
LAKE IN THE ȘTEFAN VODĂ AREA

ASSESSMENT REPORT



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Debreceni Egyetem
Környezetgazdálkodási és
Környezetpolitikai Központ



CONSILIUL RAIONAL
ȘTEFAN-VODĂ

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Introduction

The following analysis is carried out as part of the project for the reconstruction of the La Nihalcea area and aims to present proposals for plants that will be planted around the lake.

The goal of the project is the revitalization of the lake in the Stefan Voda district - to improve ecological situation of the pond, together with raising its eco-touristic attractiveness. Landscape protection, eutrophication prevention (phytoremediation), enhancing biodiversity and tourist development are taken into account.



The V-shaped pond located in southern Moldova is one of several ponds in the area. It is an attractive environment with a rich potential to perform a wide range of ecosystem services, that directly improve the quality of life. For example, supporting (nutrient cycling), provisioning (food, freshwater), regulating (climate regulation), cultural (aesthetic, spiritual, educational, recreational) functions improve security (secure resource access, security from disasters), health (feeling well, access to clean air and water) and social relations.

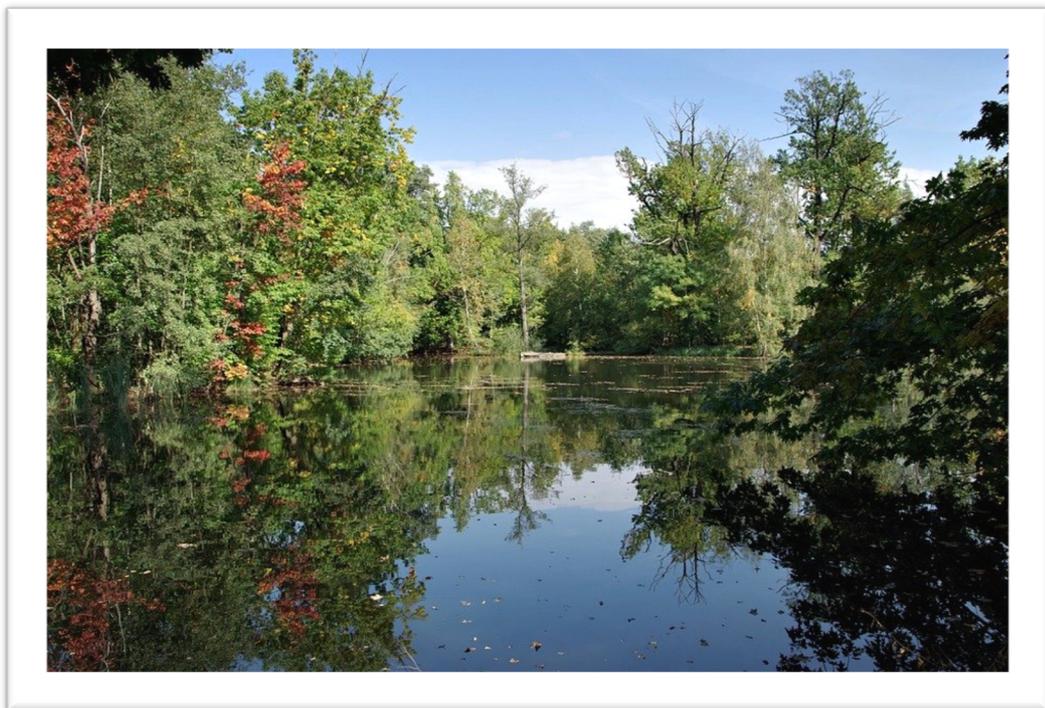


The characteristics of the district:

- ❖ Temperate continental climate with an annual average temperature from 10.5 to 11°C
- ❖ annual precipitation 450–550 mm.
- ❖ average wind speed 3–5 m/s

Benefits of planting trees and bushes around the lake:

- ❖ strengthens the shore
- ❖ the washed roots form excellent hiding places for fish and other aquatic organisms
- ❖ they constitute an environment, offering breeding places for birds, and a niche for other animals



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Vulnerabilities Moldova

Climate change is expected to cause southern and eastern Moldova, now semi-dry regions, to become dry. It can be expected that this will have a significant negative impact on forests and aquatic species

Terrestrial ecosystems

Rising temperatures force animals and plants to migrate to cooler areas in the north of the country, while new organisms appear. Some oak species have high adaptability and would be able to adapt to dry conditions in the central and northern parts of the country. Steppe plants are generally well adapted to high temperatures, although some species may suffer from a reduced population due to overgrazing.



Water ecosystems

Water quality is threatened by degradation due to natural, non-polluting factors. Thus, an increase in air temperature will lead to an increase in surface water temperature and a reduction in dissolved oxygen (DO). A decrease in the DO level combined with an increase in water temperature can affect the composition of the ecosystem, enabling the invasion of new thermophilic species and dangerous bacteria. These phenomena also support the eutrophication process.



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About the Lake

This study concerns a lake with surface of about 80 m², and surrounding area functionally connected with the lake. Lake is placed in Ștefan Vodă area. These hilly regions are part of the Moldavian Plateau.



