CULTURAL ECOSYSTEM SERVICES OF GREEN INFRASTRUCTURE IN A NEWLY CREATED RURAL RECREATIONAL SPACE

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Abstract

The paper focuses on ecosystem solutions in rural landscapes for preserving the authenticity and cultural-historical identity of the area. The subject of the study is a public space in a rural settlement, located in a traditional agricultural landscape in southern Slovakia, dominated by a water surface, with an adjacent natural community of floodplain trees. This neglected natural habitat, located almost in the centre of the village, has enormous potential for the creation of a new recreational space. The existing green features around the water feature form an important part of the natural environment and preserve the legacy of an almost undisturbed rural landscape. The landscape architectural design sensitively complements the unused space with new natural solutions that will make the area more attractive to the general visiting public. The design solutions take into account the protection and support of sensecent trees in close proximity to the water surface. Ecosystem solutions contribute to the creation of a cultural environment for the public, with an emphasis on preserving and supporting the natural habitat and traditional rural setting.

Key words: recreation, biodiversity, landscape architecture, environmental education, green infrastructure

Introduction

Water areas are an important element of the recreational landscape. Their modification for recreational use and at the same time protection of rare sites and habitats represents one of the main challenges in landscape design (Supuka, 2013). The unused area around a water feature in a rural area in the village of Bajč presented such a challenge. Ecosystem-based solutions contribute to the creation of cultural environments for the public, emphasizing the preservation and promotion of natural habitats and traditional rural settings (Kuczman, Bechera, & Tóth, 2022). The variety of recreational activities and services provided, especially social services, has a major impact on shaping the landscape character (Čakovská, Bihuňová, Hansen, Marcheggiani, Galli, 2019, Čibik, Jankechová, 2023). Cultural ecosystem services could be one of the ways to achieve awareness of social-ecological aspects, as different study results show the links between cultural ecosystem services and social sustainability of cities (Riechers, Barkmann, Tscharntke, 2016, Back, Čibik, M., 2022, Čibik, et al., 2022, Kuczman et al., 2024.). Various studies map the preferences, attitudes or values of citizens, in relation to the natural landscape and its use. For example, as (Buchel, Frantzeskaki, 2015) showed citizens' preferences for types of natural (rural) areas and showed that people prefer those natural features of nature that they cannot experience in their everyday environment, e.g., high valuation of silence and tranquillity by urban dwellers. The present paper presents landscape-architectural solutions based on similar requirements of the inhabitants for the use of the area in question.

Materials and methods

The subject of the study is a public space in a rural settlement, located in a traditional agricultural landscape in southern Slovakia, dominated by a water surface, located in a rural environment, with an adjacent natural community of floodplain trees. The municipality falls within the Nitra municipality in the cultural region of Podunajsko. The potential vegetation is dominated by ash-birch-oak forests in the catchment areas of large rivers (hard floodplain forests), willow-poplar forests in the floodplains of large rivers (soft floodplain forests), oak-oak forests and ceramic-oak forests, Carpathian oak-hornbeam forests, lowland hygrophilous oak-hornbeam forests. Soil composition is dominated by floodplain and alluvial soils, with cattail soils occurring on sands. The geological substrate of the village site consists of Neogene strata,

which extend practically across the entire Danube Plain to greater depths. Thin layers of sands and soft sandstones, which are up to 1 metre thick, alternate with layers of clay 20 to 30 metres thick. The sand layers are the carriers of artesian waters.

There is a protected bird area Dolné Považie, a biocorridor of regional significance of the river Žitava and a biocentre of regional significance, biocorridors of local significance of individual canals. The natural dominant feature of the area is a water area with natural vegetation. The surrounding public roads are drained by concrete gutters into the water area. The resulting water area forms a dominant part of the designed area, which fundamentally regulates the water regime in the village. With the surrounding natural vegetation, it completes the image of the rural landscape. Private plots of family houses surround the area from the eastern and western parts. The area is surrounded to the south and north by a municipal road, see Fig. 1.

Fig. 1: Developed area of water surface in relation to the urbanized environment (Kuczman, G., et al. 2024).

A dendrological survey was carried out on the territory in question, where 256 trees and 44 stands of non-forest woody vegetation were inventoried. 22 taxa were identified (*Acer saccharinum* L., *Sambucus nigra* L., *Prunus spinosa* L., *Salix alba* L., *Prunus* L., *Morus alba* L., *Malus* Mill., *Juglans regia* L., *Tilia cordata* Mill., *Robinia pseudoacacia* L., *Acer campestre* L., *Paulownia tomentosa, Ailanthus altissima* (Mill.) Swingle, *Populus alba* 'Pyramidalis'*, Salix cinerea* L., *Prunus avium* L., *Salix erythroflexuosa*, *Picea pungens* Engelm., *Platycladus orientalis* (L.) Franco, *Pyrus communis* L., *Symphoricarpos albus* (L.) S. F. Blake, *Ligustrum vulgare* L.). Of these, 2 taxa of coniferous species (*Picea pungens* Engelm., *Platycladus orientalis* (L.) Franco) outnumbered the other 20 taxa of deciduous species. The invasive species *Ailanthus altissima* (Mill.) Swingle is found in the area.

