The Symbiotic Habitus

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SIMBIOTSKI HABITUS

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Abstract (English)

The Symbiotic Habitus project, set in Rijeka, Croatia, proposes an innovative urban planning approach integrating ecological principles with urban infrastructure. It reimagines urban spaces as dynamic ecosystems supporting diverse forms of life, aiming to foster a symbiotic relationship between the built environment and nature. The strategy involves creating infrastructural nodes and a rhizomatic network, which function as catalysts for regeneration, biodiversity and ecological balance. These nodes modify microclimates and create more-than-human habitats, adapting to changing environmental conditions. The project emphasizes the co-evolution of urban and natural systems, striving for resilience and sustainability in urban development. The concept extends to the Rijeka University campus, where it is applied on a smaller scale, enhancing existing ecological succession areas and utilizing local resources and conditions. This approach reflects a shift towards regenerative and circular urbanism, contributing to a harmonious coexistence of human and natural elements.

Keywords: symbiosis, habitus, urban planning, resilience, biodiversity, infrastructure

Abstract (Croatian)

Projekt Simbiotski Habitus, smješten u Rijeci u Hrvatskoj, predlaže inovativan pristup strateškom planiranju koji integrira ekološka načela s urbanom infrastrukturom. Promišljanjem urbanih prostora kao dinamičnih ekosustava koji podržavaju različite oblike života, potiče se osvještavanje i jačanje simbiotske veze između ljudskog okoliša i prirode. Strategija uključuje stvaranje infrastrukturnih čvorova i rizomatske mreže, koji funkcioniraju kao katalizatori regeneracije, bioraznolikosti i ekološke ravnoteže. Ovi čvorovi mijenjaju mikroklimu i stvaraju više-no-ljudska ljudskih staništa, prilagođavajući se promjenjivim uvjetima okoliša i klime. Projekt naglašava koevoluciju urbanih i prirodnih sustava, težeći otpornosti i održivosti u urbanom razvoju. Koncept se konkretizira na primjeru kampusa Sveučilišta u Rijeci, gdje se primjenjuje u manjem opsegu, podržavajući postojeću ekološku sukcesiju i iskorištavajući lokalne resurse i uvjete. Ovaj pristup odražava pomak prema regenerativnom i cirkularnom urbanizmu, s ciljem skladnog suživota ljudskih i prirodnih sustava.

Ključne riječi: simbioza, habitus, urbano planiranje, otpornost, bioraznolikost, infrastruktura

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CONTENT

THE SYMBIOTIC HABITUS

1. Introduction: The Human Habitus and Ecological Decision-Making

1.1 Contextualizing Human-Nature Separation

Throughout the centuries, the ongoing trends of urbanization and technological advancement have unintentionally triggered a perceptual and spatial disjunction between humanity and the natural environment. While traditional and indigenous lifestyles once fostered an intimate entwinement with surrounding nature, contemporary existence has led to a misleading dichotomy between the 'natural' and the 'human'. Shortly, the world we live *in* and the world *from* have become utterly disconnected[1]. Contrary to this perceptual divide, it is scientifically well-known that human existence is intricately linked with ecological processes, relying on atmospheric composition for respiratory functions and stable climate, and deriving nutritional sustenance from ecosystems. And vice-versa, ecosystems are currently globally influenced and reshaped through anthropogenic activities - having had such a substantial impact on the planet that it defined the current epoch, proposed to be named the Anthropocene[2].

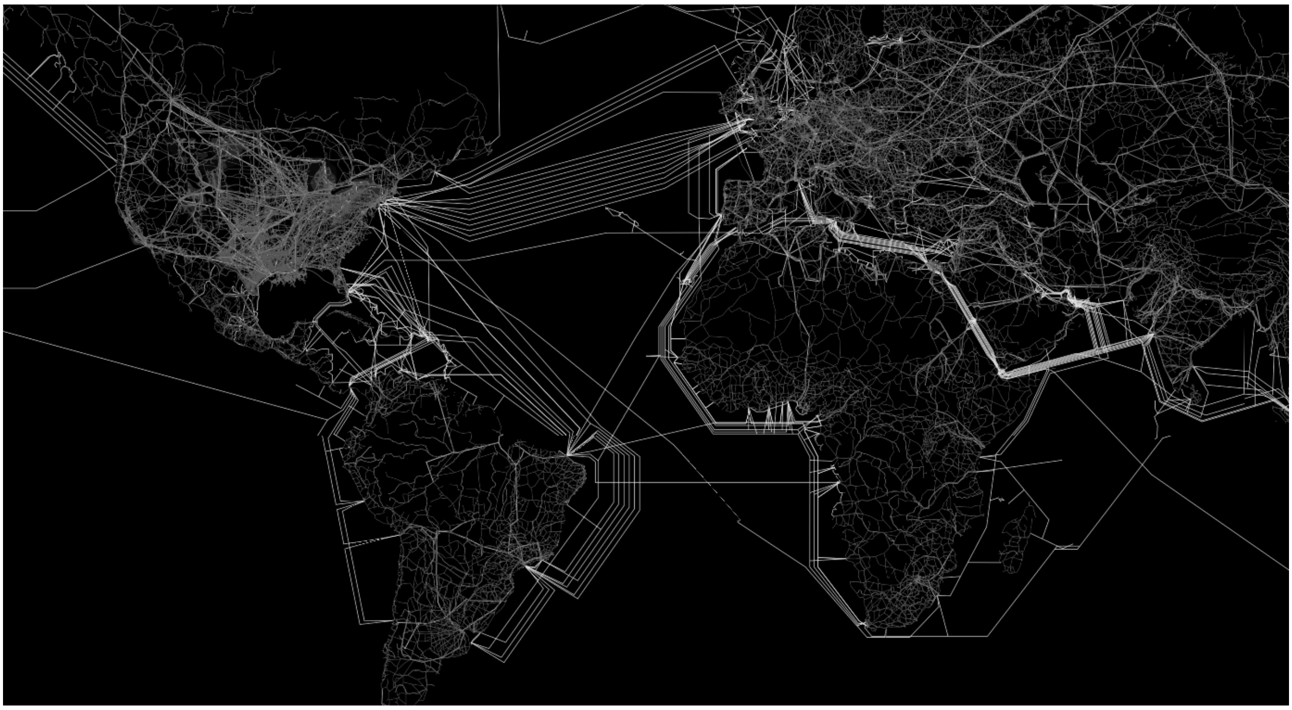

Image 01 Both our omnipresence and entanglement with the environment can be read from this map, showing the global network of human infrastructures built for transportation, communication and energy distribution.

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[1] Pierre Charbonnier, Abondance et liberté (Paris: La Découverte, 2020) rephrased in L. Bruno, “Seven Objections Against Landing on Earth”, in Critical Zones: The Science and Politics of Landing on Earth, ed. Bruno Latour and Peter Weibel (Cambridge, Massachusetts: MIT Press, 2020), 4.

[2] T. J. Demos, “Welcome to the Anthropocene”, in *Against the Anthropocene: Visual culture and the environment today*, (Berlin: Sternberg Press, 2017.), 7-25.

Over the last century, we have become more and more aware of the consequences of our actions on the environment, but the dichotomy between the human and the natural persists — while fostering an anthropocentric habitus[3]. This kind of habitus perceives the natural world primarily through its utility to human interests, often neglecting the intrinsic value of non-human entities and ecosystems, as well as our direct dependence on them.

