

## Shkodra Lake: Social and Environment Problems

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**Abstract** The human activity is considered as the main reason for the damage of the lake ecosystem stability. Shkodra Lake is ecologically characterized by a high stability. Clean water and high productivity are considered as potential health factors of this Lake. This ecosystem is one of the most preserved wetlands of the Mediterranean. However, the unfavorable global factors and human activity have a dangerous impact on the ecosystem. The damage of the lake water regime causes oscillations, which lead to disorders for the habitats and ecosystem, creating concerns to the life of populated areas. Contamination from decomposing organic matter degrades the ecosystem in a trophic unrecoverable situation. Destruction of forests around watershed, failure to have anticorrosive measures and wastewater discharges are essential for the growth of solid flows affecting the eutrophism of the lake. Shkodra Lake can't support these difficult situations by itself alone. It leads to water microbial contamination of beaches and increases people's concerns. Awareness should be raised to the public, decision making, and the population around it, in order to eliminate these risk factors. Cross contamination with toxic substances penetrate the food chain of biota and end up accumulated up to the humans, causing life-threatening and deadly diseases. People should be aware and should take measures to eliminate discharges to ensure the standards of lake water and consuming resources. Long-term strategies and policies should be set up for developing the Lake region, with main objectives and measures of managing character. Natural ecosystem of Shkodra Lake and the urban ecosystem of Shkodra city will coexist in a better way if harmony and integration of natural development and human activity will be achieved.

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### Introduction

Shkodra Lake represents a habitat of large dimensions, very interesting, unique and quite complex. Shkodra Lake is located in the Southwest part of the state border of Albania – Montenegro. It is considered as one of the 40 lakes most world known under various names in different languages: in Albanian it is known as Liqeni I Shkodres; in Serbian: Skadarsko Jezero; in Italian: Lago di Scutari, in English Shkodra Lake, etc. The name of this Lake comes from the City of Shkodra (Skadar, Scutari), a town located north of Albania.

The development and the survival of natural ecosystems of Shkodra Lake goes parallel (side by side) with the development of the urban ecosystem of the Lake. Shkodra Lake is included in the system of waters of the Adriatic Sea basin and is located close to it. The characteristics of the Lake are associated with the water regime of this Lake that changes seasonally. The Lake also plays an important role in the demographic development and its surrounding urban area. The Lake watershed has a more complex character and shows a hydrological and ecological interest. The Lake basin provides the existence of the Lake through the water supply.

Buna river that springs from the Lake and flows into Adriatic Sea, historically has been the opening of the city and the region to the Adriatic Sea. In the watershed of Shkodra Lake there live around 330.000 inhabitants, of whom nearly 85% of them are located along the Lake as for instance in Shkodra, Podgorica, Koplik, Bajza, Tuzi, Virpazar, etc. The lower areas of the Lake watershed are agricultural lands used by the residents. The use of natural resources, the industry in the basin of the Shkodra Lake and other economic activities, show that environmental issues of Shkodra Lake are closely related to the problems of the region, with the population and economy and they need perspectives and strategies for a sustainable development. Political changes in both countries, Albania and Montenegro, have also influenced the developing policies related to the ecosystem of the Shkodra Lake.



**Fig 1.** Map of Shkodra Lake

The demographic movements in the area of Shkodra Lake have been quite frequent recently. Initially, first residents that started to settle near the Lake saw it as an alternative source of living. In this early period, fishery sources were much greater than the demands of the residents hence no management needed. Nowadays, the demand is much greater than the fishery sources of the Lake itself, making it necessary for a right and sustainable management of these resources, which have to do with the development of such policies that require the solution of environmental issues and social problems nationally coordinated.

The identification of the environmental issues of Shkodra Lake and the related social problems of the region should be accompanied by integrated management of solutions, which guarantee a sustainable development of the urban and natural bioecosystem.

Initially, we have identified the environmental problems of Shkodra Lake, based on the two books published by DHORA (2005, 2012) about Shkodra Lake. The diagnostic aspects of the situation are also taken from the GROUP AUTHORS, ROYAL HASKONING (2006), while as to the assessments of habitat and bird community problems; we've been helped by the work of DENAC et al. (2010). Out of this preliminary study, we have selected three environmental problems that are most important from the ecological and functional perspective for the Lake, but also vital to the urban population, particularly those closer to the Lake and the surrounding areas.

The three complex environmental problems are addressed in principle, in accordance with DHORA (2012), but adjusted to our estimates for the recent situation of the Lake. The sociological approach of the problems, closely related to the above, is solely our own contribution. They are observed, identified and addressed in this study according to emergency problems, or due to the abnormal environmental situations of the Lake, often caused by human factors.

### **Environmental – Social problems from demographic movements**

In the region of Shkodra Lake, especially during the last decades, an intensive demographic movement towards the shores of the Lake was developed. This movement became apparent after the 90-s, with the change of the political regime in Albania and as a result of poverty, the number of residents in these areas is growing constantly seeing the Lake as a source that contributes to their welfare.

