



Filippo Angelucci¹, Armen Shatvoryan²

¹ G. d'Annunzio University of Chieti-Pescara, Chieti, Italy

² National University of Architecture and Construction of Armenia, Yerevan, RA

Abstract: Through the TACEESM research, a meta-design approach is focused on the factors influencing the "reasons and design forming factors of the project" for urban historical/contemporary urban heritages. The goal is to investigate the possibilities of working through mending and regenerative actions in view of the multiple environmental transitions and sustainable challenges. The methodological approach was assessed through a meta-design experimental workshop on Yerevan's Circular Garden. The approach integrates innovative scenarios, visions, and concepts in an inter-systemic method to rethink the urban habitat in an adaptive/co-evolutionary sense, re-establishing relationships, processes, and performances between nature and artefacts, as well as the psychological development level of current society. The experience showed the possibility of repositioning the green heritage design as a process of "mediance" through the techno-sphere, bio/physio-sphere, and anthropo-sphere to support multiple sustainable, alternative, and reversible projects. Considering the green heritage as a space-environmental interface system, it is possible to enable variable adaptative degrees to the different conditions generated from climatic, social, economic, health, and energy transitions.

Keywords: Sustainable creative architecture, Meta-design, space-environmental interface, green in-between space, adaptive actions.

Filippo Angelucci*

E-mail: filippo.angelucci@unich.it

Received: 27.10.2024

Revised: 19.11.2024

Accepted: 17.12.2024

© The Author(s) 2024



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Introduction

Sustainability challenges, well-being, and urban natural heritage

The concept of landscape with its different degrees of anthropization was defined by the 2000 European Convention¹ as a systemic entity, not confined within dimensional or temporal limitations. Landscape is thus the outcome of a continuous process of interaction between anthropogenic and natural evolutionary dynamics.

Living cultures and cultures of space complement each other, overlap, and sometimes come into conflict. In other cases, they recontextualize themselves by configuring new organisational and functional arrangements to generate positive effects in the balances of settlement space. The definition provided by the *European Landscape Convention* (ELC) is also central in the design process of the urban green heritage to provide sustainable responses in two critical areas: the field of environmental emergencies of energy, land consumption, and reduction of renewable natural resources; the field of emergencies induced by the climate change and the ongoing ecological, economic, and technological transitions. When the ELC preamble integrates perceptual, cultural, economic, social, ecological, and environmental aspects by considering them as "fundamental components of the cultural and natural heritage", a new relational framework through *bios*, *anthropos*, and *techne* is established. A new condition is hoped based on a symbiotic vision of adaptation of humankind to the natural environment. The city's natural heritage can be a regulatory system to foster an ongoing process of human-nature co-evolution that directly affects urban sustainability and people's well-being [1].

Even in urban systems, reasoning on future scenarios of design intervention to safeguard, manage, and plan

¹ Council of Europe. Council of Europe Landscape Convention. As amended by the 2016 Protocol. European Treaty Series - No. 176. Florence, 20. X. 2000.

the natural landscape will therefore have to start from overcoming the unlimited use of existing urban assets in the form of natural, cultural, and social capital.

The natural urban landscape heritage, with its physical identity, loses the connotation of a viewpoint or postcard. Policies that act on the visible natural landscape by acting only on the qualitative composition and re-composition of natural and artificial signs, thus, risk reducing the green heritage to a resource disconnected from the real needs of the settled populations of a city. It is also true, however, that even working on the other identity of the natural landscape heritage, invisible but measurable through environmental performance indicators, is no longer sufficient. There is a risk of transforming the green heritage into a quantitative entity incapable of improving the quality of life and health of the inhabitants.

The prospects for developing the urban green heritage can only start from a reconsideration of the reasons for conservation, enhancement, and transformative interventions. Innovative approaches are needed to manage the increasing levels of complexity of historical and contemporary urban habitats where visible and non-visible landscape aspects coexist. The core of this challenge is interdisciplinary because it is both cultural, behavioural, and perceptual, as well as design, managerial, and technological. A goal would be to find the possibility of working on the urban built and natural environment by pointing out new trajectories of mending and regeneration in view of the multiple environmental transitions taking place.

Actions on the urban green heritage may consolidate the *status quo*, enhance its values, or even radically change its configurational patterns and resource assets to define adaptive conditions of sustainability and well-being of the city users.

In this way, a framework of interventions could be outlined that is no longer circumscribed within net project categories. In an inter-systemic leap, moments of conservative preservation of the natural heritage would alternate with phases of care and innovative actions to produce new values and profitability. This would create the conditions for developing alternative scenarios and multiple visions of coherence between the inhabitants' needs, the environmental context variables, and the diverse levels of ecological, economic, and technological sustainability.

A different conception of the city's natural/artificial assets in the flow of time would thus be placed at the centre of the propositional process. That is, considering these assets not as consumer goods, objects, or products but as capital to be conserved, maintained, and regenerated for present and future generations.

Methods. The TACEESM experience and the Capability Building Approach

Through the TACEESM experience (Transforming Architectural and Civil Engineering Education toward a Sustainable Mode – EU Erasmus+ Program), research units of the University of Chieti-Pescara and NUACA University have developed a meta-design and interdisciplinary methodological approach to focus the complex relationships of the project with historical, modern, and contemporary urban heritages, using a strategical coexistence between mending and regenerative actions.

The TACEESM challenge was to interpret the design process through pre-existences and innovations in the urban field based on a multicultural and poly-disciplinary idea of the project. As multicultural, the project is confronted with its globalised nature and brings with it a continuous exchange of knowledge, contamination of cultures, hybridization across traditional and more innovative knowledge [2]. In its multidisciplinary nature, the project involves a more complex rearticulation between different expert and diffuse contributions, to open to a dialogical confrontation with a framework of "pertinences" through global and local dimensions [3].

This methodological approach was assessed for the first time on the Yerevan *Cascade*. The *Cascade* was considered the best opportunity to check the methodological theoretical issues and design outcomes on a case study with a complex contextual framework of public pre-existences, monumental architectures, natural entities, urban vitality, and cultural-artistic initiatives. The second checking activity was tested on Yerevan's *Circular Garden* through the bilateral agreement for teaching activity, research, education and training program between the NUACA and UniCH-PE universities.

