

Are Fishing Activities Jeopardizing The Water Ecosystem Biodiversity In Trans-Boundary Protected Area AL-Shkodra?

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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 lake Shkodra (AL-Shkodra), along with the existing practices and regulations, and to offer views from an Albanian perspective that will help resolve some of the current difficulties. The aquatic ecosystem of this lake is rich in endemic species and others. On the Albanian side some fishermen from the villages around the lake regularly fish these waters. Unfortunately, its activities are disorganized and carried out on an individual basis, while half of them fish informally, i.e. without a license. The study involved a field survey where respondents were selected using a random sampling technique to complete a survey instrument. This paper also presents to a wider public the economic, ecological and evolutionary importance of this lake. 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. It is very important for the future of the species found in the AL-Shkodra 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: Shkodra Lake, fishing, environment, endemic species, economic development.

I. INTRODUCTION

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. 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. 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.

The three major natural lakes (Shkodra, Ohrid, 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.

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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 t/year; the current estimated production is about 200 t/year.

In this paper is reported on fish structure and fishery statistics and activities in AL-Shkodra, legislation and policy framework in the fishery sector, and priorities and prospective. It is also trying to find out what is the gap between the current status of the lake, fishery, and policy and Integrated River Basin Management (IRBM) requirements; how can be promoted the sustainable fishery when transboundary practices and policy are conflicting that.

II. RELATED WORK

Lake Shkodra is generally characterized by a high biodiversity and especially a high variety of fish fauna, making this an important lake for the Balkan. The high biodiversity that characterizes the lake is the result of the existence of a good communication with the sea, and of an extensive network of rivers and streams, communicating with the lake. Its ichthyofauna includes highland coldwater fish species, warm freshwater fish species and several marine species.

Species in low number, which are usually endemic species, are in danger of further decreasing. Economically valuable fish species, such as carp, have dropped while less demanded smaller fish species have increased. It is assumed that some of presently applied fishing techniques are not sustainable because too many fishes are caught. There are traders who buy the fish in the area. A disproportion exists between supply, which is bigger in winter, and demand, which is higher in summer, and market fluctuations are high.

Fishing is controlled by a licensing system and a fishing ban. Although an income survey has not been done with respect to the fishery, currently around 350 families (about 540 fishermen) on the Albanian side are relying on fishery as their main revenue. The Park administration has implemented a one-month fishing ban during the spawning season May/June, though enforcement is sporadic. It is reported that the majority of fishermen respects the ban. Fishermen have to pay €40 for a one-year fishing license, which is not paid by all of them. Thus, there are some illegal fishing activities occurring in the area.

III. MATERIALS AND METHODS

A. CASE STUDY BACKGROUND

Lake Shkodra is the largest lake on the Balkan Peninsula in terms of water surface and is shared by Albania and Montenegro. Its watershed area is estimated at about 5,490 km², with about 80 % of this area in Montenegro and 20% in Albania, and lake surface varies between 370 km² in dry periods and 530 km² in wet periods, of which 2/3 is in Montenegro [1]. The Morača River in Montenegro is the largest tributary to the lake. Its average discharge is about 200 m³/s. Significant additional flows come from groundwater flows and springs that discharge in the northern part of the lake.

Fishery constitutes one of the most vital activities in the whole coastal area of Lake Shkodra and fish productivity has been always high. Fishing is reported to be one of the most important sources of income for the Albanian part of the basin, contributing to the annual per capita income. In years, production and structure has gone under oscillations. In the past, fish was subject to extreme pressure, a fact that entailed changes in the fish population and fish community structure. The increase of production during last decades has mostly been the result of improving of fishing techniques and decrease of professional and amateur fishermen in these areas.