A typical example is the creation of meadows newly neighbourhood of the city, an urban development without criteria in an area quite near the Lake, which right at the start generated many social problems.

The seasonal fluctuations of water level are characteristic of the stability and sensitivity of the Lake.

The development of the Lake beyond the maximum threshold triggers the flooding of meadows area, creating inevitable problems and difficulties for the population, which are often isolated by high water level and even forced for a temporary abandoning of their homes. Problems arising from the floods are associated with the damage of good lands, instability and alterations of habitats, cyclical developments of large areas, which further complicate the problems and difficulties arising to the residents of these areas.

The reduction of the Lake waters under the acceptable maximum level would mitigate the fluctuations and would prevent flood disasters. But it would have a harmful impact on the flora and fauna, would reduce wetland surface, and consequently would have a polluted Lake. Temporarily, we would gain a hydrological and ecological balance, but recovery would last long and the risk of some species to extinct is high. The agricultural lands gained by water decrease under the minimum edge could not be balanced as compared to the devastating impacts on flora and fauna. The above mentioned effects would have a negative impact if the water level would go below its minimum threshold, making the Lake even more polluted, with its surface reduced, parts of the Lake would lose connections, the morphology of Buna River would change and water temperature would rise, etc.

It would therefore be better to have measures that reduce the maximum water threshold but increase its minimum, bringing them to acceptable limits, what would be in favour of a certain ecological desensibilization, and a necessary diversion from hypersensibilization, but with a positive impact to the Lake.

Since the water regime is the main factor of Shkodra Lake ecosystem, the decisions that solve the problems should be based on the complex studies of ecological character. It would be good that the Lake water level be affected simply by the flows and the relationship between flows and exits through Buna River had an acceptable ratio.

Another example is the population of the lowland of Upper Shkodra, the area under Shkoder – Hani i Hotit road, which is a protected area and constructions are prohibited. Human settlements anywhere around the Lake are a concern for the Lake itself, for the presence of birds, vegetation of this area, development of agriculture in an unsuitable area ecologically approached, which means the digging of land, use of uncontrolled of pesticides, etc. Population that settled around the Lake from other areas, was not motivated by the needs and opportunities of agriculture to absorb labor force, on the contrary the remained rest of the population was demotivated to work in agriculture, thus considering the Lake as a source of their livelihood. Poverty and unemployment were the main causes of these migratory movements, but poverty and impatience for a rapid development and prosperity led to an over use and degradation of natural resources of the Lake and its basin in general. The Lake was being seen as a warehouse, that anyone could abuse easily. All these factors, directly or indirectly, led to the deterioration of the water quality of the Lake, damaging and wiping out of forests, destruction of fish populations and change of population structure of species required by the market and reducing the number of birds and even their decolonization.

The use of land around the Lake areas for the purpose of agriculture, tourism, small industries and fishing farms cause considerable damage to the biodiversity of this area. The cultivation of agricultural products has increased so is the use of pesticides and fertilizers, but still the economic benefit from this area remains low.

The population in the basin of the Lake had an unsustainable demographic development, which led to the spoil of the sustainable development of the ecosystem itself.

Demographic movements towards urban centres, even around Shkodra Lake, should be viewed as a positive phenomenon, but that require special attention since they become a factor for the rise and aggravation of the problems in the context of ecosystems, whether natural or urban. The sustainable development always requires environmental support, and should be inclusive of various community problems. As Misja (1998) writes, the general equilibrium can be established only in the context of harmonization of mutual links to the population - environment – development trinomial.

### **Social - Environmental problems caused from pollutant human activity**

Shkodra Lake is highly impacted by human activity. The contamination from decomposing organic matter, out of several sources, degrades the ecosystem into an irreparable trophic situation. Discharges of wastewater containing mainly decomposing organic matter, phosphorus detergents and agricultural fertilizers, which drain from the basin to the Lake, have a major impact on the Lake trophy. Many cities and other populated areas of Montenegro drain in the Lake. Even part of wastewater of Shkodra City, in specific situations, drain into the Lake.

Such difficult pollutant situations, Shkodra Lake cannot support all by itself. This brings the microbial contamination of the waters of the beaches, the risk of various epidemics, the shrink of tourism activities, etc., which adds to the concerns of social problems at the residents of these areas.

The relations saprobity - trophy have great importance in creating sustainable ecological situations. Saprobity, which is related to the degree of decomposition of organic matter, is indicated by the amount of oxygen and the composition of the invertebrate animal community. Trophy associated with the amount of nutrients in the water is indicated by N and P and the composition of the invertebrate community. When these nutrient sources are internal as for instance from the biomass of macrophytes, the self cleaning of the Lake brings balance between saprobity and eutrophication in the Lake. But when organic substances enter from allochthonous sources like sewage, organic waste, affluent feeds, etc, the establishment of equilibrium between trophy and saprobity becomes impossible.

Chemical pollution of the waters of Shkodra Lake happens due to the factories i.e. from the Aluminum Plant of Podgorica and that of Niksic Steel Processing Factory. These are toxic and cancer substances like: PCB, PCT, PCDD, PCDF, PAH, phenols, F and CN, etc. Their impact increases when discharged substances are combined with each other. Toxic pollution is very harmful because they enter the food chains of biota and end accumulated in high levels in humans causing deadly diseases. Most of these substances are very stable and their chemical decomposition, even from microorganisms, is extremely difficult.

