

FLOATING LANDSCAPES: A NATURE-BASED DESIGN APPROACH

PEISAJE PLUTITOARE: O ABORDARE DE PROIECTARE BAZATĂ PE NATURĂ

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Abstract.

This paper presents a temporary floating garden developed for the West Side Flower Fest 2024 student competition in Bucharest. The water-wise brief was translated into an elongated modular platform organised around a circular Moon Gate and two contrasting planting expressions: anthropic and natural. The project proposed 14 plant entries across the two conceptual zones, allowing the planting palette to reinforce the narrative through differences in habit, texture, colour, and visual density. The process included concept development, landscape composition, technical design, prefabrication, transport, modular assembly, buoyancy and stability testing, planting, and public display. The completed installation integrated a landscape concept with a lightweight floating structure, while a later Botanical Garden display indicates potential for reconfiguration and reuse. As a temporary exhibition project, the case focuses on design integration, modular construction, full-scale testing and adaptability rather than long-term ecological performance. Future permanent applications would require structural calculations, anchoring, material-durability assessment, long-term maintenance planning and monitoring of plant establishment and ecological performance.

Key words: floating garden, landscape design, modular platform, planting composition, nature-based solution

Rezumat.

Lucrarea prezintă o grădină plutitoare temporară realizată pentru concursul studențesc West Side Flower Fest 2024, București. Brieful privind utilizarea responsabilă a apei a fost transpus într-o platformă modulară alungită, organizată în jurul unei Porți a Lunii și a două expresii vegetale contrastante: antropică și naturală. În proiect au fost incluse 14 tipuri de plante, împărțite între cele două zone conceptuale, astfel încât vegetația să susțină narațiunea prin diferențe de port, textură, culoare și densitate vizuală. Procesul a inclus dezvoltarea conceptului, compoziția peisagistică, proiectarea tehnică, prefabricarea, transportul, asamblarea modulară, testarea practică a flotabilității și stabilității, plantarea și expunerea publică. Instalația finalizată a integrat conceptul

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peisagistic într-o structură flotantă ușoară, iar prezentarea ulterioară într-o Grădină Botanică indică potențialul de reconfigurare și reutilizare. Fiind un proiect expozițional temporar, studiul a urmărit integrarea designului, construcția modulară, testarea la scară reală și adaptabilitatea, nu performanța ecologică pe termen lung. Aplicațiile permanente ar necesita calcule structurale, ancorare, verificarea durabilității materialelor, planificarea întreținerii pe termen lung și monitorizarea instalării vegetației și a performanței ecologice.

Cuvinte cheie: grădină plutitoare, proiectare peisagistică, platformă modulară, compoziție vegetală, soluții bazate pe natură

INTRODUCTION

Urban water landscapes are increasingly approached as spaces where ecological processes, public experience, and design can be considered together. Planted floating structures belong to this broader field, but the term covers markedly different objects: engineered floating treatment wetlands, habitat-oriented islands, productive platforms and amenity or cultural installations. Reviews report potential functions ranging from pollutant removal to habitat support and recreation, while also showing that performance depends on purpose, structure, plant selection, hydraulic setting, maintenance and monitoring [Headley and Tanner, 2012; Yeh et al., 2015; Likitswat et al., 2023]. These reported functions cannot automatically be attributed to every planted object placed in water.

The same distinction is necessary when using the language of nature-based solutions. The IUCN standard links nature-based solutions to a defined societal challenge, biodiversity benefits, safeguards, evaluation and adaptive management [IUCN, 2020]. A temporary display may therefore apply nature-based design principles by using vegetation and water as organising media without constituting a verified nature-based solution in itself. This qualification is especially relevant to landscape-architecture case studies, where the primary outcome may be spatial, technical and educational rather than a measured ecosystem service.

Applied projects can nevertheless clarify how concept, spatial composition, construction and planting interact. A documented landscape-design process supports coordination between built and vegetated components and allows revisions as the proposal moves toward implementation [Istrate et al., 2023]. Floating planted elements have also been proposed as landscape accents in Romanian urban water settings [Cojocariu et al., 2023], although design relevance should remain distinct from verified ecological performance.