B. METHODOLOGY

The study is carried out using the following methods: (1) *Field survey* (for deriving the economic, social and biophysical profile of the study area), which utilized qualitative and quantitative questions, was based on samples, which were taken following the strategy to meet statistical reliability objectives. Samples were selected using a table of random numbers, the results of which were analyzed using SPSS software version 16.0. A field test was used to assess the face and content validity of the survey. 20 people were chosen to make comments on the survey's clarity and ease of use. In this study, test-retest reliability and inter-item reliability were also examined through pilot testing. Cronbach's

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alpha (α) was used to assess internal consistency: the closer the correlation is to 1.0, the more reliable it is [3]. In this study, the Cronbach's alpha (α) was 0.93. 165 residents within the study area were randomly intercepted and requested to fill a survey during the spring of 2013. The second primary method of information collection used in this study was personal interviews. These interviews have been used to provide a complement or contest, the information collected through the written survey; (2) *Literature survey*. This study was built also on the collection of secondary data pertaining to the study area. This includes past research, local and international published materials, local and international reports and unpublished local information; (3) *Cases comparison*: workshops organized with local stakeholders; (4) *Consultation of experts*: Qualitative assessments of interactions between ecosystem services and land-uses were derived as expert judgments using staff from various institutions including Universities, Ministries, other research institutions, government land management agencies, and other stakeholders.

IV. RESULTS AND DISCUSSION

A. FISH AND FISHERIES IN AL-SHKODRA

Fishery constitutes one of the most vital activities in the whole coastal area of Lake Shkodra and fish productivity has been always high. Fishing is reported to be one of the most important sources of income for the AL-Shkodra Park.

A. FISH

From ichthyologic studies carried out by both states it appears that the lake has 60 fish species belonging to 17 families. The relatively high number of endemic species (15 species according to Mariç[2] makes the lake significant on regional level (i.e. North Mediterranean). For a relatively warm lake, the number of fish species is considered great. About 10 species are commercially exploited (e.g. carp, bleak and eel). Two fish families are especially important: cyprinids (most abundant in species) and salmonid fish (which are much rarer in the lake due to their specific requirements).

The ichthyofauna of Lake Shkodra is divided into 3 main groups: 1) Autochthonous fish: 31 species of which 5 are economically important; 2) Migratory fish: 15 species of which 4 are economically important; 3) Exotic fish: 14 species of which 9 are economically important. 51 species were found on the Albanian side of the lake, 9 species have not yet been encountered.

There are big differences in status between the various species, depending on whether they migrate or not, their habitat type, economic value, reproduction requirements etc. Figure 1 generalizes the developments for the categories autochthonous fish, migratory fish and exotic fish. The strong decline in autochthonous fish between 1980 and 1990 is blamed to uncontrolled fishing, but they have recovered since. Migratory fish is particularly vulnerable for being caught, as they often swim large distances; their numbers in catches in Lake Shkodra are low. Exotic fish are doing very well in their new environment, as most of them can live in a broad habitat spectrum.

The fish biota in the Shkodra lake basin has been and is under an increasing pressure from different human activities such as water abstraction, pollution, overfishing of certain species in the past, but also introduced species [5]. Changes in fish biodiversity have affected other species, higher (birds) and lower (plankton) on the food web, resulting in disturbances in the lake ecosystem functioning. Adverse effects of the human activities are aggravated by the increasing effects of climate aridity.

B. FISHERY STATISTICS

Fishery statistics are a useful tool to monitor fishery activity and in a certain extent some fish species abundance. However, the fishery statistics can be useful and efficient, only if the following conditions are fulfilled: (a) Clear fishing regulations common to the three countries should exist; (b) the statistics should be as much as possible reliable and poaching (illegal fishing) should be reduced at strict minimum; (c) the fishing effort is documented: the minimum data needed being the number of licensed fishermen, but better an estimation of the number of nets set per month; (c) a strong implementation of fishing regulations (the existing ones or new ones) with fines and confiscated fishing material including boat if needed. Statistical data on fishery production and the species caught are fragmentary. In last years, production and structure has gone under oscillations (Fig. 1). In general, fish production in the basin has suffered a serious decrease over the last two decades or so due to a combination of ecological, social and economic factors.