The oppositions between the technical and humanistic dimensions of the project lose their certainty. The human habitat is configurable "not in a naturalistic or aesthetic sense, but in a constructive sense" [4]. According to this point of view, it is also possible to redefine the relationships between conservation,

enhancement, and transformation of the urban natural heritage by following heuristic development trajectories based on heterogeneous approaches and tools. Working on urban natural heritage becomes design research on the "reasons of the project", crossing multiple levels and timescales of intervention through strategies of conservation, care, and valorization of the built and natural resources.

The experimental approach developed in the TACEESM initiative makes it possible to enucleate at least three different fields for these project reasons by placing them in a design process that operates synchronically and diachronically on the capacities/abilities (capacity building approach) that can be activated for the sustainability of the urban habitat^{2,3}.

A first field concerns the ability to problematize the project. This means being able to see, listen, and detect the real needs for transformation of the urban habitat and its natural heritage, according to the needs of its inhabitants and users. The project is no longer unidirectional but opens itself to a framework of shared, combinable, or reversible scenarios, recording experiences, causes, effects, feedback, interferences, unforeseen events that can connote intervention on the natural heritage, not as an arbitrary action.

A second field relates to the development of distinctive design visions working with pre-existences, care-oriented or toward innovation too. Through visioning, plural and a-scalar perspectives of intervention on the urban natural heritage are enabled. By breaking the unidirectional sequence that goes from the general aestheticizing representation to the technical details of the project, more alternatives focus on the different quality levels of urban living with natural resources.

A third field refers to the capability to translate the knowledge that can inform the various project implementation phases on the urban natural heritage in the short, medium, and long term. The design experience is not limited to providing closed solutions but becomes a cognitive process of analysis, forecast, projection, and verification of its degrees of feasibility and evolution. The project extends to conceptualise the contents of interventions for the sustainability of the city, acting on urban natural heritage.

From scenarios to visions, to concepts

The capacity-building approach applied on the *Circular Garden* case study was tested as part of a meta-design process in which researchers, teachers, students, and users/inhabitants were involved. The starting assumption is to overcome the idea of urban public space (with its natural and built heritage) based on the distinction between context (external environmental system), container (built heritage/environment), and content (natural heritage, inhabitants/users, technical objects/equipment). In the public and collective spaces of contemporary cities, environmental, social, economic, common, and individual dimensions coexist in a space-time *continuum* with very blurred contours definable as an urban space-environmental interface system. In this urban space-environmental system, natural heritage is also a wide regulatory interface that acts on cultural, behavioural, perceptual, ecological, socioeconomic, and decision-making dimensions to improve the conditions of living the city together^{4,5}. The city's unbuilt green and natural space has thus been taken as an intermediate system for extending the degrees of interaction and adaptation among urban components. This position allows alternative context-sensitive and responsive sustainability futures to be defined even by bringing inhomogeneities, anisotropies, and discontinuities.

Through the capacity-building approach, multiple conditions for the regeneration of the *Circular Garden's* natural heritage were explored according to different intervention modes from both user-centred and

² United Nations, Transforming our World: the 2030 Agenda for Sustainable Development, UN A/RES/70/1. [sustainabledevelopment.un.org](https://www.un.org/sustainabledevelopment/), Distr.: General 21 October 2015.

Available at: <https://www.un.org/sustainabledevelopment/development-agenda/>

³ UNESCO, Policy Document for the Integration of a Sustainable Development Perspective into the Processes of the World Heritage Convention, 2015, General Assembly of States Parties to the World Heritage Convention, 20th session.

⁴ UNESCO, Recommendation on the Historic Urban Landscape adopted by the General Conference at its 36th session, Paris, 2011, 3.

⁵ UNESCO/ICCROM/ICOMOS/IUCN, Guidance and Toolkit for Impact Assessment in a World Heritage Context, UNESCO, Paris, 2022. Available at: <https://whc.unesco.org/en/guidance-toolkit-impact-assessments/>

environmental-centred perspectives⁶. The meta-design process thus took on a technological-environmental dimension. With respect to the areas of environmental, economic, and social sustainability/compatibility, the green assets of the *Circular Garden* were assessed in their variable anthropological, topological, and technological dimensions. Ten recurring systems of natural and artificial entities that interact with the green heritage from outside, through, and within were considered. The ten systems relate to: actors (users/inhabitants), natural and artificial factors/agents, activities and functions, spaces and places, times and cyclicities, ways of using space, causes, means, and tools, fixed and variable contextual quantities, technical systems, and objects.

The final meta-design exploratory framework is characterised by the reiteration of key issues/questions concerning who/what acts, where, how, when, why, by what means and with respect to which entities in the development of the scenarization, vision, and conceptualization activities (Fig.1). Through this process, the urban natural heritage interventions do not exclude the measurability of the project's responsiveness to users' needs or to the conservation and transformation policies. At the same time, we do not lose sight of the multiple configurations that the contemporary green heritage may assume in the short, medium, and long term. The meta-design experience based on the capacity-building approach makes it possible to go beyond the forecasting-based practice of "what" will happen in the city's natural spaces. The natural heritage becomes central for a multidimensional experience that extends itself to get alternatives for the future through foresighting and backwarding on the reasons for the various levels of intervention.

Issues/Questions	Anthropological dimensions	Topological dimensions	Technological dimensions
WHO uses the green space?	numbers and typology of users/inhabitants	users'/inhabitants' typology related to natural agent/factors	other specific users (for maintenance, security, temporary working)
WHAT forces interact with the green space?		sun, shadows, wind, water, humidity, noises, traffic positive/negative interactions (eventually also animals)	eventually artificial entities (cars, bus service, technical machineries)
WHAT users do in the green space?	kind of actions/activities of users/inhabitants	positive/negative reactions of users/inhabitants to sun, shadows, wind, water, humidity, noises, traffic, (animals)	eventually activities (positive/negative) related to the technological entities
WHERE are activities developed?	distributions of users/inhabitants presence	users'/inhabitants' activities influenced from sun, shadows, wind, water, humidity, noises, traffic, (animals)	
WHEN is the green space used?	time extension of actions/activities	effects of sun, shadows, wind, water, humidity, noises, traffic, (animals) on the times of use	effects of technological entities on the times of use
HOW is the green space used?	practices and behaviours of users/inhabitants	users'/inhabitants' behaviours modifications related to sun, shadows, wind, water, humidity, noises, traffic, (animals)	users'/inhabitants' behaviours modifications in presence of artificial/technological entities
WHY is the green space used?	users'/inhabitants' needs	attractiveness produced from sun, shadows, wind, water, humidity, (animals) (also why the green space is not used?)	attractiveness of artifacts and eventually technological entities
WHICH kind of tools are used?	kind of devices and prosthesis	users'/inhabitants' tools/devices to protect from sun, shadows, wind, water, humidity, noises, traffic, (animals)	users'/inhabitants' tools/devices necessary to use artificial entities
WHAT is the amount of used green space?		main/preferable used areas	main/preferable used areas in which is relevant technological entities
WHAT entities define the green space?		relations between building/infrastructures and sun, shadows, wind, water, humidity, noises, traffic, (animals)	eventually important artifacts (e.g. pavilions, built objects, furniture, technical plants)

