RENATURALIZATION PRACTICES APPLIED TO THE CREATION OF PUBLIC SPACES IN PERIPHERAL URBAN AREAS

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Abstract
Despite the significant emphasis placed by the professional community on the need to implement renaturalization procedures in the design of urban environments, these approaches are still applied rather sporadically in practice. Renaturalization, as a design approach, presents several challenges. These include specific aesthetic considerations, alternative ways of understanding the relationship between the user and the environment, as well as the often-demanding maintenance and management systems required in our conditions. As part of the IN-HABIT research project, the planning process for an experimental renaturalized public green space in the Nitra River retention zone has begun. The selection of species composition was based on phytocenological analysis, supplemented with renaturalization-supporting approaches such as integrated ecological design, co-design, and the Gestalt principle of contrast. This paper describes the principles applied in the renaturalization of the selected area, including the procedures used for creating and selecting suitable plants and herbs. It also discusses the methodologies employed in choosing native species that will contribute to the ecological stability of the area while enhancing its aesthetic value. An interdisciplinary team-comprising a designer, landscape architect, methodologist, implementers applying ecological, local, and historical landscape creation practices, community activators, meadow composition experts, dendrologists, engineers, and others-collaborated on creating this experimental space. The implemented solution will serve as a laboratory to monitor aspects of sustainability, the quality of the proposed designs and maintenance practices, as well as their acceptance and impact on the public.

Key words: biophilic urbanism, environmental design, nature-based solutions, autochthonous species, specific aestetics

Introduction

Designing urban public spaces that prominently incorporate natural elements helps foster a healthier and more sustainable environment. The renaturalization of cities contributes to reducing air and noise pollution, as well as mitigating the urban heat island effect. Providing natural habitats for local flora and fauna within urban settings enriches biodiversity and can help restore damaged ecosystems. In addition to supporting the mental and physical well-being of residents, green urban spaces encourage social interaction and participation in community activities (Bihuňová et al., 2017; Čibik et al., 2022; Lehmann, 2021). Integrating nature into urban environments not only enhances the visual appeal of cities but also has a positive impact on the quality of life of their inhabitants. Urban renaturalization requires specific strategies in urban planning to effectively integrate nature into built environments (Mazur, 2021). These strategies range from citizen involvement in designing green areas to collaboration among various stakeholders to support sustainable urban development.

- Natural areas within cities act as filters, capturing pollutant particles and thereby reducing harmful substances in the urban environment.
- Additionally, urban vegetation helps lower ambient temperatures through shading and evapotranspiration, countering the heat island effect and creating a cooler, more comfortable environment for city dwellers.
- Planting native species in urban spaces promotes local biodiversity and helps restore natural habitats.
- Establishing green corridors that connect natural and urban areas facilitates the movement of wildlife and further supports biodiversity (Hus, Paganová, Raček, 2021; Hus, Paganová, 2019).

Renaturalization approaches in the creation of public spaces are still used only sporadically in the Slovak context and often take on more formal expressions. The public generally prefers well-maintained and orderly environments, while spaces that appear more natural are frequently perceived as neglected. This article explores the challenges of integrating renaturalized principles into urban environments and how to encourage their broader acceptance among the public. A survey conducted

as part of the IN-HABIT project revealed that natural elements are generally viewed positively in cities; however, a conservative perception of green space aesthetics still prevails.
Public participation is crucial to improving the acceptance of such solutions, as demonstrated in the development of a renaturalized public space in the city of Nitra. In the design process, we aimed to strike a balance between formal urban aesthetics and natural elements.

