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RESEARCH ARTICLE

## Searching for opportunities to adapt green infrastructure for creating a barrier-free environment in living nature sites

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### Abstract

This project focuses on adapting Ukraine's nature reserve areas to meet modern societal challenges, ensuring barrier-free access to natural assets for visitors of all abilities. The creation of a multifunctional sensory location using native plant species in the Park "Feofaniya" (Kyiv, Ukraine), as in this project, is a practical implementation of the National Strategy for the Formation of a Barrier-Free Space. A prospective plant fund (up to 40 plant names, including native and introduced species) has been established to stimulate different sensitive organs of humans and enhance the therapeutic function of the sensory area. The multilevel design, based on the concept of mixborders, serves both decorative and functional purposes. The multisensory zone enhances existing park elements, helping to maintain a cognitive connection to nature for all categories of visitors. The proposed landscape design also includes improvements to existing park features, ensuring wheelchair users and individuals with other physical limitations have unrestricted access to safe and tactile plant compositions. To promote informational accessibility, key elements of the sensory mixborders are complemented by informational plaques and audio materials about individual types of plants used. This initiative aims to create an environment that fosters physical, emotional, and social well-being, enhances quality of life, and raises awareness about plants, providing diverse sensory experiences for people with reduced mobility. An innovative form of urban green zone for a wide range of users is being created by leveraging the existing potential of the Park "Feofaniya" and publicly available technologies. By implementing this project, the recreational zones of nature conservation areas in Ukraine will be better equipped to address contemporary societal challenges and contribute to recovery efforts in the post-war period.

**Keywords:** barrier-free environment, nature heritage, green areas, tactile gardens, optimization

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## Introduction

The current challenges and the prospects for the post-war period in Ukraine lay the groundwork for reshaping our society's culture, norms, and behaviors. With each passing day of the war, especially since Russia's full-scale invasion, adapting the environment to meet the needs of people with various functional limitations has become increasingly important. Most physical environments in Ukraine are not adapted for people with limited mobility, such as the elderly, people with disabilities, people with temporary health problems (due to injury or illness), pregnant women, people with prams, children under seven years of age, and others. According to statistics, 30–50% of Ukrainians can be considered to have limited mobility to some extent, experiencing difficulties in independent movement, spatial orientation, and obtaining necessary information and services (Fesenko & Lysyuk, 2021). Ensuring equal opportunities in all areas of life by addressing the issue of adapted physical environment, access to information, and creating a favorable environment for communication in Ukraine is enshrined in law (Resolution, 1993; Decree, 2005, 2007; Law of Ukraine, 2020). Addressing these issues quickly and effectively will not only ensure equal opportunities and access to all aspects of a fulfilling life but also serve as a key indicator of society's humanity, mature responsibility, and level of civilization. As such, implementing the country's strategic plan to create barrier-free spaces is critical (Order, 2021).

A clear sign that the principles of social inclusion are increasingly being integrated into key areas of Ukrainian life, such as legal regulation, economic and social development, healthcare, education, transportation, construction, and architecture, is the creation of the "Album of barrier-free solutions" (Big City Lab, 2023). The term 'barrier-free' is defined as the philosophy of a society without restrictions, where equal rights and opportunities for self-realization, employment, mobility, services, education, communication, recreation, and development are guaranteed for all people (Big City Lab, 2023). At the same time, there has been relatively little focus on the accessibility of natural environments for their recreational, rehabilitative, educational, and cultural potential in current research and

development, thought, creating barrier-free environments in natural areas, particularly through the use of modern technologies and techniques for designing multisensory gardens, is essential not only for people with physical limitations and their families, but for a broader segment of our society.

Ensuring easy and comfortable access to natural sites, especially those within Ukraine's nature conservation areas, extends beyond improving infrastructure and upgrading technical features, such as ramps, handrails, and path surfaces. It's about creating an environment that facilitates a seamless connection with nature – allowing people to explore unique natural landmarks, learn about biodiversity, and engage with the rich heritage of our land. It also entails offering high-quality recreational services, utilizing nature for therapeutic purposes, promoting physical and emotional well-being, and satisfying aesthetic needs (Pashchenko, 2021; Obynochna, 2022; Matiashuk et al., 2023; Kendzora & Hotsii, 2025). This is particularly critical for existing green spaces, such as urban parks, squares, botanical gardens, and other green areas, where altering or redesigning walking paths due to steep slopes or surface materials may be technically or financially challenging. Such limitations make it challenging for individuals with mobility impairments to enjoy these spaces fully. There is a growing urgency to reduce barriers and ensure everyone can freely access natural resources, recreational areas, and parks.

