Project „"Measures for conservation and restoration of natural heritage in Burgas and Enez" (MoreCare)“, ref: CB005.1.115, „ Elaboration of a joint model and methodology for assessment of the eco system services in the lakes Vaya in Burgas, Bulgaria and Gala in Enez, Turkey“

COMPARATIVE ANALYSIS

AND ASSESSMENT OF THE ECOSYSTEM SERVICES OF

THE LAKES VAYA (BURGAS) AND GALA (ENEZ)

Association „Green Strandja“

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According to the definition of the global initiative "Economics of Ecosystems and Biodiversity" (TEEB), ecosystem services are the contribution of ecosystems to human well-being. Ecosystem services can be divided in general into:

* **Supportive services** - services that create the conditions necessary to provide all other ecosystem services, such as photosynthesis or soil formation.

* **Food Services (Material services)** - all products originating from ecosystems, for example foods, fibers, fuels, herbs and medicinal plants, genetic material, drinking water.

*. **Regulating services** - the ability of ecosystems to regulate important natural natural processes such as climate regulation, quality and quantity of waters and so on.

* **Cultural services** - intangible benefits of ecosystems, such as the aesthetic and recreational value of the landscape.

Today, through our activities, we **often exploit natural resources**, influencing the ability of ecosystems to provide us with their useful services. In May 2011, the European Commission adopted a Message "Our life insurance, our natural capital: an EU biodiversity strategy for 2020"(COM [2011] 244), in which the 2020 target includes halting the degradation of ecosystem services and their restoration. Objective 2 is to ensure that: "By 2020, ecosystems and their services will be maintained and improved by creating green infrastructure and recovering at least 15% of the ecosystems affected. This includes mapping and assessment of ecosystems and their services. The Communication was followed by a European Parliament resolution adopted in April 2012.

In May 2013, the European Commission adopted the Green Infrastructure (GI) Message - Increasing the Natural Capital of Europe. It defines green infrastructure as a "strategically planned network of natural and semi-natural areas and other environmental elements that is constructed and managed to provide the most diverse ecosystem services." The concept focuses on maximizing services based on the integration of natural solutions into spatial planning and spatial development.

The ecosystem services of the two lakes - Vaya (Burgas, Bulgaria) and Gala (Enez, Turkey) are determined by the natural-geographic features, the historical development and the current socio-economic conditions of the two regions. They have their own characteristic features but also have many common components.

Both lakes are located in coastal areas, in close proximity to settlements, surrounded by highly urbanized areas, located at approximately the same altitude, almost equal to the sea level, conserving exclusively biodiversity and representing nature conservation sites from local, regional and international importance. The lakes and their adjacent areas are sources of natural products, food, energy, water for drinking and non-drinking needs, herbs and medicinal plants, they also store valuable genetic material. They perform a number of supportive and regulatory functions for ecosystems and people's lives, including climate, water quality and quantity, air cleanliness, and more. They have a huge impact on the quality of life of people, bringing them considerable and varied intangible benefits.

When assessing ecosystem services, food, regulatory and cultural services are identified using measurable and comparable indicators that are directly related to people's lives.

For the assessment of the ecosystem services of the lakes Vaya (Burgas) and Gala (Enez), we will use the following common indicators, which are selected as a result of the collected information and surveys of the two lakes in order to be mutually comparable:

1. Food ESS
    - Products from agriculture
    - Products from livestock
    - Products from wild animals, plants, mushrooms, weeds
    - Products from aquacultures
    - Providing drinking and non-drinking water
    - Energy sources

2. Regulating ESS
    - Purification of air and water from pollutants
    - Soil stabilization and regulation of erosion processes
    - Regulation of the water cycle - flood protection and drought protection

- Providing habitat types and conditions for population continuation
- Microclimate regulation

3. Cultural ESS
    - Experience the connection with the environment
    - "Carrying science researches and educational programmes"
    - Historical and cultural heritages
    - Leisure and entertainment
    - Natural heritage, existence of protected areas

To determine the ecosystem capacity to provide ecosystem services, we will fill out a matrix of selected ecosystem services indicators, in which the assessment of each indicator is graded in a five-step scale from 1 to 5 as follows:

1 – Strongly degraded
2 – Degraded
3 - Moderately degraded / Somewhat developed potential
4 – Not entirely developed potential
5 - Optimal / well-developed potential

To be more objective, we evaluate ecosystem services separately for the current state of ecosystems and their future potential.

ASSESSMENT OF THE ECO SYSTEM SERVICES OF THE LAKES VAYA (BURGAS, BULGARIA) AND GALA (ENEZ, TURKEY)

Joint model for ecosystem services assessment - Lake Vaya (Burgas) and Lake Gala (Enez)

	ESS Indicators	Current condition of ESS (1-low capacity, 5-very high)		Potential of ESS (1-low capacity, 5-very high)	
		Vaya (Burgas)	Gala (Enez)	Vaya (Burgas)	Gala (Enez)
1	Products from agriculture	2	5	3	5
2	Products from livestock	1	4	2	4
3	Products from wild animals, plants, mushrooms, weeds	1	2	3	3
4	Products from aquacultures	3	2	5	3
5	Providing drinking and non-drinking water	4	4	4	4
6	Energy sources	1	3	2	3
	Food ESS	**12**	**19**	**19**	**21**
7	Purification of air and water from pollutants	5	4	5	4
8	Soil stabilization and regulation of erosion processes	5	5	5	5
9	Regulation of the water cycle - flood protection and drought protection	5	5	5	5
10	Providing habitat types and conditions for population continuation	4	4	5	5
11	Microclimate regulation	5	5	5	5
	Regulating ESS	**24**	**23**	**25**	**24**
12	Experience the connection with the environment	3	2	4	3
13	Carrying science researches and educational programmes	3	2	3	3
14	Historical and cultural heritage	1	1	3	4
15	Leisure and entertainment	2	1	4	3
16	Natural heritage, existence of protected areas	4	4	5	5
	Total cultural ESS	**13**	**10**	**18**	**18**
Total assessment:		**49**	**52**	**62**	**63**

Analysis of the assessment of ESS

Food ESS

Indicator 1 /Products from agriculture/ – The higher and maximum estimate (5) of this indicator in Lake Gala is due to the presence of pastures and the adjacent rice fields.

