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“

JOINT MODEL AND METHODOLOGY

FOR ASSESSEMENT OF THE ECOSYSTEM SERVICES

FOR THE LAKES VAYA (BURGAS) AND GALA (ENEZ)

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Content

Context

Lake Burgas or Vaya is the largest natural lake in Bulgaria. The lake is a shallow liman on the Black Sea coast, located west of Burgas. In its western part flows Aitoska River, Sunderere and Chukarska River.

Burgas Lake is part of the Burgas Lake Complex, one of the three most important wetland complexes for concentrated waterfowl on the Bulgarian Black Sea coast.

Burgas Lake is a site of extremely important international conservation importance declared for:

- protected area (33 BG0000273) under both directives - The Habitats Directive and the Birds Directive
- Ornithologically important place (BirdLife International, 1989) the lake is located on the Via Pontica migratory road and is one of the most important stations for bird migration
- Wetland of international importance under the Ramsar Convention (2003)
- CORINE place due to its European importance for the conservation of rare and endangered bird species (1998)

  The Vaya protected area of 75 ha covering 12% of the lake.

In the area of the lake there are 245 bird species, 71 of which are included in the Red Book of Bulgaria (1985). Of the species present, 105 are of European conservation importance, 9 of

them are endangered globally and 95 species (Standard Natura 2000 form) are endangered in Europe. The lake provides suitable habitats for 89 species of birds included in Appendix 2 of the Biodiversity Act and is of international importance for the wintering of species such as Cormorant, Swan, Swallow, Great White-fronted Goose, Brown-headed Duck, and Scotch Duck. Also in winter were the worldly endangered Dalmatian Pelican and Red-breasted Goose. The lake is one of the most important places in the country of importance to the European Union for the conservation of the Thorn-tailed Duck and the breeding small water bull.

The lake is subjected to strong anthropogenic pressure (waste water, construction and household waste, heavy building, noise, industrial fishing). The free movement of fish through the canal connecting the lake and the sea is obstructed because the canal is almost entirely enclosed. The lake is polluted by petroleum products, phenols and other chemicals as a result of the nearby oil refinery. All these factors can lead to a change in the quality of water, a change in the type and quantity of fish stocks and, respectively, in the food base for many protected waterfowl.

Ecosystem services

In the project work, the CICES classification will be used as a basic classification of ecosystem services (ESS). It is recommended for work on ecosystem services by the European Commission and MAES (Mapping and Assessment of Ecosystems and their Services) as well as the methodology used in the redefined project BG03 - MethEcoSMap "Methodological support for ecosystem services assessment and biophysical assessment "Of subprogram BG03.02" Biodiversity and ecosystem services "financed by FM / EEA.

According to the classification, ESSs are divided into:

- **Food** (food, genetic resources, medicinal plants, wood, fiber, etc.)
- **regulating and supporting** (climate, pollination, water circle, soil formation, water quality, biological control, etc.)

- **cultural** (recreational - recreation, spiritual benefits, aesthetic benefits, educational and scientific activity, etc.)

Methodology for assessment of ecosystem services

The methodology which will be used for ecosystem services (ESS) assessment of Lake Burgas (Lake Vaya) and Lake Gala near Enez will follow a national methodological framework for assessing the state of ecosystems in Bulgaria and their potential to provide services (in the process of validation).

In general the steps for assessing the ESS are 3: (1) Mapping ecosystems, (2) Ecosystems assessment and (3) Estimating the ESS, including defining the potential of ecosystems to provide services.

The following are the detailed steps:

Mapping of ecosystems

Mapping of ecosystems is based on:

- Use of available national freshwater ecosystems databases - Cadastre, LPIS, LSA, Corine;
- Use of pan-European High Resolution Layers;
- (HRL) of the Copernicus program;
- Use of satellite images;
- Drawing the final boundaries of the objects.

For mapping purposes, ecosystems are divided into types according to the so-called MAES typology (2013) of three basic types of level 1: land, freshwater and marine.

Below is the typology of freshwater ecosystems in Bulgaria:

	Sub-type	Description	EUNIS nomenclature	Types of water objects in Bulgaria
C1.	**Surface standing water (level 2)**	Lakes that are freshwater, semi-salted or salty, natural and artificial.	A2.1 – A2.8	**LAKES**
C1.1	Oligotrophic lakes	Water bodies of low content, predominantly acidic (pH 4-6). They are included and lead by moderate or high pH, calcareous or basic unpolluted poor in biogenic, not very common in Europe and known as the charophytes (C1.14) habitat with the use of peat and dystrophic waters (C1.4). Since they are poor on the biogens, the higher aquatic vegetation is poor.	A3.1 – A3.7	**L1, L2, L3, L11, L12, L13**
C1.2	Mesotrophic lakes	Lakes are relatively rich in biogens at pH 6-7. Sub-communities of Littorelletea uniflorae and Isoeto-Nanojuncetea. Slightly polluted or unpolluted plain lakes. A bed of charophytes could often be formed in the mesotrophic (C1.25), but also in the oligotrophic (C1.14) waters.	A4.1 – A4.7	**L4, L6, L8, L15, L16, L17**
C1.3	Eutrophic lakes	Lakes often grow blue-green algae with a higher or lower road, rich in biogens with a pH usually above 7. Eutrophic waters support the development of macrophytes.	A5.1 – A5.7	**L6, L7**
C1.5	Salty and brackish	Brackish, salty and hypersolid lakes.	A7.1 – A7.9, A.7A	**L8, L9, L10**