The case examined here was developed for West Side Flower Fest 2024, whose official theme was “Innovations in landscape design for wise water use” and whose category was “Floating gardens (reflecting specific ecosystems)”. The competition required a 15 m² module and a temporary, demountable and replicable proposal, with planting selected under the general rules of the brief [Proiectare 6 and ADPDU Sector 6, 2024]. The aim of this paper is to present how a student team translated that requirement into a Moon Gate-centred floating landscape

installation, to examine the coordination between concept, planting and structural design, including the way the documented planting palette reinforced the anthropic–natural contrast, and to discuss its modularity, reuse potential and requirements for future longer-term applications.

MATERIAL AND METHOD

The project followed a brief-to-installation sequence. The team first interpreted the competition theme and the floating-garden requirement, then developed a concept in which water served as the common setting for two deliberately contrasting expressions of vegetation. A circular Moon Gate was positioned as the central spatial and structural element around which the two contrasting planting compositions were developed.

Within the 2024 competition schedule, teams registered by 15 March and submitted their final proposals by 15 April, following the launch of the call on 26 February. For the floating-garden category, this interval covered concept development, resolution of the modular floating structure, planting composition and preparation of the technical and presentation documentation required for submission. The construction phase followed during the official 27–30 May installation window, before the garden entered the public exhibition programme from 31 May to 2 June 2024 [Proiectare 6 and ADPDU Sector 6, 2024].

The landscape design process developed the platform as an elongated, free-form planted surface. The Moon Gate occupied the central structural intersection, while plant masses were distributed to produce an ordered, brighter anthropic zone and a looser natural zone. The project poster grouped the planting palette into two conceptual sets. The natural composition included *Carex pendula*, *Juncus maritimus*, *Miscanthus sinensis*, *Typha minima*, *Stipa barbata*, *Hippuris vulgaris* and *Alopecurus myosuroides*. The anthropic composition included *Polygonum amphibium*, *Iris ensata*, *Lythrum salicaria*, *Nymphaea* sp., *Phormium tenax* 'Purpureum', *Butomus umbellatus* and *Ceratophyllum demersum*.

The technical development combined a metal frame with PVC pipes and extruded-polystyrene components to provide buoyancy. Metal mesh was placed above and below the assembly to bind the components and support the planted layer, and peat served as the growing substrate. The frame established longitudinal and transverse axes and supported the Moon Gate. The platform was divided into puzzle-like modules to facilitate prefabrication, transport, manipulation and reassembly. The official brief prescribed a 15 m² module, and the platform was developed as a temporary, demountable system suited to the competition format.

Components were prefabricated and joined before transport. The assembled platform was then placed on water for a practical buoyancy and stability check. This was a visual and operational test under observed loading, not an instrumented structural test; no load, displacement, freeboard or stability coefficients were recorded. The implementation stage comprised transport, modular reassembly, installation of the central gate, preparation of the planted surface, positioning of plants and final compositional adjustment on site.

Following the on-site installation period, the completed garden was presented during West Side Flower Fest in Drumul Taberei Park, Bucharest, from 31 May to 2 June 2024 [Proiectare 6 and ADPDU Sector 6, 2024]. The case-study evaluation focuses on the realised spatial composition, modular construction, practical testing,

assembly process and adaptability of the installation. Ecological performance monitoring was outside the scope of this temporary exhibition project.

RESULTS AND DISCUSSIONS

From concept to floating landscape

The principal design result was a legible composition in which the Moon Gate performed three simultaneous roles: structural focal point, perceptual threshold and viewing frame (Figure 1). Its circular geometry contrasted with the elongated planted outline and made the passage between the anthropic and natural zones readable without requiring a physical wall. This use of centrality, contrast, rhythm and balance corresponds to the role assigned to compositional method in landscape-concept development [Trif, 2025]. The anthropic–natural duality was therefore expressed through designed spatial differences rather than through a literal division between managed and unmanaged vegetation.

