

## ECOLOGICAL RENATURATION PROCESS OF THE ZAGHEN POLDER IN TULCEA COUNTY

Ana JUVERDEANU

Scientific Coordinator: Prof. PhD Ana VÎRSTA

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd,  
District 1, 011464, Bucharest, Romania, Phone: +4021.318.25.64, Fax: + 4021.318.25.67,  
Email: tanaseanatulcea@gmail.com

Corresponding author tanaseanatulcea@gmail.com

### Abstract

*The article presents the evolution of the ecological renaturation process of the Danube riverbed on the territory of Tulcea county, namely the Zaghen Polder. The economic, geostrategic and biodiversity importance of the Danube valley has been written about since ancient times, and in 1910 the Roman researcher Grigore Antipa drew attention to the negative effects that the damming and draining of these wetlands for agricultural exploitation would have in the future. Following the historic floods on the Danube in 2006, this subject was reopened and as a result the Romanian legislators issued Decision no.1208 of 6 September 2006 approving the ecological and economic resizing programme in the Romanian sector of the Danube River Basin and its financing. The WWF International organisation, which campaigns for the implementation of the projects together with local decision-making institutions such as the ADDBR, provides important support in this process. A concrete example of the ecological restoration of a dammed area on the Danube is the Zaghen polder.*

**Key words:** Danube meadow, ecological renaturation, habitat, hydrotechnical works, Zaghen polder.

### INTRODUCTION

Ecological restoration is the process of restoring a degraded, damaged or destroyed ecosystem. It can involve the restoration of degraded land, renaturation processes in areas affected by extractive activities or pollution, as well as the reintroduction of species or the revitalisation of habitats in areas where land cover or population size has been significantly reduced by human actions (<https://wwf.ro/ce-facem/ape-dulci/reconstructie-ecologica/>).

Dumitrescu and Carsmariu (2014) have presented in an article on the development wetlands, the study aimed at the ecological restoration of Zaghen Lake. This wetland is located in the eastern region of Tulcea. Geographically, Zaghen Lake is located adjacent to the towns of Tulcea, Malcoci, Nufăru, and the area under reconstruction is about 200 ha. The Zaghen area is part of the Danube Delta Biosphere Reserve territory, and this territory of the Delta is a World Natural Heritage site.

It is claimed that, without these reconstruction and renaturation works, the lake enclosure will

be an unhealthy and unattractive area for tourism on the one hand and, on the other hand, it will not be able to function to take the water flows from the floods.

In order to support the importance of reconstruction of the enclosure Zaghen, Administration of the Danube Delta Biosphere Reserve (ADDBR) in partnership with the Tulcea City Hall have developed a project containing the most important benefits for the local community and the fauna of the area (Dumitrescu and Carsmariu, 2014).

### MATERIALS AND METHODS

The main functions of the floodplain are ecological, socio-economic but not in last row the biogeochemical (Mircea, 2012).

The aim and objectives of the proposed project are the following:

1. Restoring the natural habitat specific to the Danube Delta, namely the wetlands, by creating a favourable climate in which flora and fauna can develop natural resources such as: reeds, reeds, fish, birds (Dumitrescu and Carsmariu, 2014);

2. Maintaining the usefulness of the lake in mitigating floods in Tulcea Municipality (Dumitrescu and Carsmariu, 2014);

3. Maintaining the optimal level in Zaghen Lake by pumping/draining water from/into the Danube (Dumitrescu and Carsmariu, 2014).

Based on the above mentioned aims and objectives, a series of specific construction and hydrotechnical works were undertaken (\*\*\*2011).

These works ensure optimal conditions for the maintenance of a wetland ecosystem by creating a permanent water table and terrestrial refuge areas. The water level will be constant/fluctuating within the limits set by the contour dykes, but will also ensure the capture, retention and transit of floods with a probability of exceeding 1%, together with the two upgraded pumping stations (\*\*\*2011).

### Site works

State-of-the-art machinery and equipment have been used, which comply with standards regarding pollutant emissions and low environmental impact. The materials used to carry out the works were those characteristics of the area, i.e. the material resulting from excavation, decolourization, scraping, rectification of the riverbed, was used for the filling works (\*\*\*2011). In Figure 1 we can see the work done at Zaghen Polder.



Figure 1. Works carried out in Polder Zaghen (<http://www.coralconstructii.ro/en/rezervatia-biosferei-delta-dunarii/>)

The hydrotechnical works carried out within

the project initiated by ADDBR, according to the Environmental Impact Report for the Ecological Reconstruction Project in the Zaghen Polder of the Transboundary Biosphere Reserve Danube Delta Romania/Ucristia, 2013, foresee the following specific works:

1. Ecological reconstruction of specific habitat types of delta ecosystem (extension of the water span, creation of refuge areas);

2. Creation and control of the Zaghen Lake water regime;

3. Rehabilitation of the Zaghen – Danube connecting canal.

The connection of Zaghen Lake with the Danube is made by an artificial reversible channel of about 3200 m length, of which the actual channel is 3095 m long, the rest being areas connecting to the pumping stations (Figure 2).