Various theories contemplate the succeeding epoch of our time, exploring potential orientations toward the eras of Capitalocene, Plantationocene, Chthulucene[4], Symbiocene and others. These discussions involve considering various future scenarios and their cultural, geological, and ecological implications. Despite significant differences, all of these scenarios foresee a period of an ecological crisis, the extent of which depends on human actions and their ability to address environmental challenges. The predicted results of this crisis are habitat and biodiversity loss, resource scarcity, and climate change — possibly affecting the further existence of humans and other organisms on Earth.

"*While we have already tried to build a new and viable society around concepts such as democracy, sustainability, sustainable development, and resilience, all these terms have been corrupted by forces determined to incorporate and embed them into the Anthropocene where they become normalized, business as usual.*" (Albrecht, 2016, 13)

This project speculates a future city of the Symbiocene epoch, a theoretical future period of re-integration between humans and the rest of nature proposed by environmental philosopher G.A. Albrecht[5]. It represents an aspirational era where human inventions, methods, and politics are aligned with mutual interdependence and mutual benefit for all living beings. Urban areas and infrastructure are the biggest man-made structures on the planet. Global city population share doubled from 25 percent in 1950 to about 50 percent in 2020[6]. The way we use, build and perceive space and each other, human and non-human, will play a major role in future scenarios whatever they might be. By changing the concept of urbanism and architecture currently being a sort of repellent for the natural world[7], and becoming a factor of symbiotic interconnectedness, we could also change the general perception of the natural world as well as the ways we engage in it. Urban areas might become spaces of more-than-human refuge, resilience and/or regeneration if we plan them well.

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[3] The term habitus, coined by D. Bordieu, refers to the ingrained set of dispositions, behaviors, and preferences shaped by an individual's socioeconomic background, cultural experiences, and social context.

[4] See D. Haraway, "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin", in *Environmental Humanities*, vol. 6 (Durham: Duke University Press, 2015), 159-165.

[5] See G. A. Albrecht, "Exiting the Anthropocene and Entering the Symbiocene", in Minding Nature 9.2 (Libertyville, Illinois: Humans & Nature Press, 2016), 12-16.

[6] UN-Habitat, World Cities Report 2022: Envisaging the Future of Cities (published by United Nations Human Settlements Programme, 2022), 17.

[7] The concept of architecture developing repellent strategies towards nature is taken from Mason White's text *Architecture's Next Companion Species* (University of Toronto, 2013)

1.2 Project Goal: A Paradigm Shift towards a Symbiotic Habitus

This project advocates for the reimagining of the physical, and psychological space that shapes our perceptions and informs our decision-making processes, as the main role in navigating through the expected crisis. It proposes a spatial intervention in the external physical space (habitat), in order to influence the internal cultural space (habitus) that would contrast the anthropocentric mind. In essence, the habitat builds the habitus by providing the physical and social context that shapes individuals' behaviors and perceptions. On the other side, the habitus influences how individuals and communities interact with, perceive, and shape their habitat. The concept of the symbiotic habitus further enriches the understanding of the interplay between habitat and habitus, suggesting a deeper physical and psychological level of interconnectedness, belonging, and care towards nature, consequently changing the outcomes of human decision-making.

In scientific terms, the interconnectedness of organisms, their co-evolution, and symbiotic relationships are emphasized in the work of Lynn Margulis, whose holobiont concept challenged traditional views focusing solely on individual organisms. It is a term that refers to a host organism and its associated community of symbiotic microorganisms living in or around it, collectively functioning as a unit through symbiosis. The human body is an example of the holobiont as it hosts a diverse community of microorganisms, collectively known as the human microbiome, without which it could not be able to function. Margulis defines this concept as the main driver of the co-evolution of species, saying "Life did not take over the world by combat, but by networking"[8]. Understanding the concept of the holobiont challenges the traditional notion of individuality and fosters recognition of our integral role within broader ecological systems.

If we look at the holobiont concept as a micro-scale, then James Lovelock's Gaia hypothesis defines a macro-scale, considering the Earth as a whole system where living organisms contribute to the regulation of the planetary environment. This hypothesis served as an inspiration for the recent work of more-than-human philosophers such as Donna Haraway, Bruno Latour, and Ana Tsing, while simultaneously contributing to the scientific concept of The Critical Zone[9]. The concept focuses on the near-surface environment, encompassing the outer layer of the Earth from the top of the vegetation canopy to the bottom of the groundwater zone. It recognizes the dynamic interactions among soil, water, rock, vegetation, and the atmosphere, highlighting the importance of an integrative interdisciplinary approach toward understanding life processes on Earth. Shifting the perception towards seeing life on Earth as a whole, as well as the human species being a nonhierarchical and intertwined part of it, is essential for building the symbiotic habitus.

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[8] Margulis, L., & Sagan, D., *Microcosmos: four billion years of evolution from our microbial ancestors* (New York, Summit Books, 1986.)

[9] See Latour Bruno and Weibel Peter, ed., *Critical Zones: The Science and Politics of Landing on Earth,* Cambridge, Massachusetts: MIT Press, 2020

Image 02 A map by A. Arènes who experiments with alternative mappings to capture the complexity of the composition of the Critical Zone. These maps, or visualisations, shift the anthropocentric view into a view from within, which deconstructs the traditional cartographic frame of reference to create a new one by maping living things rather than space emptied of life and available to be conquered or colonized.

To shift our views and actions toward a completely different understanding of life and our part in it, we also need new vocabularies, narratives, and epistemologies. In the field of strategic spatial planning and urbanism, this shift could mean changing the way we validate and map spatial data, taking into account all living and non-living participants in space and their interrelations. It could also involve planning dynamic, adaptive, and circular systems with a deep understanding of environmental processes, enabling human settlements to become a crucial part of the ecosystem, and act as “catalysts of life and as a driving force of regeneration”[10]. By changing the concept of urbanism being a sort of repellent, and becoming a factor of symbiotic interconnectedness, we could also change the general perception of the natural world as well as the ways we engage in it.

For a visual overview of explored concepts, their interrelation, and consequentiality, see Figure 01 in the graphic folder of the project. The presented diagram shows the development of the current global situation and a transition into possible future scenarios with an emphasis on the symbiotic approach.

[10] June, L., *3000-year-old solutions to modern problems*, TEDx conference talk, 2022