	lakes			
C1.6	Temporary lakes	Freshwater lakes that periodically dry in some areas. Habits of the drying phase are according to C3.5, C3.6 and 3.7.	B3.1 – B3.4	**L5**
C2	**Surface running water (Level 2)**	Running water, including springs and temporary (drying) water bodies		**RIVERS**
C2.1	Streams	Sprinkle except for those with abundant vegetation and swamps (D2.2, D4.1)		**R1**
C2.2	Fast flowing, stormy rivers and streams	Rapid stream rivers. The riverbed is usually rocky or rocky and sometimes sand and silt. Temporary or permanent litharge zones (C3) are formed. Include high, medium and low altitude flows with medium or low outflow rates according to WFD 2000/60/EPC.		**R2, R3, R8**
C2.3	Slowly flowing rivers and streams	Rivers with current without turbulence. The river bed is usually made of sand and mud. Temporary or permanent litharge zones (C3) are formed. Include medium and low altitude flows according to WFD 2000/60/EPC		**R4, R5, R6, R10, R11, R12, R13**
C2.5	Temporary running water	Temporary water basins that have water only at certain times of the year. Habits of the dry period are according to C3.5, C3.6 and C3.7. The following aquatic plants are characteristic: *Paspalo-Agrostidion*, *Parvopotamion* or *Sparganio-Glycerion fluitantis*.		**R9, R14, R15**
X03.	Brackish coastal lagoons	Coastal water bodies with varying salinity and water volume, separated from the sea by sand, gravel, and lesser rocks. The completely saline lagoons are of type X02. They are characterized by well-developed reedbeds and submerged vegetation.	EUNIS – X03	**L8, L9, L10**

Assesseemnt of the condition of the ecosystems[1]

The assessment of the current state of ecosystems is based on field studies through defined indicators. The indicators for assessment of the status of all ecosystem types in Bulgaria are hierarchically grouped in types and groups according to the recommendations of MAES (2013).

Key indicators that are used to assess the status of ecosystems are:

Conservation status of habitats and species

- Ecological status of water bodies
- Biodiversity status
- Presence of invasive species
- Hydrologic heterogeneity

The data sources used at this stage should be tailored to the specificity of each assessment indicator.

The main data used for the assessment are:

- Evaluation of the habitats under Art. 17 of the Habitats Directive
- Evaluation of the Water Framework Directive (WFD)
- Data on water, soil, air pollution
- Pressure / impact data causing changes in ecosystems (eg climate change, anthropogenic pressure, invasive species, etc.)

A detailed description of the steps to determine the status of freshwater ecosystems is given in the study: "Freshwater and Marine Ecosystems: Status, Services, Perspectives".

The overall assessment of each group of indicators proposed in the methodology (indicators of the status of ecosystems for freshwater ecosystems) is calculated as the average of the results for the indicators included for the specific sub-type of freshwater ecosystem. The final mark must be given as an integer. *(See Table 5 and 6 of the Methodology).*

[1] According to European Nature Information System (EUNIS), the typology of the rivers and lakes according to Frame Directive for waters and the national legislation for characterization of the water bodies (Law № H-4/2013)

Assessement of the ecosystem services

At this stage, information is collected on what types of ESSs are provided and / or sought, where and on what scale, in order to quantify the potential for ESS use and how this would affect the functioning of ecosystems. Possible sources of information can be:

- MOEW - EEA - Basin Directorates, National Database
- National statistics
- Municipalities
- National Cadastre
- Scientific publications
- Projects
- In-situ data
- Data sources from / within the EU
- Data from remote observations
- Direct polls and interviews with experts

The ESS is assessed on the basis of specifically defined assessment indicators. Freshwater ecosystem services indicators have been developed by MAES (2013).

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:

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

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

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.

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	Products from livestock				
3	Products from wild animals, plants, mushrooms, weeds				
4	Products from aquacultures				
5	Providing drinking and non-drinking water				
6	Energy sources				
	Food ESS				
7	Purification of air and water from pollutants				
8	Soil stabilization and regulation of erosion processes				
9	Regulation of the water cycle - flood protection and drought protection				
10	Providing habitat types and conditions for population continuation				
11	Microclimate regulation				
	Regulating and supporting ESS				
12	Experience the connection with the environment				
13	Carrying science researches and educational programmes				
14	Historical and cultural heritage				
15	Leisure and entertainment				
16	Natural heritage, existence of protected areas				
	Total cultural ESS				
	Total assessment:				

As a result of the surveys carried out for both lakes, the assessment of ecosystem services itself will be carried out according to the defined indicators for their current status and development potential separately

Association Green Strandja
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