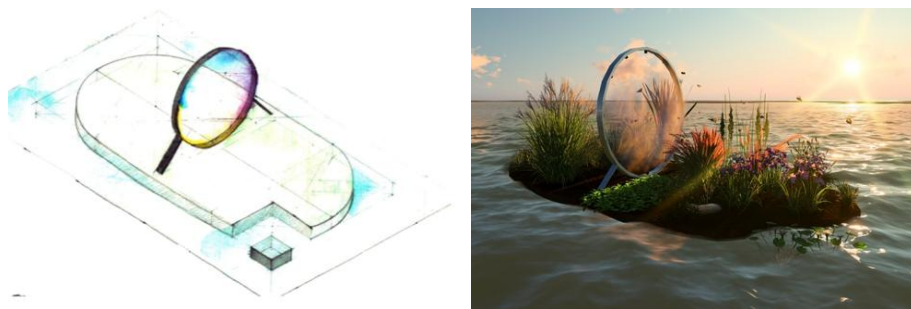


Fig. 1. Conceptual development: (left) early spatial sketch; (right) rendered view showing the circular Moon Gate and contrasting planting expressions

Design of the floating platform

The modular division proved effective in connecting the intended landscape form with the practical requirements of prefabrication, transport and on-site reassembly (Figure 2). The separated components preserved the elongated outline and central Moon Gate after reassembly, while allowing installation within the short construction period. The structural strategy therefore supported both the visual concept and the logistics of temporary exhibition.

Comparable floating-wetland literature records a wide range of frames, buoyant media, meshes and planting substrates, including polymeric components, and emphasises that material selection should respond to site conditions, design life and maintenance objectives [Pavlineri et al., 2017]. Fieldwork with natural-material islands has likewise shown that buoyancy and durability become important design criteria when floating systems are intended to remain in place over time [Karstens et al., 2021]. In this context, the student installation can be read as a successful exhibition-scale prototype whose modular logic could be further developed for permanent applications.

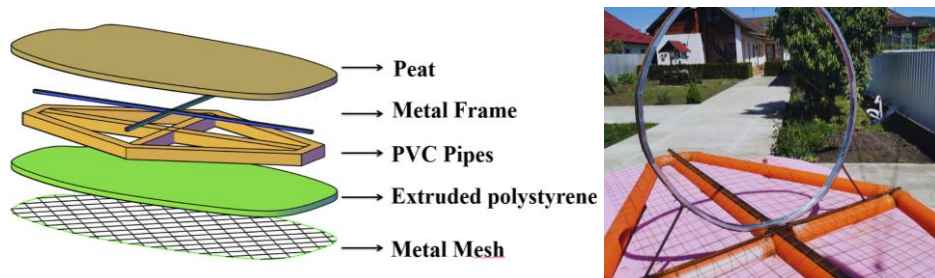


Fig. 2. Technical development: (left) exploded structural scheme; (right) modular assembly of the platform components

Planting composition

The planting strategy translated the two conceptual worlds through form, colour, height and density. The project designated one side as “natural” and the other as “anthropic”, with seven plant entries assigned to each composition (Table 1). The natural side relied predominantly on grasses, sedges, rushes and emergent forms to create a looser structure and evoke spontaneous waterside vegetation. By contrast, the anthropic side combined flowering aquatic and marginal plants with stronger architectural accents and a more deliberately ordered arrangement. The distinction was therefore expressed not only through spatial organisation but also through differences in plant habit, texture, colour and visual density.

The resulting plant palette functioned as an integral part of the landscape concept, helping to make the transition between the two sides of the Moon Gate visually legible. Rather than acting as a decorative addition to the floating structure, vegetation contributed directly to the spatial narrative and to the perception of the two contrasting landscape expressions. The selected taxa also responded to the installation's aquatic and waterside character, supporting the intended relationship between planting, water and the project's ecological theme. For longer-term applications, monitoring plant establishment and seasonal performance under site-specific conditions would provide useful information on how the composition evolves over time. The importance of evaluating ornamental plant behaviour in relation to the cultivation system and local environmental conditions has also been demonstrated for engineered vegetated systems under Eastern European climatic conditions [Cojocariu et al., 2022].