2. Project: Planning The Symbiotic Habitus

2.1 Key Principles to Symbiotic Planning

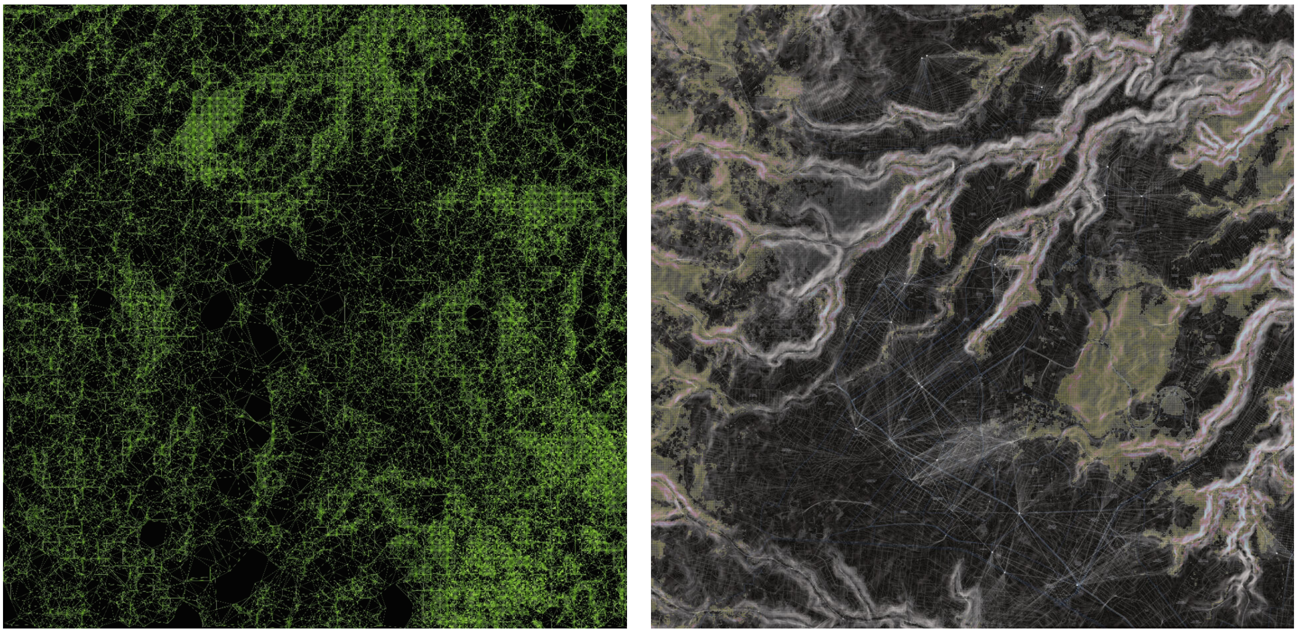
When embracing the concept of the symbiotic habitus into the context of strategic and urban planning, the foundational idea revolves around redefining urban spaces not only as centers of human activity but as dynamic ecosystems that actively incorporate and support other forms of life. This project envisions the city not merely as a human habitat but as a resilient, more-than-human shelter designed to withstand environmental challenges while fostering a symbiotic relationship between the built and the wild. As the city becomes a refuge for both humans and diverse ecosystems in times of crisis, a collective habitus can emerge — a shared commitment to nurturing life, preserving biodiversity, and actively participating in the regeneration and preservation of the environment. Times of crises can lead to collective trauma, but they also present opportunities for collective growth as the human value systems undergo shifts towards increased empathy and care.

Apart from among the indigenous societies, examples of this kind of care and regenerative relation between humans and other living organisms can be witnessed in scarce places like deserts, hills of vulcanic mountains, places with severe winds and/or soil erosion, etc. In other words, places where people are forced to care in order to survive. The climate of these places resembles the meteorologic predictions for the next epoch, in terms of temperature increase, changes in precipitation patterns and extreme weather events — so they will be used as practical references for planning and designing the proposed resilient system.

Image 03 Volcanic vineyards on the island of Lanzarote show a tradition of human resilience and care. These man-made structures ensure conditions for growing vineyards in an otherwise scarce landscape.

When discussing future resilience achieved through spatial planning and collaboration with nature, the topic can be explored across different scales: global, regional, and local. Edgar O. Wilson's Half-Earth theory aims to achieve global resilience through biodiversity by advocating for the preservation of large portions of the Earth's land and sea exclusively for the conservation of natural ecosystems. Precisely, he aims to “devote half the surface of the Earth to nature” and overcome the tendencies of contemporary humans to “favor short-term decisions over long-range planning.”[11]. The underlying idea is to create extensive, interconnected reserves that can support diverse species and ecological processes in their natural state — before it’s too late. Large, protected areas could offer refuge for a variety of species, allowing them to thrive, reproduce, and adapt to environmental changes.

London-based ecoLogicStudio puts city regions “at the forefront in both feeling the effects and fighting to offset the potentially catastrophic effects of climate change”[12]. Their project DeepGreen tests the potential of AI and open-source data to develop a new interface for planning green and resilient city regions. It generates simulated scenarios for sustainable non-linear and dynamic urban development while questioning traditional planning concepts such as zone, boundary, scale, typology, and program. Through introducing re-wilding and urban agriculture, paired with infrastructural optimization for resource management, they see contemporary cities as “complex dynamical systems - where built environment and human systems interact regularly with green spaces”[13].



Images 04-05 DeepGreen’s visual output illustrating the territory of Guatemala City: a re-wilding plan to foster a new coexistence between humans and urban wild animals (left), and an urban agriculture plan proposing a method to guarantee food security and to employ the rural population currently migrating to the city (right).

[11] Wilson, E. O., *Half-Earth: Our Planet’s Fight for Life* (New York: Liveright Publishing Corporation, 2016), Part III: The Solution

[12] From the PhotoSynthetica website by ecoLogicStudio, https://www.photosynthetica.co.uk/deepgreen

[13] Ibid. 10

When shifting the perspective from the global and regional scale toward the human scale, and within the urban tissue, planning the interaction between the built and the wild becomes a delicate weave. The question here is not about planning new cities for the future, it is about preparing the existing ones. Observing the urban heterogeneity, patches of wilderness can already be found within the neglected and abandoned spaces, unintentionally left to grow. Gilles Clément's Third Landscape theory emphasizes the value of such spaces in urban environments, considering them as areas of advanced biodiversity and ecological resilience. These places serve as a refuge, where indigenous and exogenous species that disturb man or that exist independently of man find a way to exist and develop. He considers "non-spatial organization as a vital principle through which all spatial organization is penetrated by the flashes of life"[14]. Non-organization of the Third Landscape allows biological intelligence to constantly reinvent itself.

Image 06 Gilles Clément's Garden of the Third Landscape located on the Roof of the former Submarine Base of Saint Nazaire, France

In summary, there are certain fundamental principles to consider when designing a resilient system that can grow and adapt in a mutually beneficial way, both for the city and for the wilderness. These include questioning the traditional approach to spatial valorization and spatial planning, allowing and encouraging autonomous environmental regeneration, ensuring enough spaces for wilderness to grow and spread, planning interconnectedness between these spaces, designing for perpetuity, and incorporating adaptive capacity into the planned system.

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[14] Clément, G., *Manifesto of the Third Landscape* (London: Spector Books, 2007), 32.

2.2 Infrastructural Wilderness as Solution

Embedding diverse habitats within the city establishes a mutualistic relationship between the wild and the urban, providing a refuge for biodiversity with improved habitat conditions on one side, and resource production plus amelioration of environmental stressors on the other. A pragmatic solution for the assimilation of nature within the preexisting urban framework is the superposition of a new typology, an infrastructural wilderness. The infrastructural typology is chosen for its intrinsic properties, compatible with the earlier defined basic principles for symbiotic planning, and well-elaborated in Stann Allen's propositions for Infrastructural Urbanism[15]:

I. "Infrastructure prepares the ground for future… and establishes conditions for upcoming events."

II. "Infrastructures are flexible and anticipatory. They work with time and are open to change."

III. Infrastructure does not dictate rules for further development (top-down) but "establishes fundamental points of service, access, and structure (bottom-up)."

IV. Infrastructures are pragmatic; "they accommodate existing conditions while maintaining functional continuity."

V. Infrastructures are not linear; they depend on field conditions, and "they organize and manage complex systems of flow, movement, and exchange."