Figure 1. Moldova elevation. 1 ft = 0.3048 m from: en-gb.topographic-map.com

The plants proposed were selected according to the water analysis and local climate characteristics. It is a eutrophic reservoir characterized by a high concentration of nutrients dissolved in water. Therefore, the study devotes a lot of attention to the problem of eutrophication. KCl salt was found on the lake shore, probably of anthropogenic origin. There was a salty-bitter, white sediment which indicates a slight salinity. Plants planted in saline soil have a problem with uptake of nutrients and water, despite the apparent abundance of soil. This phenomenon is called physiological drought. As a result, the plants are weakened, their resistance to diseases and pests decreases and they wither. Therefore, salinity-resistant plants have been proposed. Due to climate change, the climate parameters of the region have changed. The area is characterized by low rainfall amplitude and low humidity. Therefore, species resistant to and drought were chosen, striving for the highest possible number of native species. Aesthetic aspects and ease of maintenance were also taken into account.





Figure 2. Plant distribution

Actions that will be taken in frames of the project:



- ❖ Restoration of the pond buffer zone
 - Eradication of alien plant species
 - Planting autochthonous trees and shrub
- ❖ Reduction of soil erosion and fertilizers pervasion in the riparian zone
- ❖ Restoration of the pond waters
 - Water plants
- ❖ Restoration of fauna and flora species



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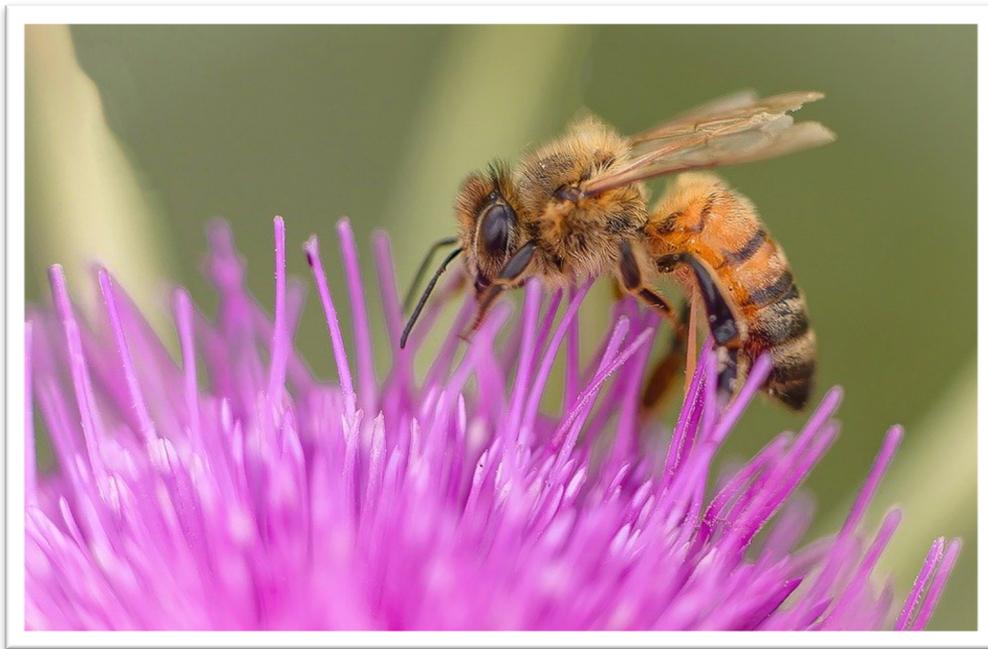
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Proposed plants

Bees are responsible for pollinating many plants that serve humans for food. Without bees, we won't have tomatoes, zucchini, apples, nuts or cherries, as well as rapeseed oil and many other vegetables and fruits that we eat every day. Therefore, it is important to provide them with habitat for life and reproduction. Such a habitat can be a lake around which honey plants bloom. In addition to protecting bees, an additional asset will be honey, which can later be collected and sold. The advantage of planting honey plants is a nice smell and appearance, which favors the development of tourism.



The increase in water fertility is a civilization problem. Eutrophication often leads to their degradation. Artificial reservoirs are particularly vulnerable to this phenomenon, and such is the lake in the Ștefan Vodă region.

Fortunately, there are other possibilities to prevent eutrophication. An effective way to reduce excess phosphorus and nitrogen is to introduce macrophytes into the reservoir.

Closer examination of the tank trophy and study of lake transparency is recommended. If exceeded nutrient standards are found, it is recommended to develop a remediation method. For example, by the Olszewski method.



An Olszewski tube is a pipe designed to bring oxygen-poor water from the bottom hypolimnetic layer of a lake to the top, in order for the device to act as a siphon. This is a very cheap method, but the positive effects of hypolimnion removal can be seen after several years of continuous use

Another method is lake aeration, bio-manipulation or chemical inactivation of phosphorus compounds, i.e. the removal of phosphorus compounds from the water by creating a sediment with iron or aluminum salts so that plants such as cyanobacteria cannot use it for blooming.

However, these methods should only be used if excessive amounts of nutrients are found in the lake after careful water analysis.