Fig. 1. Explanatory framework of key issues/questions considered for the assessment of anthropological, topological, and technological dimensions influencing the urban green heritage as a cross-system regulatory interface. Source: authors

The meta-design process experimented on the *Circular Garden* was developed in three closely interconnected phases through a continuous monitoring activity of the decision-making and projective

⁶ United Nations, Convention Concerning the Protection of the World Cultural and Natural Heritage, WHC-11/35.COM/9B, Paris, 2011, United Nations Educational, Scientific and Cultural Organization.

coherence levels between scenaristic-strategic, visionary-tactical, and conceptual-operational aspects.

The aspects of strategic-scenarization, foresighting, and backwarding activities made it possible to extend the meta-design exploration to the possible configurational patterns of the *Circular Garden* system and subsystems. The following aspects were synchronically/diachronically brought into play: physical-material entities (actors, animals, context factors, objects), material connections (processes, supply chains, cycles), established and new functional challenges (daily and tourist uses, sharing, cooperation), traditional or innovative intangible relationships (communications, events, performances). The development of the visioning allowed the elaboration of projective anticipations on the evolution of the *Circular Garden* by considering process, performative, and relational variables that allow the role of the natural heritage to still be unchanged or that are also changing. We have thus focused on the main metamorphosis vectors that, also in a tactical-alternative way, make the *Circular Garden* assume more degrees of performance redundancy and regulatory-adaptive capacities of resilience, antifragility, inclusiveness, vitality, smartness, healthiness, environmental integrated accessibility.

Conceptualization aspects favoured the development of content to address the intervention quality not only in morpho-generative terms, but also in an eco-relational sense between natural and artificial urban spaces. Priority concepts were then defined to: produce, maintain, and regenerate natural resources essential for urban life (ecological-spatial concepts); innovate uses and modifications of the commons resources compatible with inhabiting-building cultures (economic-spatial concepts); interface physical, connective, and functional variables to mediate anthropic-natural evolutionary dynamics (transitional-spatial concepts).

An experimental approach between Sustainable Creative Architecture and Meta-design

While discussing the scope of factors that should be considered in the architectural design process, there is one more important factor influencing that process. It is the "source" of that design, e.g., an architect or any author with a complex of his/her level of development, self-identifying and creative intelligence. Elements such as psychological background, upbringing, education, national identification, understanding of happiness, etc. are the key points of the author, and significantly influence and are interconnected with that "source". Consequently, these variations in personal characteristics, the different "levels" of those criteria can profoundly impact the final design outcome. At the National University of Architecture & Construction of Armenia (NUACA), we emphasize that being an architect transcends mere professional choice; it embodies a lifestyle commitment. Architects must find joy in their work, as the designs they create should emerge from a point of fulfilment and happiness. In this context, the TACEESM program has introduced a unique infographic methodology during workshops held in Malaga and Yerevan. This approach was spearheaded by the "Shatvoryan School of Architectural Self-Development", since its inception in 2019, in the frame of architectural workshops. This methodology involves sketching while listening to music, learning tolerance, being self-sustainable with no distraction, and engaging in several exercises, beginning with a "free" topic to relieve psychological tension. This is followed by more focused sketching on specific themes, leading to collaborative efforts. The culmination of these activities is the exploration of a key topic, in our case, reorganizing public spaces in Yerevan, specifically the design of the *Circular Garden*. The methodology completely lies down with the multi-layered approach, which reflects a deeper understanding of the architectural process. The method has been repeatedly tested through design workshops, consistently demonstrating that those who engage in the preliminary "tension-releasing" exercises generate more innovative and thoughtful designs compared to those who dive straight into assignments. For architects and designers, being mindful of their emotional and psychological states is essential. Such awareness can greatly enhance their capacity to find creative solutions, ultimately leading to more impactful and meaningful designs.

The key actions of the Yerevan Circular Garden experimentation

From the point of view of urban sustainability and inhabitants' well-being, acting from a technological-environmental meta-design perspective means framing actions on the city's green heritage by confronting different orders of problems and reasons for the project. The analysis, scenarization, visioning, and conceptualization steps were so oriented toward a holistic signification of the natural heritage urban role going

beyond the classic three dimensions of ecological, economic, and socio-cultural sustainability [5].

By providing for participatory/inclusive preparatory and monitoring actions that may support the various steps of urban natural heritage development, the meta-design path could give the institutional bodies (e.g., universities, public administrations, associations, etc.) a new role as an enabler/facilitator actor for the achievement of the urban sustainability and well-being goals.

The Circular Garden between Tamanyan's plan and Yerevan sustainability

Before delving into the topic of designing green and open public spaces, it is important to discuss the example of our study, specifically the creation of a circular garden around the small center of Yerevan by Alexander Tamanyan. Tamanyan, the architect of the city, was inspired by the principles of the "garden city" concept introduced by Ebenezer Howard [6], which emphasized the importance of a well-defined city centre surrounded by accessible green spaces and streets, often referred to as the "lungs" of the city.

While Howard's ideas did not specifically call for circular forms, Tamanyan [7] envisioned the city centre as an amphitheatre nestled between hills, offering a view to the south and Mount Ararat, a sacred symbol for Armenians. This unique design choice created a harmonious and visually appealing urban landscape.

Our study focuses on the eastern part of Yerevan, extending from North to South. As the city's population grew from 30,000 to 150,000 and beyond, Tamanyan recognized the importance of incorporating green spaces within reasonable reach for residents [8]. Unfortunately, the architectural development of the city was hindered by historical, political, and socio-economic challenges during the post-Soviet era. These factors have impacted the city's architectural evolution and the realization of Tamanyan's vision for a green and vibrant urban environment.