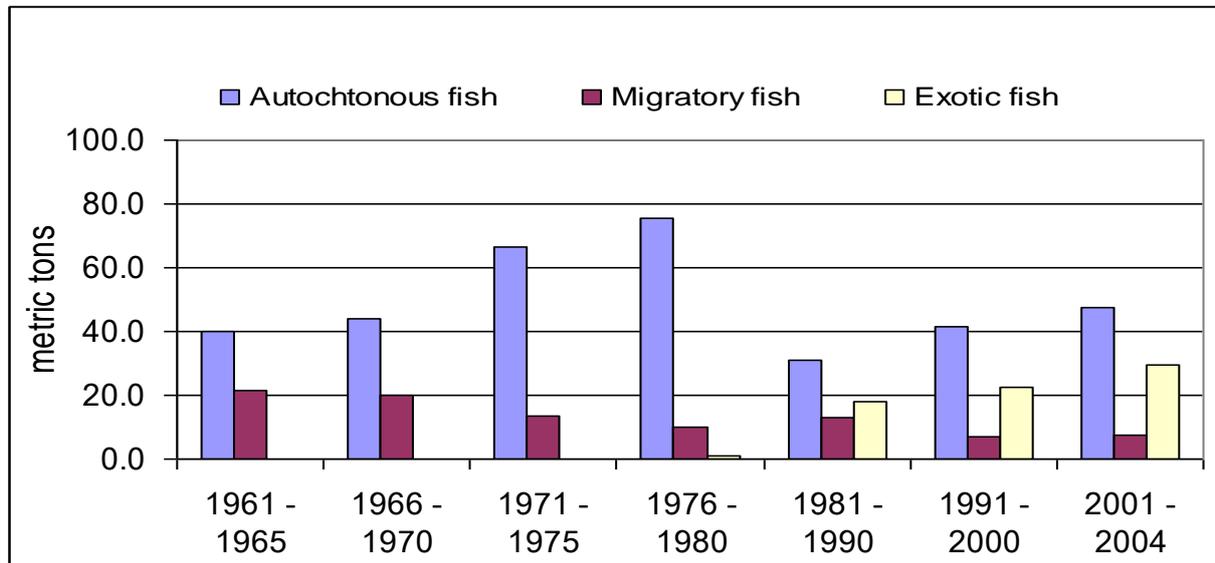


Figure 1. Mean annual fish catch on the Albanian side of Shkodra Lake

From the collected data we can see a steady production, but if we analyse the fishing data in more detail we observe some concerning phenomena: 1) Significant decline of migratory fish in the overall production; 2) Decline of autochthonous fish in the 1980s [6], but a recovery since then; 3) Increase in exotic species, especially after 1980.

Regarding the catches of migratory fish, the catches of Twaide shad (*Alosaalosa*) show a sharp decline from 1980 onwards. Among the migratory species also the Mugilidae are of economic importance. They also suffered a decrease in the catches although not as drastic as twaide shad. The Mugilidae catches fluctuate mainly as a result of hydrological changes, especially during the period September-November.

Eel catches seem to be related to hydro-meteorological conditions, but in general the production is stable. Among the autochthonous fish, catches of carp intensified, but bleak catches were less; low value species like *Rutilus*, *Pachychilon* etc. are not exploited, which has caused a sensible modification of the catch structure after 1990. Among the exotic fish, the catches of *Carassius* show a significant increase (100 t in Albania) and lately also the catches of *Perca* and *Stisostedion* increased. During the last years, also large fishes, belonging to the herbivore and planktivorous exotic fish group, like grass carp and big head carp showed an increase.

