

**Measures for conservation and restoration of natural heritage in Bourgas and Enez
(MoreCare), CB005.12.1.115, “Development of a joint model and an assessment
methodology for ecosystem services in Vaya (Burgas) and Gala (Enez) lakes”**

**POSSIBILITIES FOR DEVELOPMENT OF ECOSYSTEM SERVICES IN THE
REGION OF THE LAKES VAYA (BURGAS) AND GALA (ENEZ)**

Association Green Strandja

Burgas, November 2018

In general, ecosystem services are the benefits that natural ecosystems provide to humans. Even if we do not realize, these services exist and we are continually taking advantage of them. Our life is directly connected and dependent on ecosystem resources. The way we use, manage and protect it is in direct dependence on the footprint we leave on nature, the sustainability and nature of our model of life.

1 Lake Vaya

1.1 Human impact

Since its emergence to this day and especially during the last 50 years, Vaya lake is subjected to strong anthropogenic pressure and undergoes significant changes, among which the most important are splintering, combined with bottom leveling, reduction of total and open water space, drastic reduction of salinity and especially heavy pollution with petroleum products. Over the last few years, with the presence of large-scale agricultural machinery and subsidized area farming in the country, problems with the transfer of soil sediments and agricultural fertilizers into the lake's waters are intensifying dramatically. The management of the reedbeds along the banks of the basin is also of great importance for preserving the open water area required for feeding and resting the birds.

Deterioration of the quality of the waters of Burgas Lake is a serious threat to the survival of the bird and fish food base. In the 1960s, the lake was already highly eutrophic to hypertrophic. After heavy oil contamination in 1967 and then severe blooms of blue-green algae, impoverishment of the upper flora, and massive development of the *Stuckenia pectinata* (*Potamogeton pektinatus*). Since 1962, toxic phenomena have been recorded, followed by fish pestilence. Severely toxic seaweed strains, which are dangerous to animal dwellers on the lake, appear. The thick layer at the bottom permanently retains pollutants and mud analyzes even in 1996, showing that it is still burdened with petroleum products. According to Order № RD-272 / 03.05.2001 of the Ministry of Environment and Waters, the design category of surface water in Vaya lake is the second category.

According to the National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013 - 2022, the general condition of the wetland is unsatisfactory, with a tendency

to deterioration of bird conservation conditions. The common threats are: extremely strong anthropogenic pressure - flooding of wetlands and buildings, pollution with petroleum products, chemicals and solid household waste, excessive catches of fish and the use of gears that are dangerous to birds, poaching / fish hunting with illegal means - networks lead to a reduction in the fish fauna of the basin, the same is done even during the spawning period of the fish, victims become very rare and endangered species, birds and reptiles/, poaching also causes anxiety among species that nest, feed or rest on the lake, a worsened connection of the lake with the sea, the presence of dangerous for the birds power lines, plans for construction of wind farms.

The specific threats to the ornithofauna are: anxiety, illegal shooting; deterioration of the food base; destruction of power lines around the lake, lack of nesting places; pollution; excessive shooting; use of chemical preparations in agriculture. The specific threats to fish and herpetophanes are: overfishing, introduction of non-native fish species; deforestation; destruction of deciduous vegetation; herbicide contamination, pesticides, burning during the breeding season.

Nowadays in the liman are infused waste waters from the northern and southern industrial zones of Bourgas after passing through the established purifying plants, but the untreated waters of the Aitoska River also flow. The waters come from the sewage sludge deposits of the city of Burgas as well as from the quarry for inert materials near Gorno Ezerovo. The annual report of the Burgas Regional Environmental Agency for 2016 shows an excess of the standards regarding the aluminum content and eutrophication processes, as well as the deterioration of the parameters compared to the previous year in terms of ammonium and nitrite nitrogen.



The noise pollution also affects negatively - its sources are the main road that runs through the eastern and northern shores of the lake, the low flying planes landing at Burgas airport, large industrial enterprises. The existence of a road network near the shores of the lake is also a reason for a large part of the household waste.

By 2013, in the eastern part of the lake runs a quarry for inert materials extracted by pumping from the bottom of the lake. As a result, the natural character of the bottom is compromised, and the depth is increased many times.

Measures have been taken to protect the lake. A management plan was developed in 2005. Single activities have been carried out (actions to improve law enforcement with regard to poaching, monitoring, construction of artificial islands to attract pelicans to nesting), but no human and financial resources are provided for the overall implementation of the plan. Implementation of some of the measures set out in the Plan has started in 2010 as part of a BSPB project under the EU LIFE + Program (especially for capacity building of local institutions, partnership building).



Important specific measures for the protection of the lake are: maintenance of the water regime and in particular the connection with the Black Sea, on which the salinity of the water and other related characteristics of the wetland depend; limitation of industrial pollution; limiting diffuse pollution from adjacent farmland; building control, construction and industrial waste pollution; fisheries control.

In protected area is not allowed: the afforestation of meadows, pastures and meadows, as well as their conversion into arable land and permanent crops; the use of pesticides and mineral fertilizers in pastures and meadows; reed breeding, from 1 March to 15 August - breeding season for bird species occurring in the area; the lighting of reedbeds and coastal vegetation.