VI. Infrastructural systems resemble ecosystems, "they modify the status of inhabitation in response to changing environmental conditions."

VII. "Infrastructures allow detailed design of typical elements and repetitive structures."[16]

While typically "infrastructures tend to be hierarchical and tree-like"[17], the natural system on the other hand, based on principles like symbiosis, co-evolution and element cycles, could better be defined as a rhizomatic structure — an adaptable, regenerative, heterogenous, decentralized, non-hierarchical structure, composed of multiplicities[18]. A rhizome could be defined as a network of networks of tangible and intangible systems. It accommodates multiplicity, acknowledging the coexistence of various elements without imposing a singular structure. A rhizomatic system contains points (nodes) and lines (links) that connect them, both serve as the defining frame for the infrastructural typologies of the symbiotic habitus.

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[15] Allen, S., Infrastructural Urbanism in *Points+Lines: Diagrams and Projects for the City* (New York: Princeton Architectural Press, 1999), 54.-57.

[16] All seven propositions are quoted from ibid. 14

[17] Ibid 14.

[18] Characteristics of the rhizome according to Deleuze and Guattari's *A Thousand Plateaus*, chapter I. Introduction: Rhizome

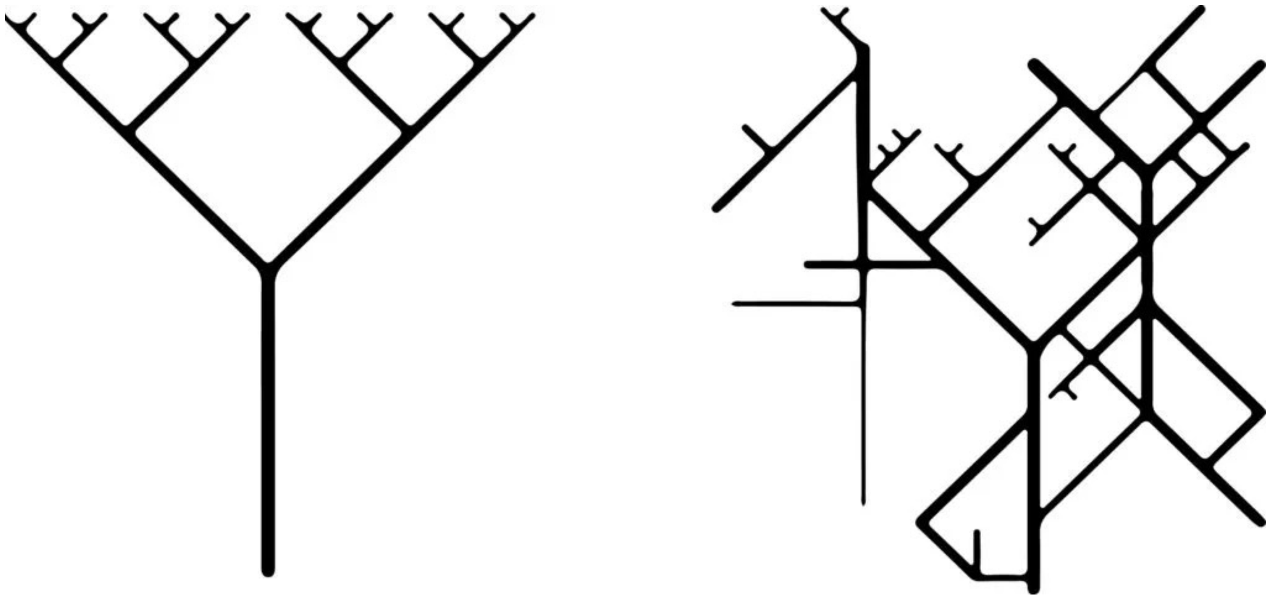

Image 07 A diagram showing a difference between a tree-like (left) and a rhizomatic structure (right).

The nodes are designed as spatial catalysts — sources of life fostering biodiversity and connecting multiplicities such as microorganisms, plants, insects, water flows, etc. Each node alters the microclimate within it to create better conditions for more-than-human life. Through modifications in terrain, orientation, and carefully designed spatial barriers, the nodes undergo alterations in how they manage rainfall, control insolation, respond to wind exposure, and experience temperature oscillations. According to Sepp Holzer, one of the originators of permaculture, microclimate techniques using earthworks, stone, and water open the possibilities for a wider range of species to appear, that would otherwise not be able to survive[19]. The shape and size of each node draw inspiration from natural, traditional, or contemporary passive solutions while adapting to the specific characteristics of the local context. The perimeter of each node defines the area of non-organization or non-doing, enabling the ecosystem within it to grow, adapt, and evolve freely.

The links or connections between the nodes are envisioned as self-organizing and adaptable, allowing the interconnectedness of the system to develop freely and according to the specific needs of each habitat and/or species. This way the rhizome develops a capacity to adapt and transform together with the changing conditions, be it climate factors, resource availability, or catastrophic events. The resilience of the system is reciprocal to its interconnectedness and adaptability. The types of links are divided into three categories: surface, underground, and aerial; taking into consideration more than is traceable, visible to the human eye, and subject to traditional spatial planning methods.

Besides the planned nodes and their self-organizing interconnections, the system allows the autonomous spreading of the habitats evolving within nodes. Each specific habitat tends to spread along the connection lines when given spatial opportunity and adequate life-depending conditions. Habitats can extend beyond the boundaries of their

[19] Holzer, S., & Sapsford-Francis, A., Microclimates in *Sepp Holzer's permaculture: a practical guide to small-scale, integrative farming and gardening* (White River Junction, VT: Chelsea Green Publishing, 2010), 21-23.

nodes in two scenarios: one where the surrounding area is overlooked and unused, and the other arising out of necessity. Different future scenarios encompass diverse value systems and address varying needs, possibly resulting in intentional node expansions for their resource capacities, capabilities for the preservation of species, microclimate modification abilities, etc. A diagram of the project's concept is shown in Figure 02 in the graphic folder, visually presenting the main elements forming the proposed rhizomatic structure and their interrelation.