Scenarios: an open project for the city's natural heritage

Scenario projections concerning the city's natural heritage as a regulatory space-environmental system should develop beyond the simple strategic-programmatic level. A system of natural heritage interventions should enable the evolution of urban green resources by supporting them toward the different community's needs. During the *Yerevan Circular Garden* experimentation, the natural heritage was considered in the urban system extended in space and time, investigating the so-called buffer zones and the field of interactions with the city's extended context. Scenarization was confronted with the key issue of foreseeing the conditions that can, could, or should not occur in the *Circular Garden* to preserve its particularities and functions. The different sections of the *Circular Garden* were studied by considering: the analysis of the extended reference contexts (e.g. SWOT analysis, questionnaires, individual and shared storytelling, documental and photograph archives); agents and determinants of well-being and living quality (e.g. sunshine factors, ventilation, temperature variations, precipitation, humidity, noise levels); the extension of natural/artificial surfaces, masses, and voids involved in the different sections (e.g. trees, technological systems, technical objects, buildings, infrastructures, collective spaces); the study and evolution of users'/inhabitants' different practices and behaviours (e.g. needs system, interviews, on site surveys, activities-functions maps, space-functional compatibility/incompatibility framework, space correlation framework, urban sketching, mind mapping). The emergent framework (Fig.2) is not limited to drawing only predictive scenarios in continuity with the past⁷. Probable scenarios (in line with trends/mainstreams), plausible scenarios (foreseeable), possible scenarios (not entirely foreseeable) and even scenarios that absolutely must be avoided (unsustainable, absurd, or dangerous) have been projected.

A comparative strategic framework was so defined to confront levels of intervention based on different green intensive actions.

Visions: The Circular Garden as a green in-between system for Yerevan

Configuring the *Circular Garden* natural heritage according to sustainability and urban well-being goals

⁷ United Nations, World Cities report 2022. Envisaging the Future of Cities. Nairobi, UN-Habitat, 2022. Available at: <https://unhabitat.org/world-cities-report-2022-envisaging-the-future-of-cities>

means imagining a space-environmental system in which several levels of systemic interaction between natural, cultural, economic, and social capital coexist⁸. Through the meta-design process, the priority goal is to translate the scenario hypotheses into alternative patterns of the space-environmental system. This means to project tactical and reversible visions in which all urban components can contribute to defining adaptive and co-evolving mediating arrangements through nature, society, individuals, and technologies, assuming the role of central fundamental resources for the city's sustainability and wellbeing⁹ [9].

Strategies toward more green intensive actions	what can happen		what could happen		what should not happen
	Predicted scenarios	Probable scenarios	Plausible scenarios	Possible scenarios	Unsustainable scenarios
Transforming park hypothesis	Chaotic development of actual compromise of natural heritage and artifacts	Intensification of micro-building and artifacts colonization	Circular Garden as walking path between architectural promenade	Circular Garden temporary empowerment with provisional micro-architectures	Micro-insula effect with total fragmentation of Circular Garden
Rainbow hypothesis	Separated development of 4 main Circular Garden existing functional sectors	Hyper-specialization of 4 existing Circular Garden sectors	Circular Garden as continue green path connecting 7 thematic functional areas	Total reconnection of 7 thematic areas, disrupted areas and Getar river course	Insula effect and demi-privatization of some Circular Garden existing sections
Reviving memories hypothesis	Overlapping of new functions to maintain the urban role of Circular Garden	Loss of memories and traditional aspects related to the story of Yerevan	Circular Garden as park/path of cultural and architectural memories	Soft micro-artifacts to transform the Circular Garden in open-air green history museum	Total loss of Tamanian's green plan pattern and globalization of Circular Garden
3R (reconnective) hypothesis	Functional loss of open air public and private activities	Intensification of building development and functional fragmentation	Circular Garden as urban green connectors for visual, physical and seasonal uses	Soft micro-intervention to supply the re-connecting function according to emerging needs	Total separation in 7 independent sectors and green as building service area
Green river hypothesis	Continuation of melting-pot practice development between green heritage and small buildings	Maximum extension of buildings and open-air recreational infrastructures	Circular Garden as urban green/blue infrastructure through intensive greening actions	Circular Garden also as blue infrastructure trough water patch-areas insertions	Total loss of green heritage as result of probable scenario
Wall of trees hypothesis	Total separation in 7 independent sectors and green as building service area	Totally autonomation of functional sector from Yerevan life (Luna-park effect)	Circular Garden as Tamanian's original experience park inside the green	Totally remotion of furniture and artifacts, Circular Garden as open-air urban green-repository	Progression of green disruption as result of probable scenario

Fig. 2. Comparative strategic framework with multiple scenarios and distinct levels of green actions. Source: authors

Urban natural heritage can no longer be considered part of the bio-physio-sphere between buildings nor part of nature-containing entities belonging to the anthro-sphere or techno-sphere. What appears is a hybrid conception of the natural heritage as a green in-between interface system that involves the entire settlement and its inhabitants in a field of inter-systemic reactivity in which quality must be at once ecosystemic, housing, constructional, and managing. In these terms, the Circular Garden visioning activities were developed by prefiguring spaces according to quality macro-requirements to meet the challenges emerging from the new paradigms of environmental sustainability and people's psycho-physical well-being. The idea of quality was declined through different degrees of intervention in the green heritage (Fig.3):

- As a relational quality to harmonise the ecological-environmental interactions between natural and artefacts, increasing the resilience/anti-fragility and healthiness of the city and its inhabitants.
- As process quality, to coordinate the natural/technical resource use, transformation, and management, increasing the conditions of smartness/interactivity and inclusion/participation for all.
- As performative quality, to orient the care, preservation, and transformation of natural/artificial systems by improving the conditions of vitality/identification and accessibility of/to the resources.

⁸ Green City Network, Green City Guidelines. Green City Network, Rome, 2018.

Available at: <https://www.greencitynetwork.it/wp-content/uploads/Green-City-Guidelines.pdf>

⁹ World Health Organization, Green and Blue Spaces and Mental Health. New Evidence and Perspectives for Action, Copenhagen, WHO Regional Office for Europe, 2021.