The lake is of extremely high ecosystem importance as a key functional element of the Via Pontica migratory road as a "landfill" for biodiversity conservation as a factor for local microclimate and as a prerequisite for the development of environmentally friendly forms of economic activity (eg ecotourism, well regulated use of water and fish resources).

Here are the main threats for Vaya lake as a result of human activity:

- Flushing, tilting and aligning the bottom;
- Reduction of the total area of the lake and open water surface;
- Reduction of the salinity;
- Dangerous pollution with petroleum products;

- Low-flying planes;
- Soil erosion;
- Fertilization of agricultural land and pollution with pesticides;
- Deterioration of water quality;
- Drainage of individual parts;
- Construction;
- Pollution with household waste;
- Excessive catches of fish and the use of dangerous fishing methods;
- Poaching;
- No good connection of the lake with the sea;
- Dangerous to the birds power lines;
- Disturbing of birds;
- Lack of suitable breeding grounds;
- Fishes with non-native fish species;
- Deforestation;
- Forest and field fires;
- Noise pollution;
- Pollution by waste water and others.

1.2 Possibilities

Along with the threats, there are significant benefits that should be used as options for the future development of ecosystem services in the Vai Lake area:

- Close and easy access of the people from Burgas and the surrounding villages to the lake;

- Existence of a large biodiversity, protected areas, forest areas, numerous cultural and historical sites in and around the lake;
- Part of the Via Pontica migratory road.



Lake Vaya plays a huge role in the life of the people of Burgas and the region. Among the ecosystem services it provides, these with the greatest weight are the regulators and the supporters. Its buffer functions are the buffer for the rainwater from the rivers flowing into it, the sediment filter and the polluted water filter from the industrial enterprises, especially the oil refinery, the municipal waste landfill, the purification plant, the inert materials quarry, etc.

The lake diversifies the lives of many people, offering them a number of cultural ecosystem services. It is within this group that the largest underdeveloped potential of the lake lies.

In the future, measures can be taken to further develop activities such as:

- Observation and study of birds;
- Study visits with students and scientists;
- Construction of visitors' centers, pedestrian and bicycle routes, bird watching towers and other interactive methods for presenting and studying nature and biodiversity;

- Development of water sports;
- Combining sea tourism with visits to natural and historical landmarks.



2 Gala lake

2.1 Human impact

Lake Galla is an alluvial freshwater lake with artificial wall located 10 km from the town of Enez and 23 km from Ipsala in the Edirne province of Turkey, near the Maritza delta. It consists of two parts called Big Gala and Little Gala. It has an area of 5.6 km² and is 2 m above sea level. The depth varies between 0.4-2.2 m. The lake is mainly fed by a drainage channel, starting from the Maritsa River, which regulates the water level and serves for irrigation of the extensive rice fields surrounding the lake.

The production of rice is the main human activity in the region of Ennez. 25% of Turkey's rice production is produced here. Accordingly, this activity determines the most significant anthropogenic impact on ecosystems and natural resources. It also relates to the main threats to biodiversity and the quality of ecosystem services related to soil, water and air pollution.

Between the cities of Enez and Ipsala, rice has been cultivated for decades on the same farmland as monoculture. This leads to a significant depletion of the soils, which necessitates their intensive fertilization.



The level of phosphates, sulphates, nitrites and nitrates used in agriculture is expected to be high in wetlands such as Lake Gala, which are surrounded by intensive agricultural areas. However, the entry of sulphate and phosphate ions into the lake's waters is partly limited by the dense reed bedshows between it and the agricultural lands as well as the drainage channels. But this leads to a decrease in the lake's water surface, stimulating faster growth and expansion of the reed areas. (Güher H., S. Erdoğan, T. Kırgız, B. Çamur-Elipek, *The Dynamics of Zooplankton in National Park of Lake Gala (Edirne-Turkey)*, www.researchgate.net, August 2011).



The main threats to the ecosystem services in the area of Lake Gala are:

- Intensive monoculture farming;
- Pollution of soils and waters with pesticides;
- Burning of stubble after harvesting of rice;
- Intensive livestock farming within the pond;
- Poaching of wild species;
- Generation of electricity through wind turbines located on the migratory path of birds

2.2. Possibilities

The area of lake Gala has enormous potential and good prospects for future ecosystem services development. First of all, a balance must be sought between the current intensive use of some of the natural resources and the development of new services.

- Easy access through a new road infrastructure to a large flow of people from the big cities of Istanbul and Edirne, as well as the whole of Turkey;

- Existence of a large biodiversity, protected areas, forest areas, numerous cultural and historical sites in and around the lake;
- Extensive and unspoiled beaches on the Aegean coast;
- Proximity to the mouth of the Maritza River;
- An abundance of historical and archaeological sites in the city of Enez;
- Part of the Via Pontica migratory road.

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- Study visits with students and scientists;
- Construction of visitors' centers, pedestrian and bicycle routes, bird watching towers and other interactive methods for presenting and studying nature and biodiversity;
- Development of water sports;
- Combining sea tourism with visits to natural and historical landmarks.

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