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THE USE OF WETLANDS AS SOCIO-EDUCATIONAL SPACES IN CHIAJNA COMMUNE, ILFOV COUNTY

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Abstract

This article discusses about the wetlands as areas of major importance for both biodiversity and socio-educational activities. Generally, wetlands located near densely populated urban areas, are oases of escape and educational spaces, relaxation areas where nature can be enjoyed and discovered. The site studied in this article is in Chiajna commune, in the immediate proximity of Bucharest. The commune dispose of natural spaces with a rich biological diversity, located in the outside urban area of Chiajna commune, where the Dâmbovița river creates a flood plain. This article proposes to identify and classify the flood plain ecosystem services by presenting them as inputs for valuing a sustainable manner in the area. Although undeveloped, this floodplain is a point of attraction for the inhabitants of the area, with a pronounced potential for recreation and leisure. Following research was developed as a planning solution which respects the natural character of the area by maintaining habitats and biological diversity. The floodplain is also designed to raise awareness and inform residents about its importance and fragility

Key words*: wetland, ecosystem services, planning solution, Chiajna commune, floodplain.*

INTRODUCTION

In the last 30 years, the process of urbanization has led to major environmental changes around the world, and these changes will continue because by 2050 most of the world's population will live in urban areas (Ahn & Schmidt, 2019). The figures show an increase in the urban population, this trend is still upward, so worldwide the urban population has increased from 31.3% in 1960 to 55% in 2019 (https: //data.worldbank.org/,2019). Urban pressure plays an important role in transforming and diminishing the most vulnerable areas. As a consequence of urban sprawl and human activities, wetlands near cities are declining dramatically (Jia, Ma, & Wei, 2011) simultaneously with the ecosystem services. Data show that wetlands are disappearing three times faster than forest ecosystems. Globally, in the last century, there has been an estimated reduction of wetlands between 64 and 70% (***, 2015). Loss and degradation of wetlands have a major impact on the economic and social environment through increased risk of floods, declining water quality with a direct impact on public health and affecting cultural values and living conditions(***, 2015).

Since they are fragile ecosystems, but at the same time represent large reservoirs of biodiversity and areas of recreational activities, subject to urban pressures and various threats, they become, in the current context, "research laboratories" we have to focus all our attention on.

Urban wetlands are seen as an integral part of the landscape and perceived as a complex ecosystem composed of ecological, social and economic factors (Jia, Ma, & Wei, 2011). In fact, when analysing these complex ecosystems, ecosystem services highlight features that emphasize the ability to regulate the microclimate, maintaining water quality, control and maintenance-prevention of floods, recreational areas and relaxation for those living in proximity (Jia, Ma, & Wei, 2011). Changes are also being made to the ecosystem services of these wetlands at the same time with the intervention and pressure on wetlands (Ahn & Schmidt, 2019).Moreover, these wetlands prevent and protect against floods, acting as natural sponges that absorb and then release water more slowly from precipitation, snow or floods, aided by nearby or indoor herbaceous and woody vegetation and contribute to improving the microclimate by providing

humidity and by decreasing the temperature (Jia, Ma, & Wei, 2011).

Therefore, the article aims to analyse urban wetlands as areas with major impact for biodiversity and socio-cultural activities in densely populated urban areas. They are perceived as escape oases and educational spaces, spaces for relaxation and leisure in the middle of nature or spaces for discovery and awareness of the natural environment.

The study area that we will investigate in this article is located in the administrative area of Chiajna commune, near Dudu and Roșu localities and is part of the hydrotechnical infrastructure of the Dâmbovița river. Located on the course of Dâmbovița, the studied site has undergone several changes over time. This fact was determined by changes in the configuration of the Dâmbovița river, caused by the major actions and projects of regularization and sewerage, started in 1868 and then continued at different periods of time until 1985-1987 when the Dâmbovița riverbed was dammed (***, 2008) (Figure 1).

Floods and other actions that could have endangered the neighbouring areas were prevented by building the Morii Lake, the largest body of water in Bucharest, creating lake areas (***, 2008) and wetlands of the type of hydrotechnical accumulation studied in Dudu. (Figure 2).