Available at: <https://iris.who.int/bitstream/handle/10665/342931/9789289055666-eng.pdf?sequence=1>





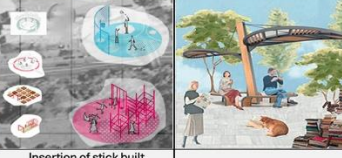





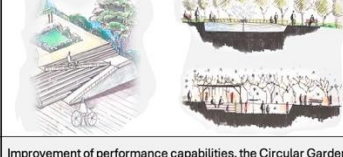
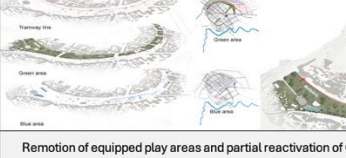

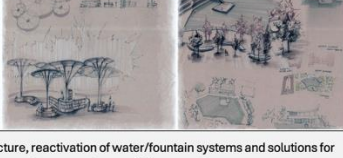


	Relational quality		Process quality		Performative quality	
	Resilience Antifragility	Healthiness	Smartness Interactivity	Inclusiveness Participation	Vitality Identification	Accessibility
Transforming park vision						
	Resurfacing Getar river maintaining the road infrastructure intact		Temporary transformations of Circular Garden using mobile furniture systems and technical objects		Intensifications of public and common uses with increase of environmental accessibility	
Percentage of green surface involved/increased						
Rainbow vision						
	A cultural environment in a common urban green area. Each sector has a different functional role		Insertion of stick built temporary systems as activity facilities		Improvement of common cultural and free-time uses	
Percentage of green surface involved/increased						
Reviving memories vision						
	An immersive experience between modern architectures, arts, monuments, gardens, recreational spaces inserted in a continuous green ring		Insertion of longitudinal walking/bike pathway and transversal walking paths between the sporting court areas to make an alternative route system			
Percentage of green surface involved/increased						
3R (reconnective) vision						
	Improvement of physical ecosystemic relations: the Circular Garden as a green re-connector		Improvement of visual and communication process: the Circular Garden as a social life re-connector		Improvement of performance capabilities: the Circular Garden as seasonal and universal responsive re-connector	
Percentage of green surface involved/increased						
Green river vision						
	Remotion of equipped play areas and partial reactivation of Getar river: increase of green covered areas toward a green+blue infrastructural function		Only temporary light architecture, reactivation of water/fountain systems and solutions for environmental accessibility			
Percentage of green surface involved/increased						
Wall of trees vision						
	Maximum extension, regeneration and new implantation of different green typologies. Circular Garden as a green corridor		Full immersion of users and inhabitants in green experience: re-connection with Tasmanian's plan boulevards, walking across the trees, taking break in the greenery			
Percentage of green surface involved/increased						

Fig. 3. Visioning framework related to the degrees and typology of intervention on the green heritage: each vision considers different relational, process, and performative qualities issues and macro-requirements referring to the sustainability and well-being goals. For each vision, it is shown a qualitative pre-evaluation of percentage amount of green surface involved. Source: diagram elaborated by the authors starting from the experimental workshop results

Concepts: New kind of green in-between spaces

Through the conceptualization phase, the urban natural heritage can be defined as a green in-between system to activate and regulate interactions through dynamical uses, functions, economical, and productive processes. The main challenge of this step is to avoid formalistic figurations focused on a concept/image that linearly could transform itself into a closed project. Meta-design conceptualization makes it possible to translate the information content (i.e., data, information, knowledge) generated through the analysis, scenarization, and visioning into an inform-actional (informative contents toward implementable actions) dimension. With the conceptualization, two important and fundamental challenges are addressed.

First, it is possible to outline the priority contents of the project to maintain, regenerate, and reinvent the values and meanings of the natural heritage toward the shared goals of sustainability and well-being.

Secondly, necessary criteria requirements are set up to direct the urban natural space-environmental system toward multiple adaptive alternatives.

The outcome of this activity shows the possibility of working on the urban natural heritage according to a continuous and open project involving all the biotic and abiotic components and capital (natural, human, socio-cultural) of the city [10,11]. At the same time, there are opportunities to work on the urban green in-between system in diverse ways. Starting from minimal care, reuse, and maintenance interventions, it is possible to go on toward more incisive actions of restoration, regeneration, or even densification of the green system, in a mix that always oscillates between conservation and transformation [12]. In the experimentation conducted on the *Circular Garden*, conceptual meta-design made it possible to recognise the genotypic richness of the urban natural heritage and its capability to generate multiple phenotypic forms of adaptation to respond to the metamorphosis of the city-system.

The emerging concepts of this third meta-design phase envisage non-linear actions acting on several levels and scales, according to the principles of interactive implementation [13]. Concepts could be no more exclusively related to specific scenarios or visions but can support the co-evolution of the *Circular Garden* system through a synergic combination of planning, design, implementation, and maintenance, allowing the natural heritage to take on varying patterns (promenade cross-sections) according to the contextual environmental changes (Figs. 4.1/4.2).

Results and Discussion

The results of the *Circular Garden* workshop experience show the opportunity offered by the meta-design process to reposition the project on the urban natural heritage within a broader vision of the built environment. Working in an a-scalar and transversal sense, it is possible to project multiverse trajectories (*trajection*) of "mediance" [14] through the techno-sphere, bio/physio-sphere, and anthro-sphere between technologies, nature, society, and people. The meta-design process overcomes the modern dualisms subject-object or conservation-*tabula rasa*; it can support the development of sustainable and well-being-oriented alternative urban project trajectories acting both on natural, human, and cultural capital.

The goals of sustainability and well-being also become decisive in the design of natural heritage for two other aspects. The first aspect concerns the possibility of considering well-being in a capability-empowering sense. Well-being cannot be separated from sustainable actions aimed at reducing land-soil consumption, maintaining and regenerating the green heritage, reducing water consumption and climate-changing emissions, safeguarding the reproducibility of living species¹⁰. The second aspect concerns the need to reinterpret the well-being as "well living", in the sense suggested by Edgar Morin [15]. In any case, all project experiences can contribute to the search for relevant knowledge to acquire skills for living in society and cities.

Within this reference framework, the results achieved through scenarization, visioning, and

¹⁰ Stockholm Resilience Alliance, Assessing Resilience in Social-Ecological Systems: Workbook for Practitioners. Revised Version 2.0., Resilience Alliance, Stockholm, 2010.

