana, pp. 122.
- Ministry of Environment Fishery and Water Administration (MoEFWA) (2006) *Fishery Management Plan (FMP) of Albania*. Tirana.
- Regional Environmental Center (REC) (2000). *Compendium of Albanian Environmental Legislation*. Tirana, pp. 455.
- Shumka S, (1994) *The dynamics of the zooplankton of Prespa Lake*. MSc Thesis, Hydrobiological Institute, Ohrid. pp. 121.
- Shumka S, (2001) Feeding relations of *Eudiaptomus gracilis* (SARS) and influence on some parameters of their life cycle in Lake Ohrid. *Verh. Internat. Verein. Limnol.* 27, 3708–3711. Sydney, Australia.
- Shumka S, Roumeliotou V, (2004) *Transboundary Prespa Park strategic planning*. BALWOIS Conference, Ohrid. (Balwois.net. paper 223)
- Society for the Protection of Prespa, (2003). *Strategic Action Plan (SAP) for the Conservation and Sustainable Development of the Prespa Park*. Agios Germanos, Greece.
- Tarlock AD, (1997) Current trends in United States water laws and policy/private property rights, public interest limitations and the creation of markets. In: *The Scarcity of Water*, Eds. Brans E.H., De Haan E; J, Nollkaemper, A, and Rinzema, J. Kluwer Law International, London, pp. 301.