Figure 1. Dâmbovița River- drone photo, source: Atena Proca

Figure 2. Hydrotechnical accumulation on the Dâmbovița river at Dudu - drone photo, source: Atena Proca

The studied area has undergone several transformations over different historical periods, being presented as a swampy land subject to anthropogenic transformations. In the descriptions and specifications of eng. A. G. Vuzitas (Vuzitas, 1936) the area upstream of the Ciurel dam was a difficult area, with floodable portions, with many mills that used the waters of the Dâmbovița River changing the hydraulic regime of the river. The situation caused a series of undesirable events by generating "disturbances in the hydraulic regime of the natural and regularized course of Dâmbovița" (Vuzitas, 1936). Thus, the mills actively intervened by using the river water for their operation, the owners modifying and intervening in the river flow by restricting the water at will, causing quite a few problems downstream of the Ciurel dam, in the urban system of Bucharest (Vuzitas, 1936).

Along with the systematization and sewerage works, new projects started in 1942 and then continued after 1944 aimed at “the rectification and arrangement of the riverbed” (Stematiu & Teodorescu, 2012).These works took place between the Ciurel dam and the Roșu commune in order to regulate the course of the river and at the same time to rehabilitate the meadow, preventing the danger of floods for the Bucharest neighbourhoods and nearby localities (Stematiu & Teodorescu, 2012). An important moment in the configuration of the space was the construction of the permanent accumulation by building an earth dam upstream of the Ciurel road starting with 1985, when Lake Dâmbovița, best known as Lake Morii, was created on an area of 241.5 ha with a volume of 14 million m3 (***,2017).

The paper aims to present the wetland along the Dâmbovița River, near the densely populated urban areas of Chiajna commune, which are in the process of densification and continuous development. The article emphasizes the importance of this free space with natural value, with a mosaic of landscapes, used as a space for relaxation and leisure and wants to highlight the ecosystem services that accompany biodiversity. The research objectives focus on identifying and classifying vegetation, zoning green spaces with development potential, capitalizing on landscapes and developing proposals for activities that highlight the potential of the site.

MATERIALS AND METHODS

The studied wetland is the reserve of space that balances the urban context of the whole commune, because, according to statistics, almost the entire surface of the commune is integrated in the built-up area. With the massive migration of Bucharest residents to areas with territorial availability, Chiajna commune has tripled its number of inhabitants in the last 20 years (Table 1) (https://insse.ro/, 2017).The need to expand the built-up area (on almost the entire administrative area) in Chiajna arose as a result of the transformations after 1990, when agricultural lands became private property and more and more people from Bucharest acquired properties in Chiajna (Haneș, et al 2016). The real estate sector became very dynamic in the mid-2000s when more and more land was bought for housing construction (Haneș, et al 2016).

Table 1. The evolution of the number of inhabitants in Chiajna commune, Ilfov county
data source https://insse.ro/, 2017

Locality	Year		
	2000	2017	2018
Chiajna commune (Ilfov county)	7300	19800	22700

The works carried out upstream of Lake Morii are part of the flood protection infrastructure. Thus, the studied area is identified in the The General Urban Plan of Chiajna commune with several uses: a water surface area was established (UTR Exla), and green spaces with recreation and rest functions (UTR Vp) (***, 2013), adjoining with living areas and other activities. From the study of the urban documentations of Chiajna commune (***, 2013), but also of the integrated local Strategy for sustainable development of Sector 6 (***, 2017) it is easy to notice that the built-up area expanded (in Chiajna commune) due to a need for leisure spaces for both the inhabitants of Chiajna commune and for those of Sector 6 in Bucharest.

In this context, regular field visits were carried out between March and June 2020, simultaneously with the study of the bibliography to obtain detailed information about the site. According to the findings, there is a bibliography that gives details about the hydrotechnical characteristics of the area, but there are only a few studies and information on biodiversity and wetland landscapes. This highlights the marginal nature of the site, as it has never been researched and popularized for its natural value.