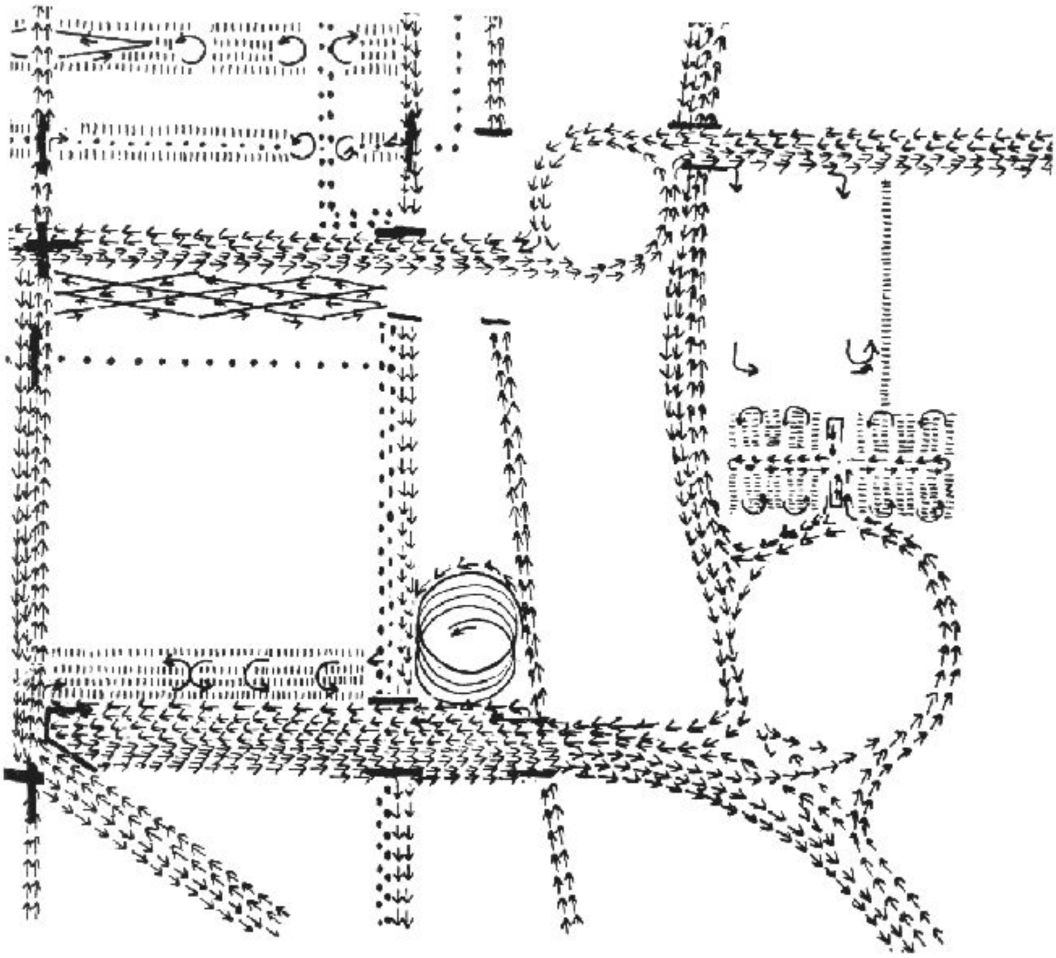

Image 08 Louis Kahn's movement diagrams from the Philadelphia Planning Study, showing a different approach to spatial planning by studying and mapping the dymanics of traffic flows

The described elements collectively constitute a rhizomatic system that spans heterogeneous scales and habitat conditions, presenting a decentralized set of overlapping multiplicities (habitats), within a non-hierarchical structure. Thanks to the principle of asignifying rupture, defined by Deleuze and Guattari, "a rhizome may be broken, shattered at a given spot, but it will start up again on one of its old lines, or on new lines"[20], making it highly resilient to stressors. Furthermore, the plan focuses on processes, flows, and activities, rather than surfaces, functions, and objects — thereby oriented

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[20] Deleuze, G. and Guattari, F., *A Thousand Plateaus: Capitalism and Schizophrenia* (Minneapolis: University of Minnesota Press, 2005), 9.

towards “the production of directed fields in which program, event, and activity can play themselves out”[21] according to specific needs, human or non-human. The principles of the proposed rhizomatic system allow and enable planning for uncertainty.

2.3 Application of the Conceptual Framework within Rijeka City

The concept is further developed and tested in the context of the city of Rijeka in Croatia. The city evolved thanks to its geopolitical location, situated at the end of the Adriatic basin. Despite its steep coastline and challenging accessibility from the mainland, Rijeka has grown around its port at the delta of the Rječina River. Due to these facts, “we find a radical and opportunistic transformation of the territory, driven by instrumental goals”[22] where it’s “possible to recognize productive co-existence among seemingly incompatible elements of the modern urban environment, nature, infrastructure, and our historical surroundings”[23]. This co-existence, paired with the already mentioned geographical position and the complex topography of the region, serves as a solid foundation for planning urban resilience. To gain a better understanding of the mentioned phenomena, see Figures 03 - 06 in the project’s graphic folder. The presented maps show Rijeka city in relation to its natural areas, to the sea coast and Rječina River, its topography, and positions of neglected industrial and infrastructural spaces.

The blend of marine, coastal, forest, and river ecosystems in and around Rijeka contributes to a rich mosaic of biodiversity. This variety of species and habitats enhances resilience by providing the area with greater stability and adaptability, allowing it to better withstand and recover from environmental stresses and changes. Symbiotic interrelations are essential for the recovery of ecosystems following disturbances, as they promote ecosystem productivity, nutrient cycling, plant pollination, and soil regeneration[24]. Over time, symbiotic interactions drive co-evolution, allowing ecosystems to adapt to long-term environmental changes. For this reason, the Symbiotic Habitus project envisions the strategic placement of its nodes to envelop and preserve a heterogeneous combination of habitats, while supporting the autonomous formation of the links between them.

The second principle for the node placement includes detecting the existing areas of the Third Landscape. Rijeka experienced an industrial boom in the late 19th and early 20th centuries, becoming a significant hub for various industries. It was known for its paper mills, shipbuilding yards, and oil refineries, the remnants of which are still present within the city. Left outside of human cultivation and development, these areas went into natural succession and became unintentional refuges of biodiversity. According to Gilles Clément,

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[21] Allen, S., Infrastructural Urbanism in *Points+Lines: Diagrams and Projects for the City* (New York: Princeton Architectural Press, 1999), 52.

[22] Mimica, V., Mrduljaš, M., Turato, I., *Fiume Fantastika* (Rijeka: Rijeka University, 2022), 11., free translation

[23] Ibid. 21

[24] From the lecture *Urban Biodiversity* held by Boštijan Surina, Ph.D. (curator of the Natural History Museum in Rijeka), as part of the Urban Studies curriculum

areas that underwent successive recoveries and inconstant evolution build up a greater resilience than the constantly evolving ones which “are subject to the selective pressure of the changing environment”[25]. By strategically situating the project's nodes in these underutilized areas, which are already resilient, rich in biodiversity, and integrated within the urban fabric, the overarching goal aims to be achieved with minimal effort.

Image 09-10 Photographs showing the existing condition of abandoned industrial sites in Rijeka, and their levels of natural succesion (INA oil refinery on the left, and Hartera paper factory on the right)

The project takes into account both present conditions and possible future scenarios, including speculations on extreme climate events such as the widening of the tropical belt resulting in species migration, severe and unpredictable weather events, and sea level rise. These scenarios foresee the appearance of new ecosystems in the area, and the shifting or displacement of the ones thriving now. This displacement could be temporary or permanent, and it could involve both humans and more-than-humans. For this reason, the utilization of existing underground spaces as refuges is proposed. These subterranean habitats could provide a stable climate for protection against extreme weather, optimize limited urban space, and enhance biodiversity by creating new ecosystems or preserving the current ones.

Due to its steep topography and strategic position, Rijeka features a complex network of underground tunnels currently utilized for various purposes, including vehicular roads, train tracks, pedestrian walkways, military uses, and water management. Some of these unused spaces serve as an opportunity for the placement of subterranean nodes of the rhizome while eliminating the need for (further) extensive excavation. Rijeka's underground infrastructure is a testament to its historical and strategic significance, but it could also become a key aspect of its future urban planning and development in crisis scenarios. Effective management and potential repurposing of parts of this network can significantly contribute to the city's functionality and resilience.

[25] Clément, G., *Manifesto of the Third Landscape* (Copyleft: Trans Europe Halles), TEH Series on new imaginaries #3, 27.