Tactile locations and/or sensory gardens have become an effective, inclusive, and innovative approach to addressing such problems in modern urban green spaces (Zajadacz & Lubarska, 2019; Nagajyothi et al., 2023; Pimentel et al., 2024). The practice of botanical gardens and nature corners for people with disabilities in urban parks has long been widespread, dating back to the first apothecary garden in Italy (in Padua), established in 1545. The practice of creating tactile locations based on specialized or 'paravisuous' gardens in Ukraine was previously reproduced in elements of apothecary gardens (vegetable gardens), which appeared in monasteries of Ancient Rus as early as the 11th–13th centuries. Such areas are currently one of the ways in which natural environments are being adapted to create equal opportunities

for leisure, provide a variety of sensory experiences, and fulfill the rehabilitative and social integration functions of 'green' spaces for all social groups (Pashchenko, 2012; Baev, 2013; Dyachenko, 2019; Krzeptowska-Moszkowicz et al., 2021, 2022). The organization of sensory locations, 'health gardens', and tactile flowerbeds to help people with disabilities overcome barriers in their interaction with the environment and nature is actively explored in numerous contemporary research reports (Zajadacz & Lubarska, 2020, 2023; Wajchman-Świtalska et al., 2021, 2022). The therapeutic function of nature is even more critical today, as its significance has grown due to the rise in technogenic stress, further underscoring its value in our modern reality (Isachenko, 2021; Lototska, 2024; Shendre & Narad, 2025). Since the start of Russia's full-scale invasion, nature-based rehabilitation has become a vital necessity for a substantial proportion of the country's population (Kendzora & Olejniuk-Puchniak, 2023; Oliferchuk & Olejniuk-Puchniak, 2024; Krasniy, 2025). Successful attempts to adapt the environment of Ukrainian settlements through therapeutic locations to facilitate use by people with physical disabilities are already being implemented for patients in medical and rehabilitation facilities (Matiashuk et al., 2018; Kovalska & Obynochna, 2019; Turovtseva et al., 2022; Rashkovska & Kolesnichenko, 2023). Since 2024, a pilot project "Scandinavian therapy gardens" has been launched in Kyiv, with international support. The design of this project considers a wide range of personal issues faced by users, as some prefer solitude (introverted users). In contrast, others seek interaction with people (extroverted users) as part of their healing process. A key aspect of its design is the careful selection of only native flora species that promote maximum biodiversity coexistence (Colville-Andersen, 2025). The adoption of modern practices for creating a barrier-free environment in Ukraine will contribute to integration into the European space and more effective protection of the rights of vulnerable groups of the population (Zubchenko et al., 2020; Kozhyna, 2020; Yasenovska & Zinenko, 2020).

Our work aims to develop landscape design solutions that create an inclusive environment at existing natural heritage sites, adapt their territories to meet rehabilitation needs,

and expand opportunities for discovering, studying, and utilizing the region's natural and cultural heritage. This project also aims to make part of the park more comfortable for visitors with limited mobility by creating a landscape and architectural composition that serves as a nature therapy function.

## Material and methods

The project focuses on transforming an area of the park-monument of landscape art of national importance Feofaniya (Park "Feofaniya"). This nationally significant landscape park is part of Ukraine's nature reserve fund. It is one of the youngest parks in Kyiv, offering a serene space for families to relax and enjoy nature. With over 150,000 visitors annually, including 30,000 children, the park plays a vital role in the city's recreational life. The Institute for Evolutionary Ecology of the NAS of Ukraine is responsible for the park's conservation, promoting its scientific, environmental, educational, aesthetic, and health benefits. Over the years, the institute has worked to increase public awareness of the park's ecological value and improve access to its key natural features (Radchenko et al., 2019; Matiashuk et al., 2019; Matiashuk & Voytyuk, 2022).

The study area is located in the park's central part. The site largely complies with the principles of barrier-free landscaping in urban environments (accessibility, safety, sustainability, aesthetics) (Barrier-Free, 2021). The layout of the existing paths and structures naturally creates a clear architectural plan. The paths (1.5–2.3 m wide) are paved with durable materials, ensuring safe and easy movement for wheelchair users towards the main path. The existing vertical structures allow for the placement of plant compositions at a level that maximizes tactile contact and fragrance perception. These structures will also double as seating areas, providing spaces for people to rest and enjoy the park's greenery.