Aesthetics

Renaturalization approaches in the design of public spaces have long been used and applied. However, in the Slovak context, particularly in urban environments, their application remains sporadic and often highly formal. While a large portion of society acknowledges the need for greenery and its greater integration into urban public spaces, there is still a prevailing conservative attitude toward its aesthetic qualities.
The general public tends to associate public spaces with high levels of maintenance and visual order. Environments that appear clean, tidy, and well-manicured are generally valued. On the other hand, greenery that appears too "wild" or "untamed"-such as informal meadows, loosely planted beds, or unmanaged shrubs-can evoke a sense of neglect or disorder.
We have created distinct aesthetic expectations for different types of spaces. In the city, this logic often translates into a preference for rigidly maintained greenery, separated from its natural forms. The aesthetic of neatness and control continues to dominate.
Despite growing awareness-among both professionals and the general public-of the benefits that renaturalization can bring to urban ecosystems, including more natural and biodiverse environments, we still struggle to fully integrate these concepts into practice. Many are not yet ready to accept a visual language that is more relaxed, organic, and less formal. Such concepts are often perceived as overly unrestrained or disorganized. Among advocates of traditional aesthetics, they may provoke resistance, particularly due to the perceived "neglect" they can convey.
Aesthetic expression in renaturalized public spaces should be understood as part of the broader ecosystem-where natural elements are not only integrated into the urban context, but also provide it with a new dimension. It is essential to find a balance between the wildness of nature and the aesthetic expectations of urban life. When natural features are carefully planned and placed within a meaningful context, they can create spaces that are both ecologically valuable and visually appealing-spaces that are more likely to be accepted by a wide range of users.
In designing such spaces, sensitivity to the aesthetic expectations of the local community should be taken into account. This can facilitate a smoother transition from traditional, formal public spaces to more natural, yet still ordered and understandable, solutions.
The public often prefers environments that are not overwhelming to the senses, but rather harmonious and balanced. Natural features-such as wildflowers, perennials, or lush shrubs-are becoming increasingly accepted, as long as they are thoughtfully arranged and do not appear chaotic. It is unrealistic to expect that a visual "canon" of public space, built over generations, will instantly adapt to new climate-related needs. However, with deliberate planning, it is possible to find a balance between the wildness of nature and the aesthetic needs of urban life.
The aesthetics of renaturalized spaces should not be viewed solely as a matter of visual appearance, but as part of a comprehensive design approach that also includes functional ecological values. Thoughtfully composed natural structures can become visually attractive precisely when their purpose is understandable-supporting biodiversity, retaining water, or mitigating temperature extremes.

Perception of Renaturalization

As part of the IN-HABIT project, an expert elicitation survey was conducted focused on visual and material preferences for public space elements in rural, peri-urban, and urban settings. The respondents – professionals from landscape architecture, architecture, design, urban planning and municipal government – provided input on natural and other elements contributing to the aesthetic quality of public spaces.

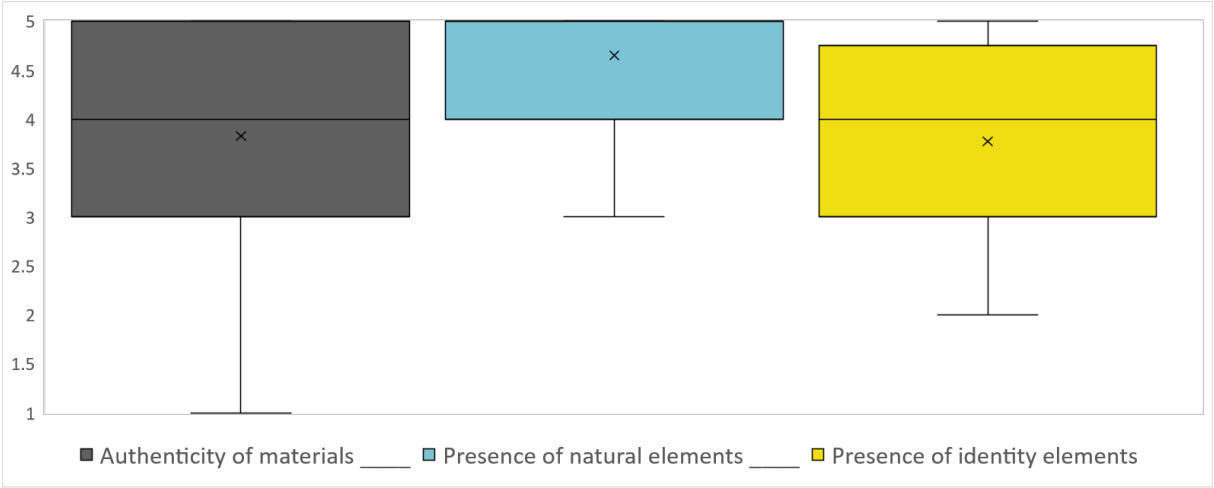

Fig. 1: Assessment of the need for the presence of natural, identity elements and the authenticity of materials by the expert group (1=lowest importance; 5=highest importance)