The transfer of nitrates into the digestive apparatus of the humans brings negative consequences for human health causing deadly disease of methemoglobines. Also other toxic pollution as piralena, phenols, etc. are present in the Lake. If taken by humans, they cause diseases to skeletal, respiratory, genital, endocrine systems, etc. Also, even the pesticides used on agricultural lands around the Lake have negative effects on human health.

Metal and plastic materials, not only spoil the view of the coasts, but also become a source of dangerous pollutants. A similar risk comes especially from the area of Zeta, where the wastes of Podgorica City are deposited, which, in different ways and states pass into the waters of the Lake.

The Lake water is the main abiotic component of Shkodra Lake ecosystem, which sustains all the community of living organisms. The utilization of this waterfront property constitutes a development perspective in the region and beyond. The Lakes are a national wealth, but Shkodra Lake belongs to both countries, therefore it requires the development and implementation of agreements and integrated management plans that will lead to a successful development of the Lake and its surrounding areas. The values of the Lake should be preserved and protected by both sides.

### **Social - environmental problems from the inappropriate use of resources.**

Shkodra Lake is quite rich in terms of its natural resources. In the Lake, so far there have been recorded 52 species of fish and 112 species of water birds. The Lake is considered as one of the 4-5 most important wetlands for wintering bird in Europe, with a capacity of 0.25 million individuals, complementing also the Ramsar criteria for the total number of individuals, for the number of individuals for some species, and for the number of bird pairs nesting on the Lake.

Fishing is one of the most profitable activities for the residents around the Lake. During the recent years, fishing in Shkodra Lake has undergone descending changes in amounts and suffered changes in the structure of the species, in the detriment of species required by the market. During the last decades, with the growth of the population and economic standard, processing industry etc, the demands for fishing in the Lake are always increasing. Unlawful fishing, often without licenses or a detailed fishing plan and often using illegal means for fishing such as explosives, generators, poisons, etc., has led to disorder and unawareness of the situation of the population and fishery resources, in general. But the bad situation in fisheries is mainly due to three factors: the overuse explained above, the introducing of unknown species to the Lake and the disruption of reproductive habitats.

The decline of fisheries in general and of special species in particular, mainly due to fishing in the Lake beyond the existing capacities, without protecting the young species, often during the periods and places of reproduction, using extermination means and tools, have led the populations to the brink of collapse, which later will turn into a big problem for the stability of the ecosystem, while socially, there will be lack of fish in the market and less profits for hundreds of fishermen.

The birds are another important resource of Shkodra Lake. The list of birds of the Lake counts 282 species, representing about 55% of the total number of species of Europe, out of which 112 are aquatic species. Almost all species are migratory or nomadic, in spring and autumn. This phenomenon is more widespread among aquatic species and especially to ciconiiforms and anseriforms. 189 species or 67% of the total number of birds of Shkodra Lake are nest builders. The recent decade developments along the shores of the Lake have reduced and even

extinct certain species, loss of bird nesting's and habitat destruction was recorded, etc. Referring to Denac et al (2010), sustainable hunting does not negatively affect bird populations, but illegal hunting proved to be a much bigger problem in the post - communist societies. Given the importance of migratory birds and their habitats in a sustainable economic development, ecotourism included, a controlled hunting is needed, through a new legislation and cooperation between our two countries with the aim of maintaining, managing and protecting the region of Shkodra Lake and migratory birds in particular.

Protecting habitats is essential for the survival of species, as it is the migration of birds for tourism as an additional attraction for the guests. With the goal of preserving this natural asset, long - term programmes and specific objectives in the use of Lake resources, preservation of specific habitats, endangered species like pelicans in particular, and the increase of the existing number of populations. Finally, the importance of upholding the Lake region as an international important site of migration for aquatic birds, with a Capacity of more than 300.000 resting birds in need of undisturbed resting and feeding sites on the Lake, needs to be highlighted.

## Conclusions

The natural ecosystem of Shkodra Lake and the urban ecosystem of Shkodra city will coexist better if harmony and integration of natural developments is co-ordinated with human activity.

Therefore, long-term policies for the development of Shkodra Lake region should be built, long-term strategy be set, need to have key operational objectives and managing measures to realize these goals.

The Lake is a common property between Albania and Montenegro. The rich biodiversity, tourism potentials, economic benefits from the resources of this Lake, give this ecosystem a national and international importance. Therefore, a collaboration and co-ordination is required between the two countries for the protection and management of this ecosystem.

To mitigate and solve social problems of the population, it would be of great interest that Shkodra Lake be declared an "International Biosphere Reserve", enabling the integration of protected areas in larger landscapes. This Biosphere Reserve would contribute to the preservation of natural values, spur economic and social development, which would be ecologically and socioculturally sustainable, as well as it would provide support to researching, monitoring, education and exchange of information.

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