The accumulated information was interpreted, resulting in zoning of the site for a better representation of the studied areas; associations of vegetation in meadow areas were identified, as well as classifications of landscape typologies accompanied by inventory of activities encountered in the field. Photographs and field sheets were taken for a rigorous research.

The research was carried out following these steps (Figure 3).

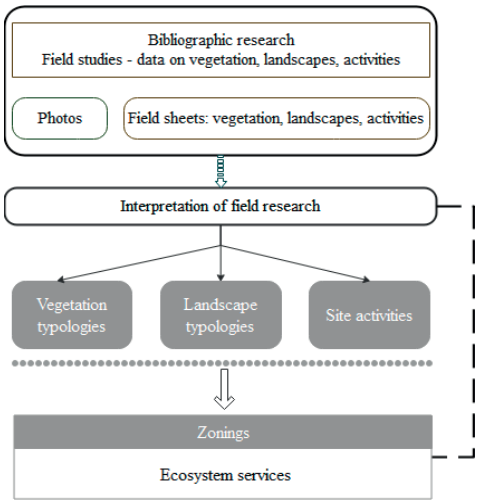

Figure 3. Conducting research

All the information was analysed and transposed in graphic form for a better clarity of the context and to be able to generate possible proposals regarding the future solutions for educational and leisure activities.

RESULTS AND DISCUSSIONS

The studied wetland is an important area for its ecological values, for its importance in flood prevention, but especially for ecosystem services: plant species adapted to the meadow environment, ecological diversity, habitats for wild bird species, aquatic ecosystems. The researched site was divided into three areas - A, B and C, corresponding to the three parts, which are separated by dams (Figure 4).

Figure 4. Zoning of the studied site, by Atena Proca

These three areas are characterized by various types of landscape, but also by vegetation with alluvial soils, swamps and ditches caused by stagnant water resulting from rains, floods and melting snow.

Being a floodable area, which is part of the flood protection infrastructure on the Dâmbovița River, the researched site has plant compositions that developed according to the activities and functions in the neighborhood or the interventions in infrastructure projects (Figure 5).

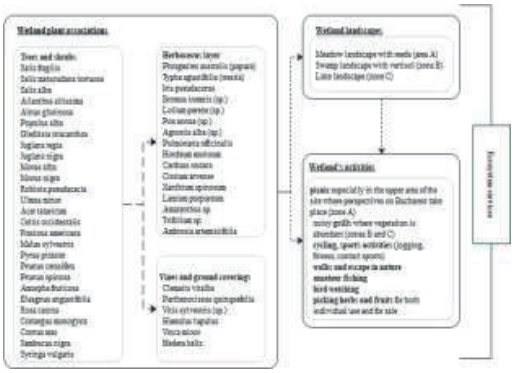

Figure 5. Plant associations-landscapes-activities

1. *Zone A*

Having the appearance of a floodplain, the landscape in zone A develops on two well-defined levels: the lower part determined by the lake basin, with a high degree of humidity, invaded by reeds and the upper part with abundant woody vegetation represented by large areas of trees and shrubs.

The Table 2 show us the representative species on vegetation floors, where predominant for this meadow landscape are the tall hygrophilous grasses represented by C*arex riparia, Typha latifolia and Phragmites communis*.

Area A (Figure 6) is accessible and subject to anthropization, and residential buildings have already been built around it.

The usual activities that take place in this area are walking, cycling, jogging, picnics, training and bird watching.

Figure 6. Zone A Meadow landscape with reeds, by Atena Proca

Figure 7. Swamp landscape with vertisol, by Atena Proca

Table 2. Vegetation typologies on zone A

Vegetation typologies		
Trees and shrubs	Vines and ground cover plants	Herbaceous layer
Salix matsoudana tortuosa Salix alba Ailanthus altissima Gleditsia triacanthos Juglans nigra Juglans regia Morus alba Morus nigra Robinia pseudacacia Ulmus minor Acer tataricum Celtis occidentalis Fraxinus americana Prunus cerasifera Eleagnus angustifolia Rosa canina Sambucus nigra Syringa vulgaris Rubus sp.	Clematis vitalba Parthenocissus quinquefolia Vitis sylvestris Humulus lupulus Vinca minor Hedera helix	Phragmites australis (papura) Typha agustifolia (trestia) Iris pseudacorus Bromus inemris Lolium perene Poa annua (sp.) Agrostis alba (sp.) Pulmonaria officinalis Hordeum murinum Carduus nutans Cirsium arvense Xanthium spinosum Lamium purpureum Amaranthus sp. Trifolium sp.