The diversity of plant habits also shaped the garden's vertical and spatial organisation. Low, submerged or floating forms maintained a close visual relationship with the water surface, while emergent vegetation and taller grasses created successive layers of height around the platform. This variation gave depth to the relatively compact composition and allowed the planting to be perceived as a layered landscape rather than as a uniform planted surface. The Moon Gate further organised these layers by framing different portions of the vegetation according to the viewing direction. As a result, plant height and habit contributed not only to the

ecological character suggested by the project, but also to the perception of depth, movement and changing views within the installation.

Table 1

Plant palette documented in the project poster and its compositional role within the natural and anthropic zones

Plant entry in the project poster	Conceptual zone	Interpreted compositional role
<i>Carex pendula</i>	Natural	Arching, fine-textured mass providing continuity and a softer edge
<i>Juncus maritimus</i>	Natural	Upright linear structure reinforcing waterside character
<i>Miscanthus sinensis</i>	Natural	Tall grass mass contributing volume, movement and vertical structure
<i>Typha minima</i>	Natural	Emergent vertical accent strengthening the wetland character
<i>Stipa barbata</i>	Natural	Fine, flowing texture adding movement and visual softness
<i>Hippuris vulgaris</i>	Natural	Low emergent aquatic form contributing textural variation
<i>Alopecurus myosuroides</i>	Natural	Grass-like matrix supporting a looser, more spontaneous visual effect
<i>Polygonum amphibium</i>	Anthropic	Aquatic or marginal cover connecting the planted mass with the water surface
<i>Iris ensata</i>	Anthropic	Upright flowering accent creating a clear vertical rhythm
<i>Lythrum salicaria</i>	Anthropic	Tall flowering layer contributing colour, repetition and vertical continuity
<i>Nymphaea</i> sp.	Anthropic	Floating-leaved layer visually anchoring the composition to the water surface
<i>Phormium tenax</i> 'Purpureum'	Anthropic	Architectural foliage providing a strong form and colour contrast
<i>Butomus umbellatus</i>	Anthropic	Emergent flowering accent adding height and ornamental detail
<i>Ceratophyllum demersum</i>	Anthropic	Submerged aquatic component extending the planting composition below the water surface

Testing, implementation and completed garden

The practical water test provided an immediate check of flotation and stability before public installation (Figure 3). Under the tested conditions, the assembled prototype floated and remained sufficiently stable to proceed with transport and exhibition assembly. The test also allowed the team to observe the behaviour of the modular connections and the platform's overall balance under the combined weight of the structural and planting components. This stage was particularly important because it provided a direct full-scale assessment of how the designed assembly performed in water before final presentation. Prototype-based approaches are particularly useful when they are iterative and followed by observation and adjustment [Rottle et al., 2023]. In this project, the water test

connected technical design with the practical requirements of full-scale implementation.



Fig. 3. Construction sequence: (upper left) practical buoyancy and stability check on water; (upper right and bottom) on-site assembly and planting during implementation

On site, the modules, central gate and vegetation came together into a coherent visual whole (Figure 4). The completed garden retained the circular focal element, the long horizontal profile and the contrast between compact and loose plant masses. At full scale, the Moon Gate's verticality balanced the predominantly horizontal character of the floating platform and strengthened the composition's legibility when viewed from the surrounding space. The final arrangement also made the relationship between structure and planting more evident, with vegetation softening the technical components and integrating them visually into the water setting. Its strongest demonstrated outcome was the coordination of concept, construction and planting within the temporary festival format. The installation was conceived primarily as a landscape-design and implementation exercise; ecological functions such as water treatment or habitat performance would require a different monitoring framework.

The completed installation also gained meaning through its relationship with the surrounding water and the viewer's movement around the display. As viewers observed the garden from different angles, the Moon Gate alternately acted as a focal object and a frame for the vegetation beyond it, while the layered planting changed in apparent density and depth. This shifting perception reinforced the installation's spatial character and allowed the composition to be experienced as more than a static floating object.



Fig. 4. Completed floating garden presented at West Side Flower Fest 2024

Figure 5 confirms that the intended anthropic–natural contrast remained legible after implementation. In the completed garden, differences in silhouette, density and planting structure allowed the two expressions to be read across the Moon Gate, demonstrating continuity between the initial concept, the planting design and the built installation.