The design proposals for the transformation of the selected location were developed using Realtime Landscaping Architect 2018, a landscape design and visualization software. Field surveys were conducted with the leveling of the terrain using an optical level, Bosch GOL 26D Professional, along with

auxiliary equipment. The selection of plant species for the multifunctional use of this park area was based on the previous work of the authors, the established database of ornamental phytocenotic species, as well as recommendations from other researchers and botanical institutions (Arslan et al., 2018; Marchenko & Butenko, 2025; Arboretum Bolestraszyce, 2025). The selection of plant species was carried out taking into account the physical, geographical, and climatic properties of the territory (Gnatiuk & Gaponenko, 2018; Matiashuk et al., 2021). Tactile-safe plants were selected based on their external morphological features (texture, shape, size, etc.) of their vegetative and generative organs, as well as their decorative qualities and medicinal properties (Bondar, 2022; Pozniakova & Popova, 2023; Matiashuk et al., 2024).

The design of the landscape mixborder was based on an ecological-phytocenotic approach. The scientific plant names, both in Ukrainian and Latin, are provided according to the International Code of Botanical Nomenclature (Turland et al., 2018) and the International Code of Nomenclature for Cultivated Plants (Brickell et al., 2016) and associated publications (i.e., Mosyakin & Fedoronchuk, 1999; Spencer & Cross, 2007).

## Results and discussion

The Park “Feofaniya” is a unique combination of a modern park complex and a reserve forest area. The forested part of the park is the richest in Europe in terms of the number of preserved ancient *Quercus robur* L. trees within an urban green zone. Therefore, a key objective of this project is to harmoniously integrate new design elements into the park’s ensemble while respecting the surrounding forest. This consideration was integral to the selection of the basic plant assortment and the material and stylistic choices made for the design of the new locations (Figs. 1 & 2).

Effective phytodesign techniques can create an environment that fosters meaningful connections with nature for all visitors. By engaging the senses – sight, touch, sound, and smell – people can enjoy a rich, varied, and safe experience in their surroundings. The project’s design is based on a sensory zoning principle, which includes

distinct areas such as a sound zone, a color zone, a tactile zone, and an aroma zone. This layout is designed to stimulate multiple sensory organs and enhance the therapeutic qualities of the space. A circular pathway allows visitors to explore each of these sensory zones and interact with the plants.

The selection of plants was carried out taking into account the principles and methods of sensory location organization, as well as the characteristics of different visitor categories (Obynochna, 2022; Bidolakh et al., 2024). In accordance with these principles, regional (valley-balcony relief), zonal (forest-steppe), and geographical (flat part) features of the territory were taken into account in its formation. Since this project is designed to be multifunctional and multilevel, each zone is created to engage at least two senses. Special attention is given to species that have a distinct effect on the visual appearance, while some of these species also stimulate the sense of hearing (Table 1). To achieve visual stimulation, plants with striking habitus, such as *Pennisetum alopecuroides* Ham., *Cortaderia selloana* Asch. & Graebn., *Asparagus officinalis* L., and *Stipa* L. species, are incorporated into the design. The sensory experience is further enhanced by the sounds of the rustling leaves of *Cortaderia selloana* and the vegetative parts of *Miscanthus sinensis* Andersson, *Festuca valesiaca* Schleich. ex Gaudin, along with the generative parts of *Nigella damascene* L., *Silybum marianum* (L.) Gaertn., *Lunaria annua* L., and *Linum usitatissimum* L., all of which produce a subtle rustling effect. By placing these species near the edges of paths, the tactile experience is also extended, particularly for *Stipa* species.