Figure 2. Polder location towards Danube River and connecting channel (\*\*\*2011).

## RESULTS AND DISCUSSIONS

In accordance with the Decision of the Tulcea Local Council No 8/29 June 2016 the completion of these works led to the expected results, thus fulfilling the project's purpose and objectives. Therefore, the Zaghen polder has the following functions: biogeochemical, hydrological, socio-economic, and of course ecological function. Thus, if we refer to the hydrological function, the lake enclosure is involved in alluvial catchment. From a biogeochemical point of view, the lake takes

up, retains and recycles certain nutrients, including phosphorus and nitrogen, as well as denitrification through the mineralization of organic pollutants, thus ensuring a natural carbon cycle, and an anoxic regime is maintained at the surface layer of the soil (Suliman et al., 2019).

Following the completion of the ecological restoration works in the Zaghen area, which was aimed at initiating or accelerating the recovery of ecosystems, major changes were made in the physical as well as in the biotic component (Marinov et al., 2021).

### Ecological functions

From an ecological point of view, the Zaghen polder is a habitat for flora and fauna, it has become an ecosystem in which animals can manifest their essential functions, reproduction and development, as well as feeding. It has also found that the Zaghen polder offers migratory birds the right conditions for life (Figures 3, 4 and 5).



Figure 3. Wild duck (<https://filmaridrona.ro/>)



Figure 4. Wild duck (<https://filmaridrona.ro/>)



Figure 5. Crested Pelican (<https://filmaridrona.ro/>)

At the same time, zooplankton and phytoplankton regeneration took place, macrophytes and microbial biofilms are essential in the decomposition of plant waste, but also in the nutrient recycling process as macrophytes regulate microbial metabolism (Suliman et al., 2019).

The socio-economic function has been fulfilled, since the premises lake a contributed to the development of ecotourism, becoming a place of recreation, but also to education, by raising awareness of the importance of maintaining it in optimal parameters (Figure 6). It is possible to practise occupations specific to the area, collect plants, harvesting reeds and of course, fishing. So Zaghen has become a habitat for a population that has not been able to keep up with progress but is familiar with all that the delta space means (Suliman et al., 2019).



Figure 6. Polder Zaghen - drone view (own photo)

## CONCLUSIONS

The findings of this study showed that the Zaghen polder can recover and manifest its intended functions. Definitions mark this term as an enclosure of land, torn from either a sea or a lake, dammed and used in agriculture. In addition to its contribution to agriculture, it enjoys three other important benefits to the community, providing a habitat for plants and animals as well as a favourable ecotourism context for people.

The results showed that this 200 ha area undergoing ecological reconstruction was a real success, as it led to the conservation of biological diversity, maintenance of natural habitats and protection against flooding.

## REFERENCES

- Decision of the Local Council of Tulcea adopted at the immediate meeting of 29 June 2016 Decision No.8 on the allocation of the fixed assets resulting from the acceptance of the investment objective "Ecological reconstruction in the Zaghen polder of the transboundary biosphere reserve Danube Delta Romania/Ukraine" Local Council of Tulcea Municipality, Tulcea county, Romania Tulcea, meeting on 29 June 2016.
- Dumitrescu V., Carsmariu A., 2014. The lower Danube green corridor. Contributions to the analysis of the restoration opportunities for certain surveyed wetlands in the Danube floodplain, diversified by types of potential. The 2nd International Conference - Water resources and wetlands, 11-13 September 2014, Tulcea (Romania).  
<http://www.coralconstructii.ro/en/rezervatia-biosferei-delta-dunarii/>  
<https://filmaridrona.ro/>  
<https://wwf.ro/ce-facem/ape-dulci/reconstructie-ecologica/>
- Marinov M., Doroşencu A., Năstase A., Lupu G., Suliman I., Alexe V., Ibram O., Tudor I.-M., Trifanov C., Mierlă M., 2021. Fauna Inventory in the Zaghen Wetland after the Ecological Restoration Works. Scientific Annals of the Danube Delta Institute, 26.
- Mircea S., 2012. Wetland restoration programs in the Prut River Basin. Scientific Papers. Series E. Land Reclamation Earth Observation and Surveying, Environment Engineering, I, 73-78, ISSN-L 2285-6064.
- Suliman I., Ibram O., Tofan L., Tudor I.M., Doroftei M., 2019. Zooplankton communities as bioindicators in Zaghen Restored Wetland, Danube Delta Biosphere Reserve. Scientific Annals of the Danube Delta National Institute, "Danube Delta Technological Information Center", Tulcea, Romania, 24, 41-50.
- \*\*\*2011, Feasibility study for the ecological reconstruction in Zaghen polder in the Danube Delta transboundary biosphere reserve, Romania/ Ukraine, SC Gaz Control, Tulcea.