c. FISHERY ACTIVITIES

Fishing is one of the most important income sources in the National Park Shkodra. For at least 600,000 people in Albania and Montenegro, the Lake fish provide not only vital nutrition, but also a source of employment and income for the local population. In Shkodra Lake, from 1992, fishing was totally uncontrolled and every means of harvest were used. Particularly troubling are the declines in carp and several migrating fish species such as sturgeon, mullet, shad, eel, and flounder. The causes for these declines may be complex. Overfishing by both licensed and unlicensed fishermen; use of destructive methods, such as electrofishing and dynamite; lack of access through the Buna/Bojana River for migrating species; invasion of exotic species such as the European river perch that may be competing with native fish; potential toxic contamination, and habitat alterations are all likely contributors. Generally, there is poor control of these activities, and little fisheries monitoring. This period is thought to have severely impacted fish populations including the native carp and 15 endemic species. At the same time fishermen and local scientists have indicated that there is indirect evidence of declining fish stock as well changes in its structure in all two Shkodra basin countries. The impact has been greatest on the long-lived species that are slow to reproduce.

The fishing activities in AL-Shkodra, and their impacts can be divided into 3 stages:

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1. FISHING UP TO 1991

The fishing activity was organised by the state enterprise: 110 fishermen were distributed over 9 fishing groups according to the fishing grounds and the fishing gear used: manual trawls for bleak and carps; gillnet, fish barriers and fyke nets for the twaide shad; two small vessels for the bottom trawl and bleak light fishing. All kind of fish species were exploited, even the low value species which were used cattle food.

After a sharp decline in the catches of twaide shad, the fyke nets used for capturing this species at the lake entrance were banned in 1989, together with the light seiner that damages also the small specimens of twaide shad. In this period also the bottom trawl has been forbidden, because it can damage the lake bottom and has an adverse impact on the carp stocks. With respect to illegal fishing activities, control was strong during these years.

2. FISHING BETWEEN 1991 AND 2001

Once the control by the state had decreased, the consequences of uncontrolled and irresponsible fishing became apparent. High value species like carp, twaide shad, eel etc were overexploited and that not only changed the catch composition but also damaged their stocks. During 1994-2000 the number of legal and illegal fishermen reached a number of 1000 persons. Abusive fishing occurred also in the Buna-Bojana River during fish migration and in the south-eastern part of the lake during carp reproduction.

3. FISHING SINCE 2001

In order to have a more sustainable and responsible fishing activity, in 2001 the Albanian Government started to intervene. The government, in cooperation with the World Bank, FAO and Cooperazione Internazionale (COOPI, Italy), was implementing the Fishery Development Project. One of its main objectives was the organisation and strengthening of the Fishery Management Organisation (FMO) leading to protection and management of fishery resources and appropriate fishing methods.

Presently, two FMOs in Albania, involving 540 fishermen, 260 fishing boats operating in 24 areas of the lake, are present in Lake Shkodra. The Ministry of Agriculture and Food (Directory of Fisheries) has two fishing inspectors, which in collaboration with central and local authorities monitor the implementation of fishery laws and regulations. This organisation has positive effects, although some other problems persist and need commitment for the future, especially abusive fishing in the rivers and streams linked with the lake, and, near the mouth of the Buna-Bojana River, gear blocking the migration of catadromous and anadromous fish.

The number of fishermen that operate in Lake Shkodra should be gradually reduced to avoid overexploiting of the valuable fish populations. The economical strengthening of the FMO and broadening of their activities will allow the FMO to be more effective in this gradual reduction.

Another problem is the uncontrolled urbanisation on the lakeside, which will affect in the future the quality of the lake's near shore waters and eventually of the fish.

A Strategic Action Plan started in 2005 in Albania to control the fishing pressure and to deal with illegal fishing. A Task Force is set-up to implement the Action Plan in the coming years.

Currently, fishing in Shkodra Lake is done on an individual/family basis and there is no collective management, monitoring of fish populations or marketing of any kind. Generally, there is poor control of these activities, and little fisheries monitoring. At the same time fishermen and local scientists have indicated that there is indirect evidence of declining fish stock as well changes in its structure.