2. *Zone B*

Zone B has a special feature since it is an area with a dynamic swampy landscape that transforms completely when there are variations in humidity. The marshy area with patches of *Salix alba* and herbaceous species from the second part of the lake, dried especially in the central part, leaves room for the vertisol to take on various shapes, which arouse the curiosity of visitors. In this area the dominant species are represented by *Salix alba, Equisetum arvense, Achillea millefolium, Coronilla varia, Plantago sp., Berteroa incana, Ambrosia artemisiifolia, Hordeum murinum, Carduus nutans, Cirsium arvense and Xanthium spinosum,* with the swamp's landscape with vertisol (Figure 7).

The activities encountered in the area include the walking, educational exploration, cycling, jogging, and bird watching.

3. *Zone C*

The third area looks like a lake landscape, with high humidity that persists over time. It is an area with a great diversity of environments, a greater diversity of species, where the marshy vegetation is associated with the aquatic one (Figure 8)

Figure 8. Lake landscape, by Atena Proca

On this lake landscape the activities as walking, cycling, jogging, fitness, barbecues, fishing and bird watching are made almost all year round, but especially from spring to autumn when plant species cover this area. In Table 3 we are specified the vegetal typologies from woody to herbaceous species.

Table 3 Vegetation typologies on zone C

Vegetation typologies		
Trees and shrubs	Herbaceous layer	Emerging vegetation (on the banks)
Salix fragilis Salix matsoudana tortuosa Salix alba Alnus glutinosa Populus alba Populus tremula Gleditsia triacanthos Juglans nigra Morus alba Morus nigra Ulmus minor Celtis occidentalis Fraxinus americana Prunus cerasifera Prunus spinosa Amorpha fruticosa Eleagnus angustifolia Rosa canina Crataegus monogyna Sambucus nigra Syringa vulgaris	Holcus lanatus Achillea millefolium Festuca sp. Salvia sp. Polygonum sp. Carex sp. Lotus corniculatus Pulmonaria officinalis Euphorbia sp.	Phragmites australis Typha angustifolia Bolboschoenus sp. Lysimachia sp. Carex sp.

Having an area with increased biodiversity very close to inhabited areas, where people come in

contact with nature, it is appropriate to develop socio-educational activities and conduct awareness campaigns to maintain and protect this wetland. Sustainable protection and management mean ecological, social, and cultural benefits that translate into ecosystem services. In this study the ecosystem services are identified with a great diversity of flora and fauna species, habitats of wild bird species, clean water resources, lake ecosystems, promenade spaces, where residents and visitors can meet nature, focusing on their well-being or practicing sports in nature (Walking, cycling, jogging, fitness). The cultural and aesthetic value of these spaces is an attractive factor that determines more and more visitors spend more time finding out more about the place. On the other hand, wetlands are appreciated for the role they play in relaxation and leisure activities, but also for scientific and cultural ones. (Jia, Ma, & Wei, 2011).

CONCLUSIONS

In the contemporary confrontation with urban development, the integration of wetlands in this dynamic can be one of the essential points that will make cities more resilient.

The development of these wetlands with park functions is a new option for the protection of habitats, the enhancement of landscapes, the development of ecological education activities and relaxation and leisure activities, as well as a means of raising awareness about to the environment. Urban wetlands have a great cultural significance by creating different types of landscapes, by capitalizing on the great diversity of environments, especially since the areas in the urban environment are limited and subjected to continuous pressure. When urban development affects wetlands, the associated ecosystem services may change.

That is why the arrangement of wetlands can be perceived from the very beginning as an area that facilitates and develops the natural heritage, the diversity of landscapes, leisure and sports activities and last but not least process related to the research and monitoring of biodiversity.

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