<http://wyborcza.pl/wiecejswiata/7,163812,23931902,wloskie-jeziora-dostaja-goraczki.html>



Utility value

In addition to aesthetic value, most of the presented species also have utility value. For example, *Epilobium angustifolium* is honey plant with high honey output. Contains vitamin C and provitamin A. Candle wicks were made from her cup fluff. In England and Russia, a substitute of tea was formerly cooked from fresh leaves, and young shoots and leaves were eaten raw as a vegetable. Rhizomes are also edible



Epilobium angustifolium

There are medical plants like *Viburnum lantana*, *Lythrum salicaria* or *Acorus calamus* which is widely used as a medicinal and cosmetic plant. Rhizome is used to flavor sugars, tinctures and liqueurs. It improves digestion, has a calming effect, helps in the fight against loot. Many health benefits! Bactericidal. Coastline strengthening. You can make jam from rhizomes. It is recommended as an additive to drinks (e.g. compotes, liqueurs and teas), salads and cakes and puddings.



Viburnum lantana



Lythrum salicaria



Acorus calamus



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Some of plants have edible fruits and can be used as a spices or for the production of juices, jams, compotes, jellies, marmalades, tinctures and dumpling fillings. Such plants are *Sagittaria sagittifolia*, *Rosa canina*, *Viburnum opulus*, *Viburnum lantana*, *Hippophae rhamnoides*, *Cerasus mahaleb* or *Prunus spinosa*.



Sagittaria sagittifolia



Rosa canina



Viburnum opulus



Viburnum lantana



Hippophae rhamnoides



Cerasus mahaleb



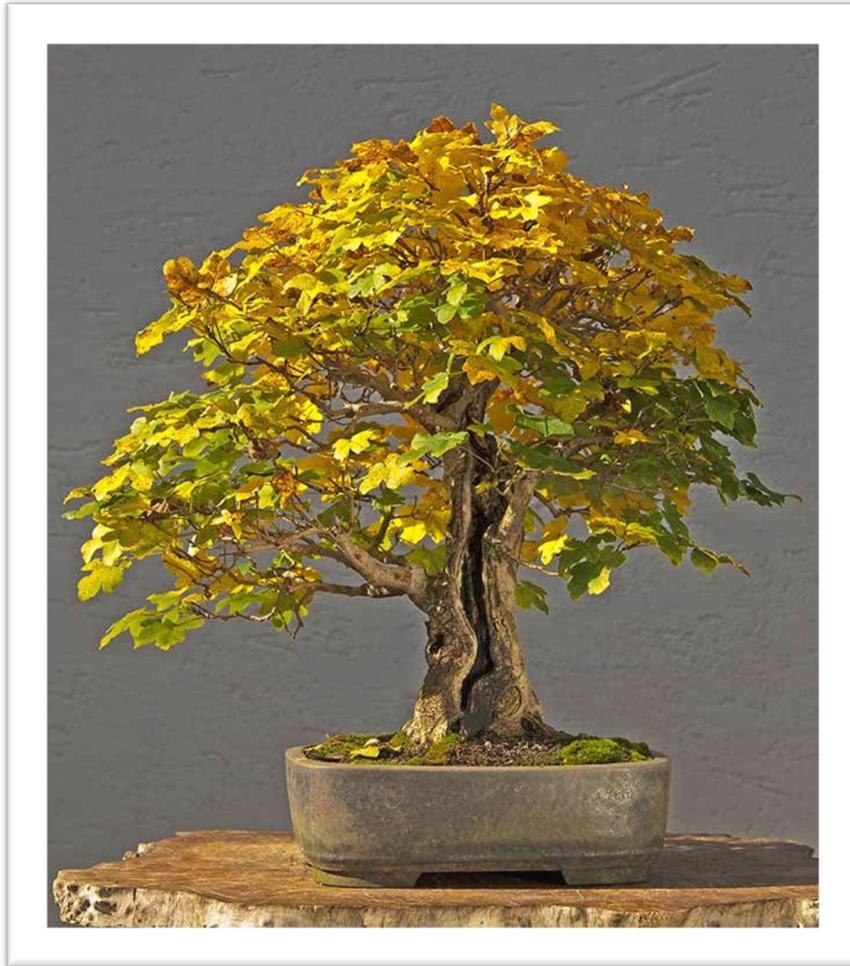
Prunus spinosa



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Several species are suitable for the production of bonsai trees: *Crataegus*, *Sorbus*, *Cornus*, *Berberis*, *Acer campestre*, *Ulmus minor*, *Cotinus coggygia*, *Potentilla fruticosa*.



Acer campestre

Summary

Water reservoirs are valuable elements of the landscape. As nature elements are habitats for many species of plants and animals. They affect the local climate and are also water reservoirs used for various purposes. The creation of an anthropogenic water reservoir is accompanied by a number of natural effects. It is important to take care of this reservoir, especially when it is subjected to anthropopressure of surrounding farms. The ecosystem, which is the retention reservoir, should be considered at the level of creative secondary succession, i.e. one that leads to the creation of an ecological system in a given place different from the original one. Initiating a new plants in this area triggers a set of reactions aimed at achieving maximum ecological balance.