The findings presented in Fig. 1 suggest that natural elements in public space are perceived as the most important, being scored not only highest on average (4.65), but also exhibiting the highest level of agreement among the expert group. The authenticity of materials (3.83) and presence of identity elements (3.77) are of comparable importance according to the experts, although there seems to be higher level of disagreement with the former (with some of the experts rating material authenticity even as low as 1 or 2).
The analysis of experts' open-ended responses highlights a strong emphasis on aesthetic harmony, urban coherence, and material quality as key elements of attractive public spaces. Respondents describe ideals such as an "*aesthetic/harmonious impression of spaces*" and a "*clean environment, nice urban surroundings, clean parks*." At the same time, the theme of maintenance repeatedly emerges as important: "*well-kept and clean city*" "*maintaining the natural character in cities and metropolises".* This suggests that the need for maintenance is considered equally important as design or spatial identity. In fact, when reflecting on the identity and authenticity of natural elements, the way they are maintained appears to be a decisive factor in their acceptance within urban environments. Despite awareness of the importance of renaturalisation, "*the charm of the unintended or accidental",* and historical layering, a strong attachment to more conventional aesthetics in relation to greenery in public spaces persists even among experts.

To change established visual stereotypes, it is important to communicate the value of authentic aesthetics and natural appearance more effectively-so that renaturalization solutions are better understood and accepted not only by professionals, but also by the general public.

Model Implementation
In the creation of the model environment we implemented, understanding user preferences was a key factor that significantly influenced the design. It is natural that looser, nature-inspired aesthetics are more readily accepted by the public in peripheral areas of the city rather than in the urban core. For this reason, the selected site is located on the outskirts of the city-specifically, in direct contact with the Nitra River, within its retention zone. (Fig. 2)
Open green spaces on the outskirts of cities offer an interesting testing ground for applying renaturalization-based aesthetic concepts in design. These areas also serve as specific points of contact between the public and such principles. Transitional zones between urban and rural landscapes have the potential to become laboratories for new forms of collaboration between experts and the public. They allow not only for the testing of visual solutions but also for experimenting with participatory processes and fostering residents' relationships with natural elements in urban environments. Gradually increasing public awareness and aesthetic sensitivity in such areas can lay a crucial foundation for the broader implementation of renaturalization approaches in more prominent parts of the city. Implementing renaturalization in this manner is a more time- and resource-intensive process, but it also offers higher long-term effectiveness.

Fig. 2: Localization of the renaturalized area within the city of Nitra (source: authors)

Based on these considerations, we chose this type of area to carry out a pilot intervention as part of the IN-HABIT project. The model implementation aims to test the applicability of these principles in practice. The solution has an experimental character-this pilot project will function as a laboratory for testing ecological and aesthetic renaturalization strategies. The revitalized site covers an area of 15.200 m².
The following section outlines the revitalization process of a specific location, grounded in active public participation and the application of nature-based approaches in the design and creation of public space.