Available at: https://www.resalliance.org/files/ResilienceAssessmentV2_2.pdf

conceptualisation show how a good meta-design process can contribute to the definition of various actions aimed at rethinking the *Circular Garden* as a space-environmental system of regulatory interface considering:

- The *Circular Garden* as an urban natural historical heritage, conceived in the past to ensure in Yerevan better liveable conditions and qualities of life, and which can evolve toward new qualitative declinations of living together in the city.
- The *Circular Garden* as an infrastructural system projected toward medium and long-term intragenerational and intergenerational sustainable goals, in which the natural heritage is confronted with the new paradigms and challenges of sustainability.
- The *Circular Garden* as system aimed at the maintenance, development, and co-evolution of people's well-being conditions in the short and medium term, considering the different variables and transitions that can affect the inhabitants' health.

Planning	Design	Implementation	Management
Integrability. Circular Garden to reprogram as green promenade reintegrating the tramway lines on 2 external sides of the park.	Connectivity. Intersections between Circular Garden and transversal urban roads to improve the reconnection of green continuity through ecoducts (on surface level) and road deviations (on underground level).	Green continuity. Recreational temporary/unused pavilions to remove toward the recovery and maximization of green coverage continuity also through new trees insertions.	Densification. To promote only intervention of re-densification and re-integration of trees, shrubs, herbs coverage also supported through the remotion of temporary pavilions and eventually extraordinary demolition of unused buildings.
Blue infrastructurability. Rediscovering of Getar river course in all those situations where is possible.	Walkability/Cyclability. Entire length of the Circular Garden to transform in a promenade with walkable/cyclable paths between the urban green.	Slow-mobility. For the achievement of urban slow mobility, introduction of a light low speed micro-people mover along all the new Circular Garden promenade.	Soil permeability. Existing walkable paths to transform in hybrid drainage/storage rainwater infrastructure to improve multiple use of water (e.g. irrigation, reactivation of winter skating rings, regulation of humidity, reuse of rainwater).
Health orientation. Circular Garden promenade to re-develop toward a cultural, sport-well-being and therapeutical activities for a total immersion into natural open-air spaces.	Interaction empowerment. Insertion in the Circular Garden promenade and on road intersections of suspended walkable path for all to improve the experience to live between the nature inside the city.	Multi experience-ability. Isolation of the Circular Garden from the urban surround for a continuous green-wall promenade to create experiential conditions of forest-scape, soundscapes, flavour/olfactory-scapes, waterscapes.	Transformability/Reversibility. Only temporary soft/light use connected with cultural, educational and musical activities must be previewed for the Circular Garden using removable furniture, pavilions, plants.
Alternative movability. Introduction of a bicycle line inside the garden to promote alternative moving modalities across the city, using shortest route through the Circular Garden.	Permeability. Redefinition of the Circular Garden central sectors through the introduction of walkable public pathway crossing the private sporting areas.	Soil re-reshape-ability. Sporting courts to transform in public playgrounds and to redefine under the road level improving better audience and visibility from the garden at street-eye level.	Removability. Remotion of recreational, carousel, and restoration buildings preserving only cultural architectures and monuments.
Water permeability. Getar river to re-surface without removing road infrastructures re-establishing balanced conditions between air and water and proper irrigation conditions for the green areas.		Micro-climatic adjustability. Support new tree planting to put the Circular Garden at least toward the 10% of Yerevan built up areas and to improve urban microclimatic regulations against heat-island, dust, smoke, and noise.	

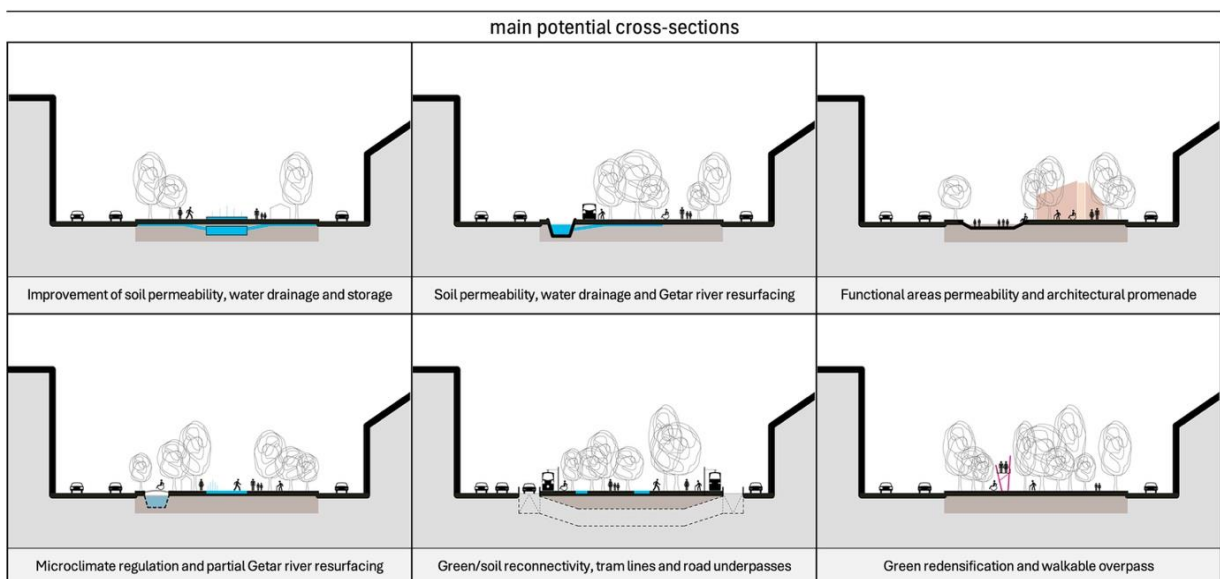


Fig. 4. | 4.1 – Example framework of conceptualization outcomes as criteria-requirements referring to the main steps of interactive implementation process; 4.2 – Comparison framework between various potential *Circular Garden* cross-sections. Source: authors

Green in-between spaces as opportunity to re-capitalize the urban landscape

Through the interpretation of the natural heritage as a complex system of ecological, anthropic, and cultural resources, the *Circular Garden* is assigned a strategic, tactical, and operational value to accommodate caring, ideational, and productive activities to the various forms of urban capital. We therefore go beyond the ideological-financial vision of natural heritage as a system of consumer goods that can be monetised. The hypothesis is to place the *Circular Garden* in a new value, economic, and regenerative dimension. The green in-between system is recontextualized within a dual horizon of recapitalization.