Indicator 2 /Products from livestock/ – The higher estimate /4/ of this indicator is due to the fact that in the pastures of the Gala Lake are fed and rest many animals (grazing and resting cows and sheeps).

Indicator 3 /Products from wild animals, plants, mushrooms, weeds/ – According to the director of Lake Gala National Park, 29 species of herbs are collected in the area of the lake, which explains the higher score /2/ of this indicator.

Indicator 4 /Products from aquacultures/ – The higher estimate /3/ of this indicator for Lake Vaya is due to the fact that in recent years it has regained its reputation as a source of fish and in the present moment fishing is estimated to be around 200 250 tons / Current state of the protected areas in Southeastern region of Bulgaria, 2014 / and is expected to grow in the future. The Lake Gala Park has been place for fishing until 2013, after which fishing there is banned. Currently fishing is in the Maritsa River, in the two dams built around the Maritsa River, as well as in the rice fields. For both lakes, plans are being made to phase out fishing, so higher estimates are expected in the future.

Indicator 5 / Providing drinking and non-drinking water/ – The waters of lake Vaya regulate and maintain high levels of groundwater in the area and this helps to use them as irrigation water in the adjacent areas of the lake. Lake Gala plays the role of a water reservoir, which, if necessary, takes over the excess water from the fields of rice, and in the summer it is used for irrigation. Therefore, an equal score /4/ on this indicator is given on both lakes.

Indicator 6 / Energy sources/ – The higher estimate /3/ of this indicator in Lake Gala is due to the presence of park wind power generators and, therefore, the lack of such in Lake Vaya.

Regulating ESS

Indicator 7 /Purification of air and water from pollutants/ - Both lakes are sediment and filter for polluted water from adjacent industrial plants, households and agricultural activities in the areas. In this respect Lake Vaya plays a more important role in people's lives because it is situated in the borders of the city of Burgas, with a population of 202 694 people (according to NSI data as from 31.12.2017). The lake is a filter for domestic waste water, water

contaminated by surrounding businesses, and especially the oil refinery, inert aggregate sludge and municipal waste landfill before it flows into the Black Sea. On the other hand, as the largest non-urbanized surface on the territory of the city and a living environment for different types of aquatic and moisture-loving chlorophyll plants, the lake purifies and dilutes the concentration of pollutants in the air of Burgas. So we can define it as the city's lung.

Indicator 8 / Soil stabilization and regulation of erosion processes/ - Maximum estimates for both lakes taking into account their importance in supporting soil fertility, related to improving the microclimate and maintaining the groundwater level, and their role as an obstacle to shore erosion. Passing into the lakes, the torrents of surrounding tributaries are calming down, thus reducing the transfer of sediment and soil erosion.

Indicator 9 /Regulation of the water cycle - flood protection and drought protection/ - Maximum estimates for both lakes taking into account their role as a buffer for torrential rainwater flowing from rivers and real barriers that reduce the risk of coastal flooding associated with ongoing climate change.

Indicator 10 /Providing habitat types and conditions for population continuation/ - In both lakesbiodiversity is extremely high, and therefore their importance as a "landfill" for biodiversity conservation and as a guardian of genetic resources is immense. The rating for Lake Vaya is slightly lower due to its proximity to a large city, busy roads, higher urbanization and pollution.

Indicator 11 / Microclimate regulation/ - Maximum estimates for both lakes as important factors for the local microclimate, especially for expected climate change in the near future.

Cultural ESS

Indicator 12 /Experience the connection with the environment/ - Outstanding natural resources and rich biodiversity are the basis for developing ecological tourism and recreation. Lakes diversify people's lives through the opportunities they offer for spiritual and aesthetic enjoyment from nature as well as for educational and scientific work. The estimates indicate insufficient use today and real potential for this in the future.

Indicator 13 / Carrying science researches and educational programmes / - Both lakes are very useful and favorite places for ornithologists. A regular visit by students, students and scientists to study biodiversity (birds, animals, plants) is organized. The evaluation of this indicator for Lake Gala is lower due to a lack of infrastructure and logistics. Opportunities and intentions for the future are greater.

Indicator 14 / Historical and cultural heritage / - Estimates in both lakes are currently very low, but opportunities for combining the extremely rich natural and archaeological monuments and landmarks in the areas as well as combining them with sea tourism are discussed.

Indicator 15 / Leisure and entertainment / - Opportunities for recreation and entertainment are much larger than the ones used so far. The rating for Lake Vaya is slightly higher because the territory is already the subject of specialized (mainly ornithological) tourism and sport fishing. There are currently discussions over the organization and construction of the necessary infrastructure in both lakes for the development of water sports, cycling, photo-tourism, hiking, fishing, etc.

Indicator 16 / Natural heritage/ - The unique biodiversity and natural resources in the areas of both lakes define them as sites with a special status in terms of conservation of the natural heritage. They are nature conservation sites of local, regional and international importance.

Association Green Strandja

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