The minimal management of the fishery in Shkodra Lake is entirely focused on maximizing the catch of the main commercial species. Species diversity conservation and aquatic ecosystem health are not management objectives in any one of the two littoral states. Indeed, past fishery management's narrow focus on production rather than sustainable harvest has caused managers to focus exclusively on trying artificially to increase the population of fish through hatcheries. This led to the introduction of species of fish, with uncertain consequences for ecosystem health. Exotic

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species are expanding rapidly. The reason for this is mainly that there is little sensitivity to the potential economic and/or ecological consequences of introducing exotic species.

B. 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 [4].

a. 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 [7].

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.

b. 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.

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C. 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: Drini–Buna, Mati, Ishëm–Erzeni, Shkumbini, Semani and Vjosa. 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.

d. PRIORITIES AND PROSPECTIVE

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:

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.

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. 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.

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.

In order to achieve transboundary co-operation it is an advantage to have a set of commonly agreed principles. The EU Water Framework Directive (WFD) should be useful in this context, and designating the Shkodra area as a pilot basin for implementation of the directive in the two countries.

The cooperation among two countries was very sporadic and with the Memorandum of Understanding (MoU) between the Ministry of Environment in Albania and the Ministry of Environmental Protection and Physical Planning in Montenegro the basis exists for cooperation and establishment of a body for water management the Lake Shkodra basin. This MoU stipulates that working groups will be created and an action plan prepared for its implementation. Although signed in May 2003, no working group has been created yet, let alone an action plan prepared.

With the likely future accession of Albania and Montenegro to the EU, the WFD approach is an important guide. A RBMP is a detailed account of how the objectives set for the river basin (ecological status, quantitative status, chemical status and protected area objectives) are to be reached within the timescale required. There is a need for a plan that will include the analysis results of the river basin's characteristics, a review of the impact of human activity on the status of waters in the basin, an estimation of the effect of existing legislation and the remaining "gap" to meet these objectives; and a set of measures designed to fill the gap.

V. CONCLUSION

Given the fact that this lake is shared among two 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.

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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.

There is an urgent need for implementing a better control and rational utilization 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, and 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.

In the future, a bilateral body for fishery in Shkodra Lake should be created being responsible for the transboundary management of the fishery. It will be responsible to issue the fishing licenses, to write new fishing regulations and to implement those new fishing regulations thanks to special fishing wardens. The objectives of this bilateral body for fishery in Shkodra Lake will be responsible to negotiate with the two states in order to get a permanent transboundary management of the fishery (evaluated every five years) implying:

- development of common sustainable fisheries plan, including a common licensing system, and uniform fishing regulations;
- basin-wide assessment of fish resources, related habitats and biological demands;
- a common legal status for professional fishermen (part time fishermen or inhabitants fishing with nets should be banned);
- a common license should be issued with regulations and duties for the fishermen. A maximum number of licenses (to be determined) will be set;
- all fishermen will fish with the same fishing devices (length and mesh size and type of nets and maximum number nets used determined). Each fisherman will set nets with boys numbered (those will belong to the bilateral body);
- a introduction of a fishing ban during the spawning period for selected species, and the modernization of the basic fishing infrastructure;
- some parts of the lakes should be banned for fishing, for example, the zone close to the delta of some rivers should be a no fishing zone;
- boat used by licensed fishermen should be registered and only those boats will be allowed on the lakes;
- to organize and set a transboundary wardening system with fines in case fishing regulations are not implemented by a fisherman;
- to organize a system to collect fishery statistics including fishing effort and fish caught by species;
- the issue of stocking will be discussed with the appropriate persons and decision will be taken to undertake or not such a stocking. If the decision is positive, stocking rules (no new introduction of fish species) should be set and stocking efficiency assessed;
- a total ban of stocking new introduced species;
- the protection of River Buna (Albania) and Morača (Montenegro), which are an important spawning habitat for a significant portion of Shkodra fishes.

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