To enable the possibility of observing and experiencing the impact of light and color on elements of living nature, a coloristic diversity of plants has been chosen, which are also tactilely safe. The foundation of this location is formed by promising phytocentric species, ensuring the possibility of exploring the richness of local biodiversity (Popovych et al., 2018; Kysnychan et al., 2022; Matiashuk et al., 2023; Marchenko & Butenko, 2025). The visual perception zone of the sensory area is formed by herbaceous perennials, specifically *Perovskia abrotanoides* (Kar.) Sytsma, *Bergenia crassifolia* (L.) Fritsch.,

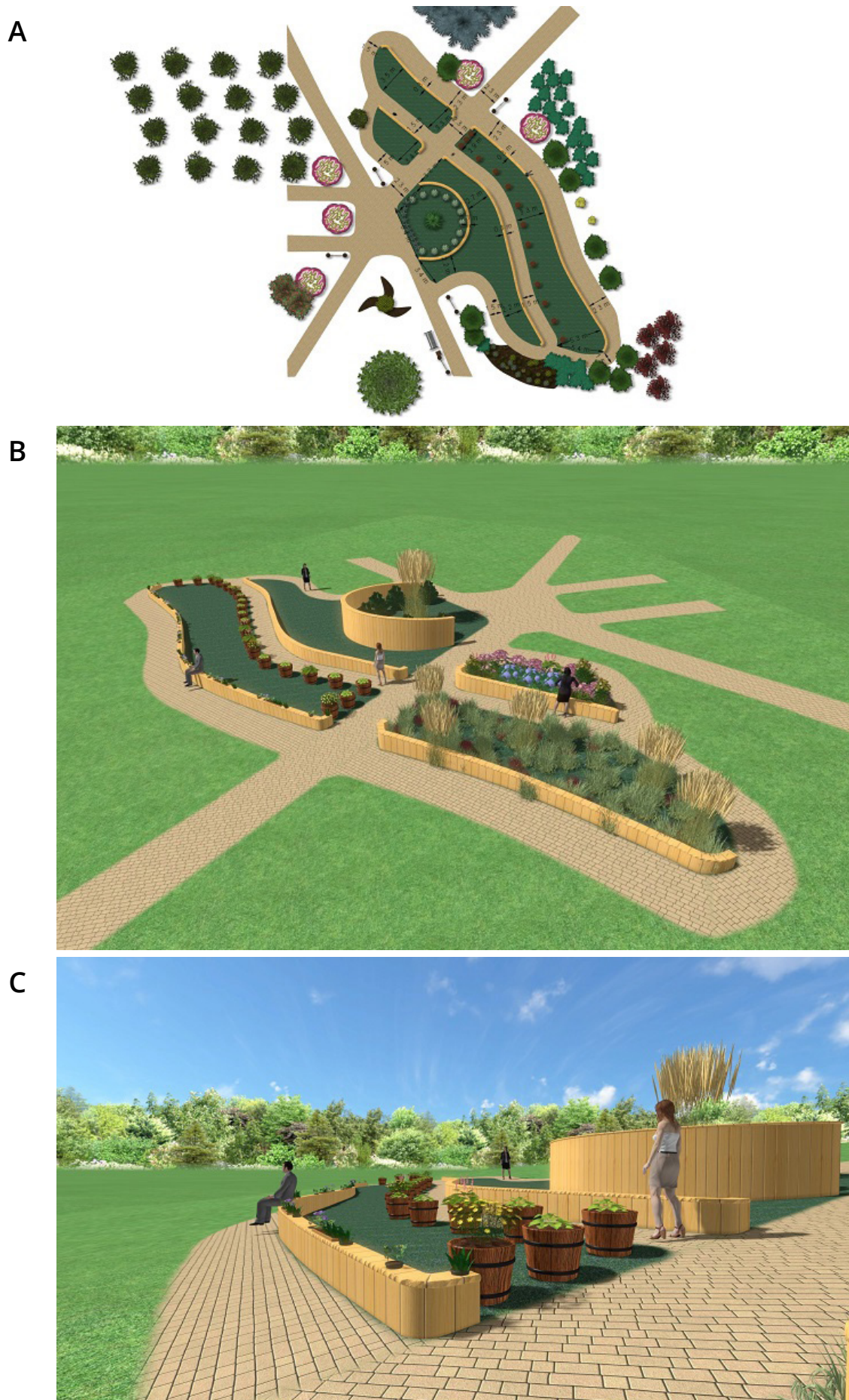


Figure 1. Plan (A) and visualisation (B, C) of the Park "Feofaniya" transformation.