Approaches to composition
The selected area represents a site with its own specific characteristics and requirements. It is a linear zone that, due to its direct contact with a watercourse, offers significant aesthetic potential, while also facing limitations in the form of a flood protection embankment. This technical element impacts the space both visually and physically, influencing how it is perceived. The pronounced contrast between the length and width of the area became a defining factor in the design approach.
The compositional concept and final design emerged gradually, based on initial analyses, interviews with users, and on-site observations. These inputs led to the conclusion that it was essential to work with contrasting spatial forms while creating a layout that would be both legible and easily understood by users. In developing the composition, we drew on principles that support renaturalization and approaches that enhance the legibility and acceptability of natural expression within an urban context. An integrated ecological design approach made it possible to connect ecological functions with the visual logic of the space.
The aim was to create a space that respects the existing qualities of the site-especially its proximity to the river, its linearity, natural elements, and its characteristic spatial scale. The design, therefore, employed subtle segmentation of the area's length into smaller sequences and created zones for relaxation with varying degrees of intimacy and openness. The composition was based on a balance between more open and denser expressions and a clearly readable spatial structure. A key aspect of the design process was the creation of a comprehensible spatial type. The Gestalt principle of contrast was used as a tool for generating visually clear tensions between geometric and organic elements-supporting legibility while maintaining a natural feel.
Several vertical structural axes run through the site, along which tree plantings were arranged. The spacing of the plantings, the alternation of species, and the arrangement of meadow vegetation were all guided by a unified proportion system, which provides a clear visual framework for perceiving the space. The rhythmic planting of trees, based on this consistent proportion, introduces a sense of order into the area-but without evoking a sense of rigid intervention, thanks to the contrast with the looser, more spontaneous meadow surfaces. This structure supports natural movement, guides the eye, and simultaneously offers a sufficiently open space for individual interpretation and experience. (Fig. 3)

Fig. 3: Alternating tree species rhythmically planted in lines (source: Michala Poláková, 2024)

An interesting aspect of the design is the intentional disruption of the regular pattern through the informal scattering of clover seed, which breaks away from the core compositional order. This subtle intervention acts like a "shadow of clouds"-visually light, irregular, and yet harmonious. It enriches the space without significantly altering its structure. The strong geometry of the composition is deliberately contrasted with the loose, expressive quality of natural elements, creating a balance between order and naturalness-an essential factor in user acceptance of the design.

To ensure better public acceptance of the renaturalized space, we applied aesthetic concepts more commonly associated with formal urban design. The goal was to find a balance between natural elements and structured composition-one that respects ecological values while remaining intuitive and accessible to the general public.

- We worked with contrasting spatial forms that reflect the specific character of the site. This contrast contributes to the spatial dynamics and legibility of the environment.
- The rhythmic structure, based on consistent spacing and alternating species, helps guide the viewer's gaze and keeps the space open, increasing its accessibility and sense of naturalness.
- The balance between geometric and organic elements is key to creating a space that is both understandable and natural-supporting user interaction while maintaining aesthetic value.

Vegetation Elements Applied in Renaturalization Processes

The design of the space in the selected area utilized solitary, linear, and area-based vegetation elements. These elements extend throughout the entire space based on the previously described compositional approaches.

Trees were introduced into space, planted in rows. The selection of species was based on the potential natural composition of the riparian vegetation, as well as the vegetation of the peripheral areas of the city of Nitra. Native species were chosen, whose growth habits would not disrupt the surrounding character of the site in their mature stages (Wlodarczyk, Mascarenhas, 2016). Given the specific location within the floodplain of the Nitra River, tree species were selected that could tolerate potential increases in groundwater levels without damaging their root systems and, as a result, their vitality. A total of 42 trees were planted. The species selection, including C*arpinus betulus, Acer platanoides,* and *Acer pseudoplatanus*, was made based on the surrounding riverine vegetation, thus linking the plantings with the overall local vegetation.

The design also aimed to incorporate fruit trees into space, based on feedback from respondents. These fruit trees-*Prunus avium, Pyrus pyraster*, and *Sorbus aucuparia* - offer seasonal effects

throughout spring, summer, and autumn. The fruit trees are an accentuating feature of the entire space, providing interest throughout the year. After planting, the trees were professionally treated, ensuring their development over the coming decades.
The meadow communities were designed within three rectangular areas totaling 1550 m², which extend throughout the entire site. For this type of space, a seeding method was chosen, involving sowing on areas with removed vegetation, as well as overseeding into existing grassland without the use of chemical vegetation removal. The selection of the appropriate seed mix was based on a phytosociological survey of the site. This method of establishing meadow vegetation is the most environmentally sustainable approach. The meadow mixture primarily consists of species native to the region, excluding any species with invasive potential that could pose a risk to the peripheral environment of the city. mix also includes supplementary species that enhance the summer or autumn aspect, such as *Linum* or *Zinnia* (Fig. 4), especially during periods when most species are dormant and visually less attractive. The established meadow plantings also have research and educational potential, as they will allow for the observation of the integration of native vegetation with the new meadow mixes.
To ensure the success of the design and to make the individual vegetation elements attractive to the public, proper maintenance management had to be established. This management will be extensive but will follow specific mowing schedules to ensure that the meadow vegetation elements remain functional, while also distinguishing between areas designated for rest and those with visual appeal.