On the one hand, the *Circular Garden* can contribute to recapitalizing and enhancing the value of the natural heritage (reproducible green capital) with other functional, performative, and relational meanings (shareable socio-cultural capital) concerning the values attributed to it by users and inhabitants. The perception, cognition, and experience of the *Circular Garden* arise from the connections that will be established with the change of actors who live and work in it, in terms of using benefits, safety conditions, affordances, accessibility to resources, common services, identification of existence, and survival spaces. Assuming not only an ecosystemic but an ecological-cognitive value as the result of an integrated eco-socio-technical process, the *Circular Garden* will thus play the role of an interface landscape in which different modes of connection between living organisms and resources, between human societies and nature are manifested [16]. It may also take on value as a landscape whose "third" nature [17] will allow some parts to be preserved and maximised as purely natural resources for the sustainability and well-being of Yerevan.

On another line of recapitalization, the *Circular Garden* reinterprets the system of natural resources in an innovative way, considering them no longer as background goods (i.e., as objects/tools dedicated to production processes). The background goods are also given technological, environmental, and cultural value for the economic activities in which the aesthetic, formal, and expressive canons of a community are reflected. The *Circular Garden* is therefore a semi-natural heritage system that holds a space-territorial dimension, requiring care, maintenance, conservation, or even redesign to preserve its form and functionality. Focusing on the forms and functions it has taken and will continue to take over time, the *Circular Garden* thus becomes a natural, architectural, artistic landscape in which biological, technical, cultural, and material resources coexist [18]. It loses its nature as an instrumental entity to be exploited (immobilised physical capital) and is identifiable as a system of spaces and places (transmissible physical-cultural capital) in which each activity can contribute to maintaining or modifying the city's states of sustainability and healthiness.

From this experiment, therefore, the *Circular Garden* appears as an ecosystem connected with cultural, functional, and economic values, manifesting itself as a system of immaterial and intangible values. At the same time, however, it is as a system of public works, architecture, landscapes, and resources with their own tangible, material form and consistency. The qualities of this heritage should therefore be considered dynamically, enhancing the potential degrees of responsiveness and adaptability to internal and external stresses as fundamental resources for fostering Yerevan's sustainability and well-being.

Conclusion. Circular Garden as a new potential connector of sustainability and well-being

Technological innovations have allowed us to determine well-being, safety, and sustainable-oriented conditions inside the capsular artificial realities of buildings. But what happens outside in the urban space when we consider the natural resources?

The outdoor urban environment, where nature interacts not only in parks and gardens but also with streets and squares, can contribute to declining sustainability and well-being by extending the definition of heritage or landscape. It is so important to explore the different fields of conservation and transformation that may arise under conditions of environmental transition between the more stable long-term projections and the more immediate and executive mid/short-term actions. Urban natural heritage projects top-down imposed or theoretically unchangeable risk to become inadequate or ineffective.

The capacity-building approach experimented on the *Circular Garden* involved in an inter-systemic process

innovative scenarios, visions, and concepts enabling the rethinking of urban natural heritage in an adaptive/co-evolutionary sense, re-establishing relationships, processes, and performances between nature and artefacts. From this meta-design experience, a new idea of project emerged; it is referable not on authorial, predictive, or blocked positions acting on objects and parts of the city. Key sustainability challenges require a design process that works on intermediate space-environmental systems of systems. The role of these interfaces is to enable multiple degrees of variable adaptation with respect to global and local conditions induced by environmental, climatic, social, economic, health, and energy transitions.

Considering the extension and the complex pattern variability of the *Circular Garden* as an *ante litteram* infrastructure for urban sustainability crossing the whole of Yerevan, the relationship between natural and architectural heritage was central in this experiment. The problem assessment, scenario projection, previewing, and informational conceptualization took on a fundamental significance, going even beyond the green heritage conservation/restoration project, the identification of landscape viewpoints, or the creation of comfort areas.

The problematization/contextualization of the green heritage in a global/local sense becomes a fundamental activity for a "project of the project"; they are essential to maintain and enhance the reproducibility and regeneration capacities of the soil, water, air, and their biocenosis. The *Circular Garden* can become a strategic ecological infrastructure system with which to care for the existing green heritage, to encourage its regeneration through ordinary and eventually extraordinary maintenance actions, to reintegrate the floral herbs, trees, and shrub subsystems. Thus, it is a matter of reactivating the performativity and motility of natural environmental systems as the main vectors for the preservation of natural physical-biological processes, the cyclicities of water, air, and carbon flows that ensure the vitality, functionality, and basic ecosystem services for the city¹¹.

Foresight abilities are central to directing design choices in an enabling sense. According to the World Health Organization's bio-psycho-social paradigm of inclusive and resilient sustainability, systems of environmental factors (e.g., natural resources, buildings, cities, infrastructure, services, and products) are the determinants of people's psycho-physical well-being and their degrees of participation. *Circular Garden* green assets can therefore also enable new sustainable practices and behaviours in city inhabitants¹².

People can develop new sensitivities, habits, and co-design processes (empowerment) to regenerate Nature in the city as a common good. Visioning abilities thus bring into play ways of producing, using, transforming, and economically managing urban green spaces to generate better liveable conditions for individuals and communities.

Informational capabilities are essential to design any intervention on the urban natural heritage. The informational content of the project will have to confront synergistically with the natural performative capacities and the operational-transformative abilities of users. It is necessary to restore the relativities between quantitative design data, contextual qualitative factors, and the quality of healthy and comfortable natural urban physical space. Also in the *Circular Garden*, the concept of capability thus tends to rebuild a system of multiple connections between space, time, energy, and settlements, seeking the degrees of coherence and design content to respond to the maintenance and evolution of cyclicity, relationships, dependencies, circuits, subsidiarity of the city's natural and man-made artefacts.

In this sense, it was possible to rethink the *Circular Garden* not as a collection of quality concentrations. The romantic yet modern dimension of urban natural space made up of parts, point emergencies, or zones has

¹¹ About the central role of *Circular Garden* as physical-biological ecosystemic asset, it is also interesting the historical analysis proposed in T. Amiryan (Ed.), *Getar. Memory of a River. Cultural and Social Narratives Laboratory*, Yerevan, 2023.