A rhizomatic network of planned natural nodes, serving as refuges of life and biodiversity, intertwined by a self-organized web of connections, forms a symbiotic system within and with the city. This mutualistic relation exemplifies a dynamic equilibrium where urban development coexists with ecological conservation: the city supports the growth and maintenance of these natural nodes, while the nodes enhance urban environmental quality, response to climatic extremes, and resource availability and/or quality. Besides fostering a specific habitat, each node has its function towards the city, acting as a sponge system for flood prevention and water purification, as a green island providing specific microclimate and improving air quality, as a community composting site contributing to waste reduction and soil quality, as pollinator gardens providing resources for the city, etc. Speculative visualizations showing the challenges and opportunities facing the city of Rijeka, regarding climate change scenarios and the development of the proposed infrastructure, are shown in Figures 08 - 15 of the project's graphic folder.

2.4 Case study: Rijeka University Campus

The rhizomatic system's design embodies the principle of networks within networks, where each segment, whether viewed closely or from afar, maintains its rhizomatic characteristics. This scale-invariant nature means that the structure and function of the system remain consistent regardless of the level of magnification. Within this framework, smaller networks of natural nodes exist, each mirroring the larger network's characteristics, thereby creating a complex, multi-layered system of ecological and urban interconnectivity. This intricate design ensures that no matter how the network is expanded or reduced, its essential nature as a rhizome – always branching, always interconnected – persists, symbolizing the limitless potential for growth and adaptation in both the ecological and urban realms. Like a natural ecosystem, it is self-organizing and capable of evolving in response to changing urban and environmental conditions.

The project further develops on a smaller scale, within the area of the Rijeka University campus, a network within a network where its spatial manifestation, execution, and relation to time are defined. The campus area presents a good testing ground for the project, primarily due to the significant amount of unused space currently undergoing natural succession. This situation has arisen largely because of political and economic challenges that have hindered the full development of the campus, leaving substantial portions of undeveloped space. While the impossibility of implementing the spatial plan represents the status quo, the mentioned voids are left for free use by various non-human entities such as weeds and pioneer plant species, insects, and weathering phenomena.

Furthermore, the university campus is currently undergoing a phase of green transition, a 3-year project titled The Resilient Campus focusing on sustainable solutions and the quality of outdoor spaces. One of the goals of the project is to develop infrastructure that promotes health and well-being, making the objectives of the Symbiotic Habitus particularly suitable for this environment. Given the university setting, there is also the added advantage of engaging with academic resources, student involvement, and research opportunities, further enriching the project's potential impact and value.

What makes the campus area additionally suitable is its occasional harsh weather conditions. The area enjoys a humid subtropical climate characterized by hot, humid summers and windy, wet winters. Frequent rain makes Rijeka one of the wettest cities in Europe, with statistics indicating that approximately one in every three days is rainy[26]. Another specific condition is the microclimate of the mountain plateau where the campus is located. Bura, the local cold and dry wind of the northeast direction, can be extremely strong here, with gusts that can reach hurricane force. Its powerful and unpredictable nature makes it a notable feature of the local climate. So by mitigating the existing weather conditions within the campus area, the project is tested for its future task.

Image 11 A speculative visualization of the Symbiotic Habitus implemented on campus grounds, made with an AI image generator in the early phases of the project

Besides the climate conditions, further analysis of the area focuses on mapping and differentiating zones of natural succession, wild species, topography specifics, and the surplus of human activities in space, such as construction waste and stone piles. For a more detailed view of the analysis see Figures 16 - 21 in the project's graphic folder.

[26] From the Analytical Basis of the Rijeka City Development Plan for the period 2021-2027

The elements of nature that exist within urban environments but are typically seen as inferior or detrimental, including things like dirt, mud, smoke, weeds, insects, and decay, are conceptually defined as subnature. This is a concept developed by architectural historian and theorist David Gissen, criticizing the tendency to create overly sanitized, controlled urban environments. It argues for a more dynamic and inclusive approach to urban nature, recognizing the value of all its forms[27]. The project maps and valorizes detected elements of subnature, and uses them as a starting point for its development.

The existing succession areas, strong wind, heavy rain, construction waste, and stone piles are defined as surplus. On the other side, more-than-human refuge, resilience, water runoff prevention, wind barriers creation, microclimate adaptation, resource management, and biodiversity are defined as goals or shortages. By using the surplus to meet the shortages[28], the project envisions a circular system of repurposing waste, reducing the need for extracting new raw materials, and passively exploiting local climatic conditions instead of consuming human-generated energy. Circular systems are advantageous because they replicate nature's regenerative cycles, and their principles of efficiently recycling nutrients and energy, thereby fostering resilience, ecological balance, and sustainability.

Several universities, such as East Carolina University, University of Reading, and Winthrop University, have already intentionally incorporated areas of ecological succession into their campus grounds for educational, environmental, and aesthetic purposes. These are areas where land is left unmanaged to allow natural processes to take place, providing a living laboratory for students and staff. Such areas include creating pollinator-friendly habitats, using native and drought-tolerant vegetation, and smart irrigation systems. These initiatives help in managing the campus's ecological footprint and contribute to the study and observation of ecological processes. This project is designed to improve the ecological succession areas at the Rijeka University campus. Enhancing the living conditions within these areas not only fosters a more vibrant ecosystem but also contributes to the well-being of the surrounding community.

[27] See Gissen, D., *Subnature: Architecture's Other Environments* (New York: Princeton Architectural Press, 2009)

[28] The idea developed within Disequilibrium Utility, a methodological exercise in utilizing spatial and social disadvantages of a specific context for productive purposes, presented by Prof. Ida Križaj Leko, as part of the Urban Studies curriculum at the Rijeka University, academic year 2023./2024.

2.5 Infrastructural Typologies Development

As already mentioned, the climate effects that need to be mitigated within the university campus at the present moment are harsh winds, hot summers, and large amounts of precipitation. The predicted climate conditions for the future of the Mediterranean area foresee an overall increase in temperature with periodical harsh weather events and changes in the seasonality of precipitation, causing either storms or droughts. The project proposes a variety of infrastructural nodes designed to meet these conditions to ensure better environments for human and more-than-human life.

The shapes and sizes of proposed typologies are conditioned by the local context and the decision to use found surplus materials on site, such as construction waste, stone, and soil. These materials are prone to excavation, movement, and filling, resulting in the creation of hollows, ditches, swales, mounds, and dams. Each typology is constrained within these possibilities, while inspired by natural, traditional, indigenous, and permacultural techniques already locally or globally tested for a specific purpose.

The proposed typologies and their functions within the campus arise from overlapping and connecting the heterogeneous entities encountered on-site – see the diagram in Figure 22 of the project's graphic map. The function and users of each node are flexible, adapting to the specific context and need. There are five basic node typologies developed according to their archetype functions: Collecting, Extricating, Protecting, Harvesting, and Storing.

The Collecting typology is inspired by the traditional local techniques for collecting water in dry areas by shaping hollows in the ground. In a dry or desert-like scenario, these hollows collect and keep moisture enabling plant growth within the collector and creating cooler microclimates. In a wet or monsoon-like scenario, the collector becomes a water body, collecting precipitation, preventing run-off water, and mitigating temperature oscillations. A water body also ensures biodiversity as it creates new habitats above and under the surface. A good example of this technique can be seen in Sepp Holzer's permacultural methods, where he uses it for the creation of rain gardens, crater gardens, and ponds. He uses them for water management and conservation, microclimate creation, biodiversity enhancement, irrigation, and nutrient distribution[29].