Fig. 4: Changes in the visual impact of the meadow within the year 2024 from June to September (source: Marek Hus, Michala Poláková, 2024)

Conclusion

At present, it is difficult to expect that integrating climate-related requirements into the traditional visual canon of greenery will be immediate or easily achievable. The need to balance aesthetics, functionality, and ecological demands presents a challenge that calls for gradual changes-not only in societal habits but also in the approach to designing public spaces.
Aesthetic strategies and compositional systems must be flexible and considerate of both ecosystem services and the needs and preferences of local residents. The success of renaturalization projects lies not only in their ecological contribution but also in their ability to engage the public and involve them in the creation and maintenance of public spaces. Combining formal urban aesthetics with ecosystem-based renaturalization methods, along with the careful selection of suitable locations, increases the chances of broader public acceptance.
There is a clear need for a shift in mindset-one that can gradually be fostered through exposure to well-designed transitional urban edge areas. Introducing natural elements through formal aesthetics and other specific approaches may prove to be an effective path forward.

- Focusing on the preservation of formal and familiar compositional approaches in combination with natural aesthetics.
- Emphasizing the idea of visual "manageability" of natural elements.
- Gradually applying renaturalization strategies to allow communities to adapt over time.
- Using hybrid design approaches to create a "nature-like" visual effect in urban environments that remains acceptable even to those who prefer more structured arrangements.
- Incorporating natural green elements enables the use of a wider range of plant species.
- Implementing more extensive maintenance practices can enhance biodiversity while reducing labor intensity and rsource use.

We are aware that the approaches and aesthetic strategies we propose may lead to a more conservative character in public spaces. However, we see this as a tangible starting point-one that can gradually lead us toward a broader spectrum of suitable compositional models and methodologies. Aesthetics that reflect biodiversity functions do not have to conflict with order or legibility-when designed with sensitivity to place and user, they become part of a sustainable and meaningful whole.

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Souhrn
Přestože odborná veřejnost klade značný důraz na potřebu zavádět renaturalizační postupy do navrhování městského prostředí, v praxi se tyto přístupy stále uplatňují spíše sporadicky. Renaturalizace jako návrhový přístup představuje několik výzev. Patří mezi ně specifické estetické ohledy, alternativní způsoby chápání vztahu mezi uživatelem a prostředím a také často náročné systémy údržby a správy, které jsou v našich podmínkách vyžadovány. V rámci výzkumného projektu IN-HABIT byl zahájen proces plánování experimentální renaturalizované veřejné zeleně v retenční zóně řeky Nitry. Výběr druhové skladby vycházel z fytocenologické analýzy doplněné o renaturalizaci podporující přístupy, jako je integrovaný ekologický design, co-design a princip Gestalt kontrastu. Tento článek popisuje principy uplatněné při renaturalizaci vybraného území, včetně postupů použitých při tvorbě a výběru vhodných rostlin a bylin. Pojednává také o metodikách použitých při výběru původních druhů, které přispějí k ekologické stabilitě území a zároveň zvýší jeho estetickou hodnotu. Na vytvoření tohoto experimentálního prostoru spolupracoval mezioborový tým - složený z projektanta, krajinářského architekta, metodika, realizátorů uplatňujících ekologické, místní a historické postupy tvorby krajiny, komunitních aktivizátorů, odborníků na složení luk, dendrologů, inženýrů a dalších. Realizované řešení bude sloužit jako laboratoř pro sledování aspektů udržitelnosti, kvality navržených návrhů a postupů údržby, jakož i jejich přijetí a dopadu na veřejnost.

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