**Figure 2.** Results of the first stage of project implementation in the Park “Feofaniya”.

varieties of *Lavandula angustifolia* Mill., varieties of *Hyssopus officinalis* L., *Digitalis grandiflora* Mill., and *Physalis alkekengi* L. To further diversify and enhance the decorativeness, part of the plant composition will be changed annually with the addition of annual ornamental plants, such as varieties of *Tropaeolum majus* L. and *Matthiola incana* (L.) W.T. Aiton, and the genus *Tagetes* L. Over time, the assortment of this changing component may be supplemented and improved.

The most significant group (over 30%) is that of plants used to provide aromatic sensory experiences, which are also complemented by tactile perception (Table 1). The accessibility of these plants for visitors with limited

mobility will be ensured through the creation of modular locations with compositions of aromatic and flowering plants (Fig. 1). Their convenient placement along pathways will allow for detailed interaction with the plants using touch, smell, and sight. Modular compositions will be partially changeable through plant selection to maximize the decorative effect throughout the location's lifespan. The primary permanent elements of these locations will be various aromatic species and varieties of the genus *Mentha* L. These plants have medicinal properties and culinary uses (vitamin collections, teas), and their spicy-aromatic qualities lend themselves to taste applications (Minarchenko, 2012;

**Table 1.** Assortment of species for the proposed sensory area in the Park "Feofaniya".

Nr	Species	Flowering period	Decorative and sensory function
<b>Liliopsida</b>			
Alliaceae			
1	<i>Allium tuberosum</i> Rottler ex Spreng.	VIII-IX	fragrant, decorative
Poaceae			
2	<i>Anemanthele lessoniana</i> (Steud.) Veldkamp	VIII	decorative, sound-producing
3	<i>Festuca valesiaca</i> Schleich. ex Gaudin	V-VI	decorative, sound-producing
4	<i>Cortaderia selloana</i> Asch. & Graebn.	VIII-XI	decorative, sound-producing
5	<i>Miscanthus sinensis</i> Andersson	VIII-XI	decorative, sound-producing
6	<i>Pennisetum alopecuroides</i> Ham.	VIII-X	tactile
7	<i>Stipa pennata</i> L.	V-VI	tactile
8	<i>Stipa pulcherrima</i> K. Koch	V-VII	tactile
9	<i>Stipa tirsia</i> Steven	VI-VII	tactile
<b>Magnoliopsida</b>			
Apiaceae			
10	<i>Levisticum officinale</i> W.D.J. Koch	VII-VIII	fragrant
Asparagaceae			
11	<i>Asparagus officinalis</i> L.	V-VI	decorative
12	<i>Yucca filamentosa</i> L.	VI-VIII	decorative, sound-producing
Asteraceae			
13	<i>Artemisia taurica</i> Willd.	IX-X	decorative, fragrant
14	<i>Echinacea purpurea</i> (L.) Moench	VII-IX	coloristic, medicinal
15	<i>Echinops sphaerocephalus</i> L.	VI-VII	tactile, sound-producing
16	<i>Matricaria recutita</i> L.	V-VIII	fragrant
17	<i>Silybum marianum</i> (L.) Gaertn.	VII-IX	tactile, sound-producing
18	<i>Tagetes patula</i> L.	VI-X	coloristic, fragrant
19	<i>Tagetes tenuifolia</i> Cav.	VI-X	coloristic, fragrant
Brassicaceae			
20	<i>Lunaria annua</i> L.	IV-VI	sound-producing
21	<i>Matthiola incana</i> (L.) W.T. Aiton	VI	fragrant, coloristic
Caprifoliaceae			
22	<i>Lonicera japonica</i> Thunb.	VI-IX	coloristic, fragrant
Lamiaceae			
23	<i>Hyssopus officinalis</i> L.	VII-VIII	coloristic, fragrant
24	<i>Lavandula angustifolia</i> Mill.	VII-IX	fragrant, coloristic
25	<i>Mentha × piperita</i> L.	VI-VII	fragrant, tactile
26	<i>Perovskia abrotanoides</i> (Kar.) Sytsma	VII-IX	fragrant, coloristic
27	<i>Salvia pratensis</i> L.	V-IX	coloristic
28	<i>Salvia verticillata</i> L.	VII-IX	coloristic

