THE IMPACT OF SHORT-TERM RECREATIONAL ACTIVITIES ON THE HABITAT OF FLOODPLAIN VEGETATION IN THE URBAN ENVIRONMENT

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Abstract
Forest vegetation is one of the main elements of the landscape image. These fragments form a landscape and have irreplaceable microclimatic and ecological functions in the landscape. Development and urbanization of natural localities in Petržalka accumulate many inhabitants in these parts of the natural floodplain forest ecosystem. This concentration of the population poses a danger to ecological stability, and biological balance and, in some cases, disrupts the ontogenesis of individuals. The environmental conditions and the structure of the forest are the most important individual factors necessary for the proper function of the ecosystem. As a result of frequent short-term recreational activities in exposed and marginal forest areas, mechanical damage to trees and herbs is also frequent. A direct example can be the destruction of greenery or damage to the environment, which can include stepping on sidewalks in addition to reserved areas or a form of alienation of young plants. In this paper, we focus on mapping the changes in morphogenesis and health status of woody plants caused by recreational activities.

Key words: fragmentation, floodplain forest, countryside

Introduction
The relationship between extra-urban, intra-urban, and anthropogenic activities has many aspects relevant for consideration. The landscape that surrounds us with all its elements is a consequence of the interaction of natural and human factors. Plant communities can adapt to the anthropogenic influences which they are exposed. Short-term tourism is also one of these impacts. In the lowlands of Slovakia, the most common type of short-term tourism is hiking and cycling. The basis of hiking and cycling lies in the activities that accompany movement in the natural environment with a purpose. (Matlovičová, 2015) By appropriate management of the human activity, we can preserve and develop the natural elements of the landscape and thus prevent their devastation. (Plesník, 2010)

Material and methods
In the research process, we used standard methodological procedures developed on a survey of currently available sources of information and a field survey. First, we had to determine the site to evaluate the interest area. The area of interest was selected using various map materials, e.g., military mapping, orthophoto maps, and vector maps of the current state of the area. According to predetermined criteria, was the selection of research areas possible, the monitoring areas had to contain fragments of floodplain forests and anthropogenic activity to happen.
The location of the monitoring area in the field was using the Handheld Nautiz X6 device and the MAPUJ application. During the terrain research, we directly recorded the attributes of individual polygons and points.
To evaluate the current state of tree species in the model area, we used the methodology of the Arboricultural standard from 2019. In the field, we evaluated the health of the trees based on Arboricurtural standards. The health status of the tree is assessed based on a summary analysis and a concurrence of several phenomena affecting the integrity of the individual:
- mechanical damage,
- infestation by wood-destroying fungi, xylophagous insects,
- the presence of coarse dry branches,
- the presence of cavities and exits,
- the presence of defective and damaged branches
- other damages caused by human activity (Arboricultural Standard, 2019)

Further data processing took place in the QGIS free-and-open-source (FOSS) geographical information system (GIS).

Results

The solved area is located directly near the residential complex Slnečnice on the merge of Petržalka. Inhabitants use this fragment of the forest as a communication channel to reach the main course of the Danube. Activities performed in this location mainly affect the plant floor and partially the shrub floor. (Heinrichová, Reháčková, 2013) The woody plants on the solved polygon were most vital, there were many outcrops on the plant floor. The age of the tree growth averaged around 30 years (28.4 years).

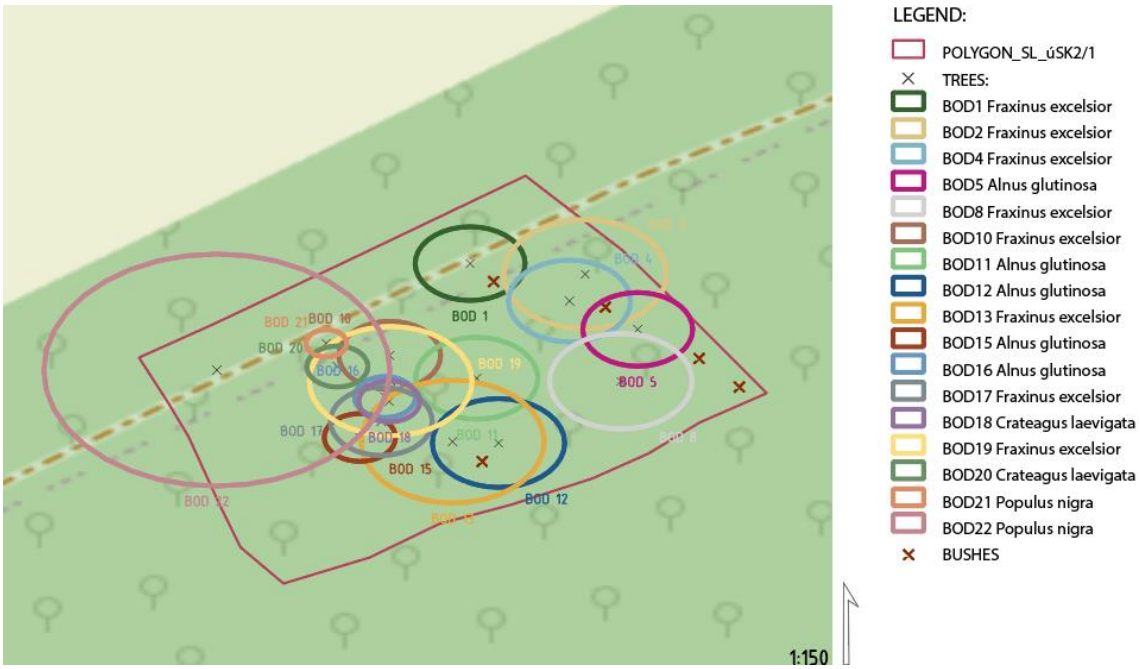

Fig. 1: inventory area at a scale of 1: 150

Populus nigra, whose age is a calculation, deviates from this average in age intended for approximately 141 years.