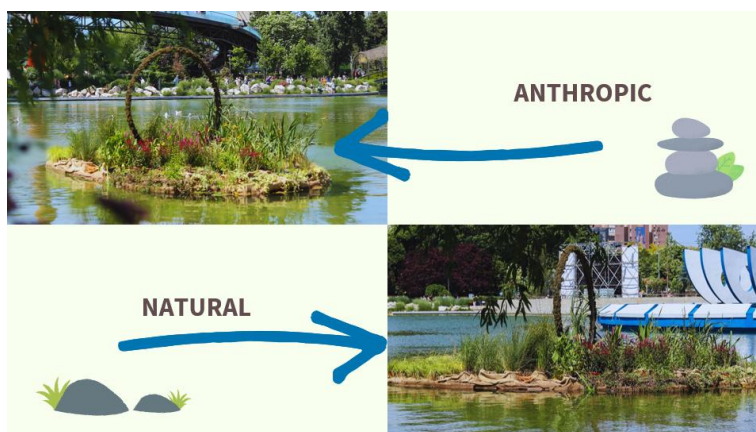


Fig. 5. The natural versus anthropic concept

Reuse, landscape potential and transferability

The installation was subsequently documented during the twentieth edition of "Regina Toamnei, Crizantema" at the "Răsvan Angheluță" Natural Sciences Museum Complex in Galați. The museum's official announcement confirms the exhibition opening on 24 October 2024 and describes a mini floating display on the lake beside the Japanese Garden [CMSNG, 2024]. The photographs document the circular-gate floating display in this second setting (Figure 6), demonstrating that the modular concept could be reconfigured and reused beyond the original festival

context. This second exhibition therefore provides practical evidence of the design's adaptability and communication value.



Fig. 6. Floating landscaped display in the lake of the Japanese Garden, Galați museum exhibition, 2024

The wider literature shows that planted floating systems can be developed for treatment, habitat, productive, cultural or amenity purposes [Likitswat et al., 2023]. Researchers have successfully monitored aquatic-plant establishment on experimental floating islands, but survival and cover varied over time and among taxa [Martínez-Peña and López-Candela, 2018]. Environmental improvement has also been reported for purpose-built artificial islands [Yeh et al., 2015]. These studies outline possible future research directions rather than outcomes for the current garden. Productive use involving herbs or vegetables would similarly require separate studies of food safety, nutrient requirements, substrate, irrigation, and yield.

For a permanent installation, the design would need site-specific structural calculations; verified connections, anchoring, freeboard and load criteria; resistance to wind, waves, ultraviolet exposure and freeze-thaw cycles; safe maintenance access; long-term maintenance planning; and monitoring of plant establishment and any ecological objectives. The project should be described as a nature-based design approach because living material and water organise the landscape experience. Classification as a verified nature-based solution would require a stated societal challenge, measurable biodiversity outcomes, safeguards and adaptive monitoring in accordance with the IUCN framework [IUCN, 2020].

CONCLUSIONS

The project translated the floating-garden brief into a coherent landscape composition in which the Moon Gate linked spatial organisation, view framing and the contrast between anthropic and natural planting expressions.

The modular platform connected design intent with transport and short-term assembly, while the practical water test provided a useful full-scale check before public installation.

The completed festival garden and later museum display demonstrate the installation's potential for exhibition, reconfiguration, and reuse.

The planting design was central to the project narrative: the 14 plant entries were divided equally between the natural and anthropic palettes, using contrasting habits, textures, colours and aquatic layers to make the conceptual duality legible. For longer-term applications, monitoring plant establishment and seasonal performance would help document how the composition evolves under site-specific conditions.

For permanent or ecosystem-service applications, the landscape concept would need to be complemented by site-specific structural verification, anchoring, material-durability assessment, long-term maintenance planning and ecological monitoring.

From an educational perspective, the project provided an interdisciplinary exercise in which students connected conceptual thinking, planting selection and composition, structural prototyping, practical testing, logistics, full-scale assembly and public presentation, strengthening the relationship between landscape-design theory and implementation.

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