Fig. 2: View of the original senescent willows (*Salix alba* L.) and the water surface (Kuczman, G., et al. 2024).

A research by design method was implemented in the study, in which the focus is on defining key design principles that are applied in landscape architectural solutions. The solution is applied in two main phases, namely analysis, which are addressed in the broader context of functional and spatial analysis, landscape analysis and dendrological analysis. The initial part analyses the requirements of the residents for the reclamation area to be addressed, which have been complemented by the requirements of the municipal councillors. The second phase, the design part, consists of a landscape-architectural design in which social aspects are implemented, in line with ensuring the continuity of the green infrastructure of the rural space.

Results

This neglected natural habitat, located almost in the centre of the village, hides a huge potential for the creation of a new recreational space. The requirements for determining the spatial layout and functional use regulations on the basis of the land use plan were the creation of protective greenery and accompanying greenery along the streams and roads in the open countryside, and around the production areas, to propose the creation of new and maintenance of existing public spaces with green infrastructure and pedestrian paths, the delineation and definition of the nature of the elements of the UES, such as bio-corridors, bio-centres of local significance, etc. All these defined requirements are taken into account in the landscape-architectural design of the project, which promotes education, sports and recreation, with the help of cultural ecosystem services of green infrastructure. The dominant feature of the area is the water surface, which determines the visual and compositional solution. Significant visual compositional links to landscape dominants have been observed in the design, see Fig.3.

Fig. 3: Visualization of open views of the water surface, access via wooden piers (Kuczman, G., et al. 2024).

These have been taken into account in the location and placement of small architectural elements such as piers over the water, benches, resting areas, picnic areas with shelters and play areas for children see Fig 4. The location of educational and play elements for children follows the existing kindergarten and the selection of a play area for children at the opposite end of the designed area is based on the intention to make use of the currently unused areas. This intention has also been reflected in the location of all the small architectural elements that accompany the newly constructed circular service road.

Fig. 4: visualization of proposed landscape and architectural solutions (Kuczman, G., et al. 2024).

The existing basic skeletal stands, groups and solitary trees are preserved as far as possible in the composition of the landscape space surrounding the water area. Emphasis is placed on the protection and preservation of the original senescent willows *Salix alba* L., which form a highly authentic compositional character in the vicinity of the water body. We propose to treat them, for the safety of the space and further perspective in the space. The felling measures of the trees were aimed at removing damaged trees, with low vitality and functionality to perform functions in the space, as well as due to poor health and their defects on the tree, stability with the risk of failure of the tree by upheaval in the slope, breaking of the trunk or breaking off part of the crown, which threaten the safety of the space. Invasive species *Ailanthus altissima* (Mill.) Swingle. Increased attention was paid to the protection of trees and their protected root space in accordance with Arboricultural Standard 2,3 (Paganová, 2018) and Act No. 543/2002 Coll. on

nature and landscape protection. Trees of authentic shapes and species typical of the rural environment of this landscape are the dominant feature. The rural space is complemented by flower beds, which will be designed in a stylised form, planting a perennial mix that requires less intensive maintenance and shrubbery to enhance the background of these plantings. All of these areas functionally complement and relate to the existing public spaces and their use. They link seamlessly with the existing entrances to the space and provide barrier-free access. The massing of vegetation creates a natural barrier in the steep banks and their safety is complemented by low wooden railings connected by hemp rope, which also thematically complete the water surface. Surrounding private parcels of land are visually separated by shrubbery. At the same time, they ensure undisturbed use of the newly built recreational space. The design process resulted in a newly constructed recreational area based on natural vegetation with the implementation of educational and natural elements that add to the natural tranquility value of the rural landscape.

Conclusion

The water surface in the designed rural area creates a natural habitat, which is located almost in the central area of the rural settlement. It currently provides a range of important conditions for flora and fauna. The surrounding water area has great potential for recreational use by the inhabitants of the village, taking into account social aspects. The presented landscape-architectural solutions point out the possibilities of restoring the recreational landscape space, through nature-oriented solutions, with the support of cultural ecosystem services. The design solutions were discussed and approved at a public meeting of the municipality and implemented in the pre-design documentation for the building permit.

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Souhrn
Příspěvek představuje krajinářsko-architektonické řešení v okolí vodní plochy ve venkovské oblasti na jižním Slovensku, v němž jsou realizovány vzdělávací, rekreační a sportovní prvky. Výsledky návrhu odrážejí společenské požadavky, zohledňují přirozenou vegetaci a dotvářejí okolí vodní plochy přírodě blízkými řešeními s pomocí kulturních ekosystémových služeb. Návrhová řešení byla projednána a schválena na veřejném zasedání zastupitelstva obce a zapracována do projektové dokumentace pro stavební povolení.

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