Tab. 1: percentage of tree species in the locality

Name	count	Percentage
Fraxinus excelsior	8	36.4
Alnus glutinosa	8	36.4
Crateagus laevigata	3	13.6
Sambucus nigra	2	9.1
Populus nigra	1	4.5

The species representation of trees according to Viceníková 2003, recalls the species composition of floodplain willow-poplar and alder forests. These habitats occur in the vicinity of large rivers and are linked to their aquatic regime. (Viceníková a Polak, 2003) There was no visible damage to the stoma stump due to frost or human activity. Human activity affects the floodplain community overall. Disturbed forest areas are exposed to invasive plant species, which were present near the interest polygon. The Forest community with its tree population creates phytoclimate overal. (Rožnovský, Litschmann, (ed) 2003) The crossings open access to adverse weather conditions, and disturbing biological processes (tree growth, rejuvenation), and the forest is rapidly receding. As a result, is the rapid outflow of rainwater, reducing groundwater status. In the area was recorded direct damage to the natural environment, namely footpaths and damage to the assimilative parts of plants. By damaging the assimilative parts of invasive species, their reproduction also occurs, which affects the diversity of floodplain forests.

Fig. 2: images of damage found at the site

Discussion

Floodplain forest habitats in the urban environment of Bratislava are under pressure and stress increases caused by anthropogenic factors. The development and urbanization in Petržalka represent a violation of ecological stability and biological balance. These led significantly contributed to the fragmentation of the remains of Bratislava floodplain habitats in the studied area. A forest is a complex of biotic and abiotic elements defined by time and space. At the same time, it is the societies of many organisms that implement, and interact with each other, and their complex interactions affect the ecosystem. (Hutárova, 2011) Floodplain forests are azonal forest communities located along the longitudinal, regularly, and irregularly water and flood regime. These bioclimatic conditions conditioned the development of organisms that adapt to waterlogging. Habitats of floodplain stands have been associated with periodic water fluctuations. By disrupting the water regime of the Danube, the conditions for the growth of floodplain forests have changed. (Viceníková a Polak, 2003)

Conclusion

Based on an overview of the topic, the work succeeded in examining the relationships between habitats and external anthropogenic influences on the current state of floodplain vegetation. In this case, tourism affects the plant floor and the spreading of invasive plants. By unintentionally damaging and assimilating parts of plants, they inadvertently help their spread. Participants in individual types of tourism work on ecological balance very differentiated. The collection of plant material and young plants is also a problem. These deficiencies can be remedied by proper management. Negative phenomena can be minimized by designing a physical barrier and introducing periodic inspections and removal of invasive plant species. (Hutárová, 2011)

References

Matlovičová, Kvetoslava, Radoslav Klamár, and Mirosław Mika. (2015). Turistika a jej formy. Prešov: Grafotlač Prešov, s. r. o.

Plesník, Pavol. (2010). “Vplyv Cestovného Ruchu Na Biosféru.” Acta Geographica Universitatis Comenianae 54 (1): 75–80.

Arboricultural Standard. 3: Trees Condition Assessment. 2019. Slovenská poľnohospodárska univerzita v Nitre, Slovakia. ISBN: 978-80-552-2013-0

Heinrichová, Miriam, a Tamara Reháčková. Aktuálne Problémy Krajinnej Architektúry a Krajinného Plánovania: Zborník Vedeckých Príspevkov: [recenzovaný Vedecký Zborník]. 1. vyd. Bratislava: VEDA, vydavateľstvo Slovenskej akadémie vied, 2013.

Viceníková, Andrea, and P. Polák. (2003). Európsky Významné Biotopy Na Slovensku. Štátna ochrana prírody SR v spolupráci s DAPHNE - Inštitút aplikovanej ekológie. ISBN 80-89035-24-8.

Rožnovský, J., Litschmann, T. (ed): Seminář „Mikroklima porostů “, Brno, 26. března 2003, ISBN 80-86690_05-9, str. 1-14

Hutárová, D. (2011). “Changes in Floristic Composition as a Result of Floodplain Forest Ecosystem Disturbance.” Životné Prostredie 45 (4): 212–16.

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Souhrn
Terénním výzkumem jsme ověřili současný stav a druhové složení fragmentu lužního porostu v blízkosti městské části Petržalka. Složení rostlin poukazuje na nepřímé zásahy antropogenních faktorů do struktury studovaného biotopu. Pro zachování těchto biotopů je nutné správně nastavit management dané lokality a minimalizovat antropogenní zásahy do rostlinného patra. Flóra lužních lesů se mění a je závislá na mnoha rušivých faktorech, jejichž eliminací se do popředí dostávají druhy, které nejsou součástí lužních společenstev.

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