Image 12-13 A traditional way of collecting water in karst areas on the Adriatic coast (left) and an example of Holzer's crater garden (right).

[29] See Holzer, S., & Sapsford-Francis, A., *Sepp Holzer's permaculture: a practical guide to small-scale, integrative farming and gardening* (White River Junction, VT: Chelsea Green Publishing, 2010).

Depending on its size, a Collecting node can be used as a compost pit, fire pit, rain garden, crater garden, swamp, pond, lake, or wetland. As such it can be suitable for microorganisms, fungi, water plants and algae, fish and aquatics, insects, birds, reptiles, mammals, and humans.

The Extricating typology develops around a phenomenon found at the location of the campus – piles of construction waste that started to function as green islands over time, providing south-facing slopes and rooting conditions for various plants, such as weeds, aromatic herbs, and flowers. These positions offer better access to sunlight, which is vital for photosynthesis, especially in the early morning or late afternoon when the sun is at a lower angle. Being elevated, even slightly, can also increase a plant's exposure to pollinators such as insects or birds. Furthermore, elevated areas, such as small hills or mounds, typically offer better drainage than flat areas, ensuring that any excess water drains away more efficiently. In natural deserts, these principles are used by rooting plants such as Seidlitzia rosmarinus, providing them with adequate living conditions in otherwise harsh conditions[30]. Depending on the climate scenario and the Extricating node's size, it can be used as a biodiversity mound, a secure place for nesting birds, or a potential flood island.


Image 14-15 Example of a construction waste pile acting as a green island on the university campus (left) and a photo of rooting mounds of Seidlitzia rosmarinus in a desert in Qatar (right).

The Protecting typology is envisioned as a circular area enclosed by an embankment, commonly found within the traditional South Mediterranean cultures, where circular stone walls are built to protect plants, animals, or even insects. On the island of Pantelleria in Italy traditional walled gardens can be found protecting citrus trees from harsh winds. Similar structures can be found on Croatian islands, built for keeping and protecting sheep. In the south of Croatia, in the Konavle region, a circular drystone wall

30 See Seidlitzia rosmarinus Wikipedia page: https://en.wikipedia.org/wiki/Seidlitzia_rosmarinus

typology named *janik* is used as an apiary for keeping beehives[31]. The Protecting node acts as a shelter from strong winds and insulation while preserving moisture within its perimeter. It can also be used for the protection of sensitive species from outside predators, invasive species, and pests. Depending on its size it can be used either as an enclosed garden or shelter in smaller variants or to define the perimeter of a larger protected area. If needed the typology can also be used to create an elevated water body, protected from groundwater or run-off water contamination.

Image 16-17 Image of a walled garden on the island of Panteleria in Italy (left), and of the art installation Amarillo ramp by R. Smithson showing how an embarkment could work instead of a wall (right).

Image 18-19 Close-up image of the Lanzarote vineyards (left) and the simmilar shape being used in the Sahel region for water collecting and natural regeneration (right).

The Harvesting node is a combination of the Protecting and the Collecting typology, in the form of a semi-enclosed hollow in the ground used for water management, wind protection, and selective insolation. Similar typologies can be found being used in harsh conditions, such as areas with heavy rainfall, but also in very dry areas, in both hot and

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[31] Trojanović Anita, Andlar Goran, Đukan Pavo, Sturica Petra, *Dry stone heritage of Konavle (Croatia) Cavtat*, XVII International Congress on Dry Stone, 2021

cold climate areas, and areas with strong winds. Initiatives in the Sahara use such typologies for collecting water and re-greening ecosystems[32], while S. Holzer uses them in the steep and wet terrain of the Alps to prevent run-off water and erosion at his permacultural farm. This typology can also be found in the already mentioned vineyards on the volcanic hills on the island of Lanzarote, providing moist and temperature conditions for the grapes to grow. This typology is usually used on sloping terrain, when used facing uphill it collects water and nutrients while preventing erosion. If facing downhill, preferably towards the south, it acts as a sun trap protected from cooling north winds. When used in sequences, this typology can act as a sponge system made of cascading ponds used to absorb, clean, and release water in flood or erosion-prone areas.


Image 20-21 Underground and surface manifestations of the Iranian qanat system used for water trasportation and storage. In addition to providing water, qanats also help in cooling buildings and even preserving ice in some cases.

The Storing typology is a combination of the Protecting and the Extricating node, in the form of a deeper hollow in the ground covered with a mound. The hollow can be either found, in the form of a cave or unused man-made underground space, or it can be dug out. Underground spaces naturally maintain a more constant temperature than surface environments, making them energy-efficient options for storage and shelter. As they are inherently more protected from surface-level impacts, they can provide safe havens during natural disasters such as tornadoes, hurricanes, and earthquakes. Traditionally, underground spaces have served for storing water, food, wine, seeds, and other valuables not only because of their temperature regulation characteristics, but also because of the protection from contamination, reduction of exposure to external elements, and theft security. In a desert-like context, the Storing node can be used for water storage, while in wet climates it can store seeds or food that needs protection from moisture.

The Storing node functions as an underground refuge or storage space, with a mound-protected entrance that also serves for its passive ventilation. Thanks to its form, the mound allows air to heat up and rise from its hollow core, allowing fresh air to enter. This principle is inspired by the qanat and wind catcher typologies, both originating from

[32] See Zougmoré, Partey, Ouédraogo, Torquebiau and Campbell, *Facing climate variability in sub-Saharan Africa: analysis of climate-smart agriculture opportunities to manage climate-related risks*, 2018

ancient Persia[33]. The qanat is an underground system used for water extraction, transport, and storage, while at the same time providing cooling for buildings. The wind catcher acts as a sophisticated passive ventilation solution, in the form of an “air chimney” using wind and solar power for indoor air circulation. Cultures exposed to very high temperatures, such as in ancient Persia and Africa, have used underground systems not only for infrastructural but also for residential purposes. So depending on its size and context, the Storing node can be used for diverse functions ranging from water wells and seed banks to underground houses and shelters. In the future, predicting possible harsh surface conditions, whole habitats could shift underground.



Image 22-24 Some of the references for the creation of the Observing typology, from left to right: sensor at Boulder Creek CZO, meteorological tower at Boulder Creek CZO, and a birdhouse with feeders.

In addition to the described typologies, used for natural regeneration, habitat enhancement, resource storage, refuge, and disaster effect mitigation, another one is proposed, emphasizing environmental monitoring, observation, and research dedicated to learning more about life on Earth as a whole. The typology is inspired by the Critical Zone Observatories, dedicated to understanding complex interactions within this zone, where rock, soil, water, air, and living organisms interact. CZOs are designed to provide comprehensive and integrated observations of these interactions, offering insights into the processes that shape Earth's surface and support life. This involves studying aspects like soil formation, water cycle dynamics, nutrient cycling, and the impacts of human activities on natural processes. By deploying a range of scientific tools and methods, including advanced sensors, remote sensing technologies, and field experiments, CZOs collect valuable data that enhance understanding of environmental changes and their implications, while providing critical information that helps in predicting and mitigating the

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33 See Keshtkaran Parinaz, *Harmonization between climate and architecture in vernacular heritage: a case study in Yazd, Iran*, Beiza: Elsevier Ltd., 2011

effects of these changes[34]. This kind of data could be beneficial not only for university purposes and raising general consciousness, but also for strategic planning interfaces using AI technology – such as Deep Green, which has already been mentioned above. For AI-driven strategic planning, the deliberate and thoughtful collection of quality data is paramount. It not only enhances the accuracy and relevance of the AI's analyses and recommendations but also ensures that these systems are ethical, compliant, and adaptable to forthcoming needs and changes. Implementing an observative typology into the project also allows future evaluation and adaptation of the proposed system.