**Table 1.** Continued.

Nr	Species	Flowering period	Decorative and sensory function
29	<i>Thymus marschallianus</i> Willd.	VI–VII	fragrant
30	<i>Thymus serpyllum</i> L.	V–VII	fragrant
Linaceae			
31	<i>Linum usitatissimum</i> L.	VI–VII	sound-producing
Ranunculaceae			
32	<i>Nigella damascena</i> L.	V–VII	sound-producing, coloristic
Saxifragaceae			
33	<i>Bergenia crassifolia</i> (L.) Fritsch.	V–VII	coloristic, tactile
Scrophulariaceae			
34	<i>Digitalis grandiflora</i> Mill.	VI–VIII	coloristic, decorative
Solanaceae			
35	<i>Physalis alkekengi</i> L.	VI–VII	tactile
Tropaeolaceae			
36	<i>Tropaeolum majus</i> L.	VI	coloristic

Sobko et al., 2012; Alekseev, 2013; Govorun, 2020). Additionally, with a focus on the olfactory experience, the compositions will include *Matthiola incana*, *Levisticum officinale* W.D.J. Koch, and various cultivars of *Tagetes tenuifolia* Cav. Plants like *Tropaeolum majus* and others will complement the coloristic effect of the compositions.

The proposed selection of plants ensures a high decorative effect for the location, both through the harmonious combination of evergreen plants, ornamental grasses, ground-covering species, and the flowering of most species. In terms of phenological development, the first plants to bloom (starting in May) will be representatives genera *Thymus* and *Stipa* genera, as well as *Lunaria annua* (Fig. 3). By September–October, the blooming phase will continue in *Lavandula angustifolia*, *Perovskia abrotanoides*, *Echinacea purpurea* (L.) Moench, and species and varieties of the genus *Salvia* L.. The decorativeness of the entire location will be further diversified in autumn by adding low-growing varieties of garden chrysanthemums. Throughout the whole growing season, the sensory value will be provided by over 75% of the species from the proposed list of tactile and aromatic plants.

In addressing the set goal, we considered the priority of this issue for our society, as well as the importance of ensuring barrier-free

access to elements of living nature through sensory experiences. We also factored in the existing global expertise, alongside the findings and contributions of domestic researchers (Bayev, 2013; Yasenovska & Zinenko, 2020; Kovalchuk, 2024). We believe that adapting the recreational zones of nature conservation areas of Ukraine for recreational purposes should follow the principles of accessibility and equal usage for all visitor categories. Since recreational activity aims to restore people’s mental and physical well-being by creating opportunities for general health and educational relaxation, it’s essential to ensure barrier-free access to Ukraine’s nature reserve areas and objects (Order, 2022). Hence, the proposed adaptation project encompasses several areas outlined in the National Strategy for Creating a Barrier-Free Space in Ukraine by 2030 (Order, 2021).

In particular, Direction 1 (physical accessibility) of the Order (2021) states that “all objects in the physical environment should be accessible to all social groups, regardless of age, health condition, disability, financial status, gender, place of residence, and other factors”. By enhancing existing natural spaces, this project will improve the accessibility of the Park “Feofaniya”’s park territory using phytodesign techniques and approaches.