¹² The green heritage is included from the World Health Organization in the list of natural environmental factors with enabling capabilities to determine the well-being of people. Cfr. World Health Organization, *ICF/International Classification of Functioning Disability and Health*. Erickson, Geneva, 2006; World Health Organization, *Health Promotion Glossary of Terms*, WHO, 2021.

been overcome. Instead, the possibility of re-evaluating the urban natural heritage as a socio-technical-ecological system, characterised by differences in potential, tensions, and positive/negative balances between the various city apparatuses in a diffuse framework of quality, was evaluated. In this new framework, it is not possible to assign absolute priorities to any elements, neither to envisage only conservative actions nor to work exclusively on the new construction, trying to solve problems by isolating them from their context. It is necessary to have a broad vision to consider each individual part of the *Circular Garden* as part of a superordinate system.

In practice, the possibility of implementing a process of recapitalisation of the *Circular Garden* in its entirety, working on the ecological, socio-cultural, and economic components, was outlined. The idea of quality has thus completely transformed into a flexible path that includes forms of reuse, maintenance, renovation, redevelopment, regeneration, restructuring. A process that responds to decisions that can be made only involving users, also including spontaneous ones, by maintaining or replacing pre-existing parts of the system.

Acknowledgment

Thanks to the colleagues of the National University of Architecture and Construction of Armenia/Faculty of Architecture, professors David Kertmemjian and Varazdat Hovhannisyanyan, and to all the participants in the experimental workshop "The urban space between public and private dimensions as a technological-environmental boundary system".

Conflict of Interest

The authors declare no conflicts of interest.

Funding

This research is supported with the EU funds Erasmus+ Mobility Agreement.

References

- [1]. A. Harasimowicz, Green Spaces as a Part of the City Structure. *Ekonomia I Środowisko*, 2 (65), 2018, 45-62.
- [2]. M. Ceruti, F. Bellusci, *Abitare la complessità. La sfida di un destino comune*. Mimesis, Sesto San Giovanni (MI), 2020.
- [3]. E. Morin, *La tête bien faite*. Seuil, Paris, 1999.
- [4]. E. Vittoria, Una nuova concezione del paesaggio, in: INU, VI Congresso dell'Istituto Nazionale di Urbanistica, Difesa e valorizzazione del paesaggio urbano e rurale. Istituto Nazionale di Urbanistica, Roma, 1958, 145-148.
- [5]. R. Rostami, H. Lamit, S. Meysam Khoshnava, R. Rostami, M. Solehin Fitry Rosley, Sustainable Cities and the Contribution of Historical Urban Green Spaces: A Case Study of Historical Persian Gardens. *Sustainability*, 7 (10), 2015, 13290-13316. Doi: <https://doi.org/10.3390/su71013290>
- [6]. E. Howard, *Garden Cities of Tomorrow*. Swan Sonnenschein & Co., London, 1898.
- [7]. M.G. Barkhina, Y.S. Yaralova, *Sovetskaya arkhitektura*, vol. 1, in: M.G. Barxina, I.Y. Cagarelli (eds), *Mastera sovetskoy arkhitektury ob arkhitekture*. Iskusstvo, Moscow, 1975 (in Russian).
- [8]. A.A. Sargsyan, E.V. Hovsepyan, M.V. Martirosyan, Alexander Tamanyan, *Collection of documents and materials*. Gitutyun, NAS RA, Yerevan, 2000 (in Armenian).
- [9]. M. Ak, A. Güneş Gölbeç, The Role of Urban Green Spaces in Sustainable Urban Planning. *Journal of Urban and Landscape Planning*, 6 (2), 2021, 85-97.
Available at: https://www.julpreview.ro/files/JULP6_2021-Mehmetali-AK-p85_97.pdf
- [10]. M. Carmona, The Place-shaping Continuum: A Theory of Urban Design Process. *Journal of Urban Design*, 19 (1), 2014, 2-36. Doi: <https://doi.org/10.1080/13574809.2013.854695>
- [11]. C. Folke, R. Biggs, A.V. Norström, B. Reyers, J. Rockström. Social-ecological Resilience and Biosphere-based Sustainability Science. *Ecology and Society* 21 (3), 41, 2016.
Doi: <http://dx.doi.org/10.5751/ES-08748-210341>

- [12]. V. Di Battista, La tecnologia dell'architettura nell'intervento sul costruito, in AA.VV., La cultura tecnologica nella scuola milanese, Maggioli Editore, Sant'Arcangelo di Romagna, 2014, pp. 45-54.
- [13]. G.D. Geldof, Coping with Complexity in Integrated Water Management. On the Road to Interactive Implementation, Tauw, Deventer, 2005. Available at: https://geldofcs.nl/wp-content/uploads/2018/10/Govert_Geldof_Coping_with_Complexity_2005.pdf
- [14]. A. Berque, From "Mediance" to Places. Stream, 04, 2017. Available at: <https://www.pca-stream.com/en/explore/from-mediance-to-places-2/#ref-1>
- [15]. E. Morin, Enseigner à vivre. ACTES SUD, Paris, 2014.
- [16]. A. Farina, Il paesaggio cognitivo. Una nuova entità ecologica. FrancoAngeli, Milano, 2006.
- [17]. G. Clement, Manifesto of the Third Landscape. Trans Europe Halles, 2005.
Available at: <https://www.teh.net/documents/6/TEH-Publication-Manifesto-of-Third-Landscape-145x225mm-2022-WEB-Spreads.pdf>
- [18]. B. McGrath, Intersecting Disciplinary Frameworks: the Architecture and Ecology of the City. Ecosystem Health and Sustainability, 4 (6), 2018.
Doi: <http://dx.doi.org/10.1080/20964129.2018.1482730>

Filippo Angelucci, Doctor of Philosophy (PhD) in Environmental Design (Italy, Chieti) - G. d'Annunzio University of Chieti-Pescara, Professor of Technological and Environmental Design of Architecture, Associate professor at the Department of Architecture, filippo.angelucci@unich.it

Armen Shatvoryan, Doctor of Philosophy (PhD) in Architecture (RA, Yerevan) - National University of Architecture and Construction of Armenia, Acting Dean of the Faculty of Architecture, Associate Professor at the Chair of Architectural Design and Design of Architectural Environment, Shatvoryanschool@gmail.com