Species	Month									
	III	IV	V	VI	VII	VIII	IX	X	XI	
<i>Allium tuberosum</i>	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green
<i>Anemanthele lessoniana</i>	medium green	medium green	medium green	medium green	medium green	light yellow	dark Purplish Pink	light yellow	medium green	medium green
<i>Artemisia taurica</i>	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	yellow	yellow	very Light Bluish Green
<i>Asparagus officinalis</i>	medium green	medium green	medium green	medium green	medium green	moderate Red	moderate Red	moderate Red	medium green	medium green
<i>Bergenia crassifolia</i>	medium green	medium green	strong Purplish Pink	strong Purplish Pink	medium green	medium green	medium green	medium green	medium green	medium green
<i>Cortaderia selloana</i>	medium green	medium green	medium green	medium green	light yellow	light yellow	moderate Purplish Red	moderate Purplish Red	moderate Purplish Red	moderate Purplish Red
<i>Digitalis grandiflora</i>	medium green	medium green	medium green	medium green	moderate Purplish Pink	moderate Purplish Pink	medium green	medium green	medium green	medium green
<i>Echinacea purpurea</i>	medium green	medium green	medium green	medium green	medium green	moderate Purplish Red	moderate Purplish Red	moderate Purplish Red	medium green	medium green
<i>Echinops sphaerocephalus</i>	medium green	medium green	medium green	medium green	light Blue	light Blue	medium green	medium green	medium green	medium green
<i>Festuca valesiaca</i>	medium green	medium green	medium green	medium green	light green	light green	medium green	medium green	medium green	medium green
<i>Hyssopus officinalis</i>	medium green	medium green	medium green	medium green	medium green	moderate Blue	moderate Blue	medium green	medium green	medium green
<i>Yucca filamentosa</i>	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green
<i>Lavandula angustifolia</i>	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	moderate Blue	moderate Blue	moderate Blue	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green
<i>Levisticum officinale</i>	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green
<i>Linum usitatissimum</i>	medium green	medium green	medium green	medium green	light Blue	light Blue	medium green	medium green	medium green	medium green
<i>Lonicera japonica</i>	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green
<i>Lunaria annua</i>	medium green	moderate Purplish Pink	moderate Purplish Pink	moderate Purplish Pink	medium green	medium green	pale Yellowish Green	pale Yellowish Green	pale Yellowish Green	pale Yellowish Green
<i>Matthiola incana</i>	pale Yellowish Green	pale Yellowish Green	pale Yellowish Green	pale Yellowish Green	medium green	light Purple	pale Yellowish Green	pale Yellowish Green	pale Yellowish Green	pale Yellowish Green
<i>Matricaria recutita</i>	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green	medium green
<i>Mentha × piperita</i>	medium green	medium green	medium green	medium green	moderate Purplish Pink	moderate Purplish Pink	medium green	medium green	medium green	medium green
<i>Miscanthus sinensis</i>	medium green	medium green	medium green	medium green	medium green	medium green	light yellow	moderate Purplish Red	moderate Purplish Red	moderate Purplish Red
<i>Nigella damascena</i>	medium green	medium green	medium green	medium green	light Blue	light Blue	light Blue	medium green	medium green	medium green
<i>Physalis alkekengi</i>	medium green	medium green	medium green	medium green	moderate Red	moderate Red	moderate Red	moderate Red	moderate Red	moderate Red
<i>Pennisetum alopecuroides</i>	medium green	medium green	medium green	medium green	medium green	medium green	moderate Purplish Red	moderate Purplish Red	moderate Purplish Red	medium green
<i>Perovskia abrotanoides</i>	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	very Light Bluish Green	moderate Purplish Pink	moderate Purplish Pink	moderate Purplish Pink	moderate Purplish Pink	moderate Purplish Pink	very Light Bluish Green
<i>Salvia pratensis</i>	medium green	medium green	medium green	medium green	moderate Blue	moderate Blue	moderate Blue	moderate Blue	medium green	medium green
<i>Salvia verticillata</i>	medium green	medium green	medium green	medium green	medium green	moderate Blue	moderate Blue	moderate Blue	medium green	medium green
<i>Silybum marianum</i>	medium green	medium green	medium green	medium green	medium green	moderate Blue	moderate Blue	moderate Blue	medium green	medium green
<i>Stipa tirsia</i>	medium green	medium green	medium green	medium green	medium green	light yellow	light yellow	medium green	medium green	medium green
<i>Stipa pennata</i>	medium green	medium green	medium green	medium green	medium green	light yellow	light yellow	medium green	medium green	medium green
<i>Stipa pulcherrima</i>	medium green	medium green	medium green	medium green	medium green	light yellow	light yellow	medium green	medium green	medium green
<i>Tagetes patula</i>	medium green	medium green	medium green	medium green	medium green	moderate Orange	moderate Orange	moderate Orange	moderate Orange	medium green
<i>Tagetes tenuifolia</i>	medium green	medium green	medium green	medium green	medium green	moderate Orange	moderate Orange	moderate Orange	moderate Orange	medium green
<i>Thymus marschallianus</i>	medium green	medium green	medium green	medium green	medium green	light Purple	light Purple	medium green	medium green	medium green
<i>Thymus serpyllum</i>	medium green	medium green	medium green	medium green	medium green	light Purple	light Purple	medium green	medium green	medium green
<i>Tropaeolum majus</i>	medium green	medium green	medium green	medium green	medium green	moderate Red	medium green	medium green	medium green	medium green

white	light Blue
light yellow	moderate Blue
yellow	vivid Blue
moderate Orange	moderate Purplish Pink
moderate Red	dark Purplish Pink
pale Yellowish Green	light Purple
very Light Bluish Green	strong Purplish Pink
medium green	deep Reddish Purple
light green	moderate Purplish Red

Figure 3. Decorative value of herbaceous perennials based on the color palette of their vegetative and/or generative parts.

The use of this territory for educational, scientific, aesthetic, conservation, recreational, and wellness purposes is central to the mission of the Park “Feofaniya”. Therefore, it is essential to note that the proposed project aligns with the vision of Direction 2 of the Order (2021) in terms of informational accessibility. To ensure access to information about the variety of plants used in the phytocompositions, signs with the names of the main species will be added, and Braille prints will be included later on. This practice is already widely implemented in this area. It plays a key role in the effective utilization of the park’s phytodiversity for environmental education and recreational services, as well as for introducing visitors to specific tree species native to Ukraine (Radchenko et al., 2016, 2019). With the implementation of this project, we will gain valuable experience in creating equal opportunities for accessing natural and cultural assets, improving the quality of life, and facilitating social adaptation for visitors with various functional limitations. Green spaces offer a unique environment for physical development and self-discovery, helping to restore lost or strained social connections, promote emotional healing, and facilitate social rehabilitation. Therefore, this project also partially addresses the vision of Direction 4 of the Order (2021) regarding social and civil accessibility by creating an inclusive environment for people with disabilities and other low-mobility groups, supporting their integration into public life. The key focus is on fostering an understanding of the challenges faced by people with disabilities and providing equal access to nature for all visitors, while also promoting the importance of creating a barrier-free space in Ukraine that meets international standards.

## Conclusions

As a result of the work, a project for optimizing park environments within the nature reserve fund of Ukraine was proposed, involving the creation of rehabilitation sensory gardens using native and introduced plants.

By utilizing landscape design visualization software, a proposal has been developed for organizing a multifunctional, multilevel location, based on the example of Park

“Feofaniya”. The project aligns with the main objectives of the National strategy for creating a barrier-free space, particularly in forming sensory locations adapted to the needs of various population groups. This will serve as an example of how to organize a barrier-free environment in living nature sites.

A basic selection of tactile-safe plants has been developed for creating sensory compositions at the Park “Feofaniya”, taking into account their vegetation periods and decorative-functional purposes.

The use of the existing specialized pathway network, small architectural forms, plant name signs (including Braille prints in the future), and audio tours ensures that individuals with mobility limitations can explore the represented phytodiversity.

This work highlights the modern possibilities for more effective use of the recreational potential of protected areas of Ukraine, while enhancing environmental education, scientific, and informational services, as well as their therapeutic functions.

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## Пошук можливостей адаптації зеленої інфраструктури для організації безбар'єрного середовища на об'єктах живої природи

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Представлений проєкт адаптації рекреаційних зон природоохоронних територій України до сучасних викликів суспільства, що дозволяє забезпечити безбар'єрний доступ усіх категорій відвідувачів до природних цінностей. Створення поліфункціональної сенсорної локації із використанням аборигенних видів рослин у ППСМ “Феофанія” є реалізацією основних напрямів Національної стратегії з формування безбар'єрного простору. Сформований перспективний фонд рослин (до 40 найменувань рослин, зокрема і з використанням аборигенних видів та інтродуцентів) для стимулювання різних органів чуття людини та підвищення терапевтичної функції сенсорної локації. Запропонований ландшафтно-дизайнерський проєкт вдосконалює існуючі елементи території парку і сприяє підтриманню когнітивного зв'язку з природою для усіх категорій відвідувачів. Створювана багаторівнева композиція (за типом міксбордерів) має декоративно-функціональне призначення і доповнює паркову територію інклюзивною мультисенсорною зоною. Реалізацію інформаційної безбар'єрності основні елементи сенсорного міксбордеру забезпечать текстові таблички та аудіюваний матеріал про окремі види використаних рослин. Проєкт спрямований на створення умов для фізичного і емоційного відновлення, соціальної взаємодії, підвищення обізнаності про рослини і забезпечення різноманітного сенсорного досвіду для осіб з маломобільних груп. З використанням існуючого потенціалу парку “Феофанія” та загальнодоступних технологій створюється приклад інноваційної форми міської зеленої зони для широкого кола користувачів. Завдяки реалізації цього проєкту, рекреаційні зони природоохоронних територій України будуть більш придатними для вирішення сучасних суспільних проблем та викликів сьогодення і перспективи повоєнного періоду.

**Ключові слова:** безбар'єрне середовище, природна спадщина, зелені зони, тактильні сади, оптимізація