The Observing typology works as a sensor mount, in the form of an above-ground-underground column, able to accommodate various devices for measuring a wide array of parameters such as meteorological data, soil moisture and temperature, water discharge, air quality, seismic activity, acoustic emission, etc. It also provides space for above-ground shelters for flying organisms if needed, such as bird nests, insect hotels, and beehives. This possibility plays a crucial role in enhancing the resilience of these species by providing safe havens for nesting, roosting, and protection from predators and harsh weather conditions. These structures contribute significantly to biodiversity conservation, supporting the survival and proliferation of various flying species vital for ecological functions like pollination and pest control.

A table of proposed infrastructural typologies for the development of the Symbiotic Habitus can be seen in Figure 23 in the graphic folder of the project. The table shows the flexibility of use for each node type according to its scale, requirements of the climate scenario, function, and users. The scale and position of the nodes are planned categories, while their function and users are flexible according to the changing needs of time. For instance, the relation of the node towards water and whether it is functioning as a run-off water management mechanism or a regenerative garden preserving moisture depends on the changes in climate conditions.

[34] See Latour Bruno and Weibel Peter, ed., *Critical Zones: The Science and Politics of Landing on Earth,* Cambridge (Massachusetts: MIT Press, 2020), chapter III. Critical zones

2.6 Balancing intervention and autonomy

The spatial intervention within the campus area aims to transform it into a resilient shelter for more-than-human life by incorporating infrastructural nodes that enhance the proliferation of wild ecosystems. The system of proposed nodes, and auto-generating links connecting them, form a rhizome within a larger rhizome of the future resilient city of Rijeka. The rhizome is designed according to the current environmental situation, with an adaptive capacity to accommodate a variety of possible future changes. The nodes are placed either within the space between existing university buildings or in place of the ones never developed. If the campus ever continues growing, the nodes standing in the way can easily be removed and replaced by buildings. Thanks to the principle of asignifying rupture, the rhizome will not be damaged by this.

A system of interconnected nodes on campus arises from the observation and validation of existing natural processes and cycles in the area, understanding the local climate, topography, flora, and fauna. Figure 24 in the project's graphic folder shows a map of the proposed intervention. Each node is placed and sized according to the opportunity of unused space, and the variety of ecosystems that already inhabit or have a possibility of emerging within its perimeter. The typology and orientation of nodes depend on the type of energy they passively work with to create better life conditions, be it sunlight, water, or wind. All the proposed elements in the system work together synergistically and build resilience through an interconnected variety of habitats.

A Collecting node is placed in the location with the lowest altitude of the campus, functioning as a rain garden collecting excess water, adjusting the microclimate, adding ambient, and creating an aquatic habitat to expand biodiversity and resilience. Water, enriched with nutrients from surrounding ecosystems at higher altitudes within and beyond campus limits, is collected here, supporting diverse aquatic and nearby terrestrial life. The Observing columns are used here to measure water temperature, pH levels, dissolved oxygen content, nutrient concentrations, water level fluctuations, and the presence of specific contaminants or toxins. The Collecting node is shaped by digging a hollow in the ground, while the remnants of soil are used to form a nearby Extricating node – a mound providing various types of insolation and exposure to wind on its slopes while serving as a refuge for species that don't like being stepped on or occasionally flooded.

Since smaller piles of construction waste are present on site, the Extricating typology is already being unintentionally tested. It serves as a home for annual flowering plants, such as poppy, which makes it also a valuable habitat for pollinators. Two larger Extricating nodes are proposed on a meadow on the eastern side of the campus since this area is already populated with flowering and aromatic plants thanks to natural succession. This way, the existing habitat can easily expand to a more resilient territory and a wider variety of biodiversity. Each Extricating node also hosts an Observing column, measuring soil moisture and composition, air temperature and humidity, light intensity, wind speed and direction, and population dynamics of pollinators, such as bees and butterflies.

Additionally, sensors can assess plant health and growth patterns and the presence of pests or diseases that might affect the ecosystem's health.

The pollinating meadow habitat is completed with the Harvesting nodes, creating a big wind-secured and sun-exposed space on the northwest side of the meadow and smaller excess water collecting rain gardens on its south side. These two spots provide both sanctuary on cold and windy days, and access to drinking water on hot and dry summer days. A few Observers housing hotels for insects, beehives, and bird feeders are located in the wind-secured space of the big Harvesting node to help build resilience in winter conditions.

In the northern section of the site, remnants of a former military base, which previously occupied the current campus area, are still visible. A large asphalt plateau in the northwest, and a large hall with adjacent auxiliary objects in the northeast corner of the campus area. In the spirit of the utilization of existing conditions found on site, the hall is converted into a development center used for the design, construction, and monitoring of the proposed infrastructural nodes. The adjacent auxiliary objects serve as tool and machinery storage, while the surrounding area is used for material keeping and sorting. The university can contribute to the project's development by offering educational programs and workshops to students, professionals, and community members within this center. Furthermore, through interdisciplinary research, various university sections can develop and test technologies for environmental monitoring and data collection, explore innovative water management techniques, develop strategies to adapt to the impacts of climate change, study rewilding techniques, and more.

This northern section is different from the rest of the campus because there are no university buildings built there, so the undisturbed natural succession reached its third phase and started to assimilate with the surrounding nature. Since the space is neglected by humans, the natural forest that borders the campus from the north has started to advance over the fence. Two Protecting nodes are placed in this area, safekeeping the already evolved habitat, and sheltering it from strong cold winds and sudden temperature oscillations. The phenomenon of autonomous habitat expansion, detected in this area will later be used when elaborating on the project's development through time.

Besides utilizing the former military hall, the project also proposes the use of former military tunnels whose air shafts are detected adjacent to campus borders. Below-ground observation can provide valuable information on possible habitat shifts in crisis scenarios, and help plan more-than-human shelters for the future. The university can also research underground seed banks and food production, such as mushroom farming to take advantage of the benefits of the underground in the wake of the predicted crisis. For that reason, Observing columns are placed next to the entrances to the shafts, monitoring above and below-ground parameters.

The existing asphalt plateau is converted into an elevated water storage, by taking advantage of its impermeable surface and building a large Protecting node on top of it. Since the plateau is located on a plain at the bottom of a hill, it has a possibility of collecting run-off water alongside direct precipitation. Located at the spot with the highest altitude within campus grounds, the overflow can passively irrigate the rest of the area. Excess water is directed into cascading Harvesting nodes for flow regulation. Since Rijeka is one of the rainiest cities in Europe, the proposed area of 4,000 square meters can collect 8,800 cubic meters of water per year, reaching 2.2 meters of fresh water depth[35]. A water body enriches the area by supporting biodiversity, offering recreational and aesthetic value, regulating climate, and providing essential ecosystem services for a wide range of species including humans. The Observing infrastructure is used here to track water flow and levels to monitor for flooding or drought conditions, as well as ambient weather conditions like temperature, humidity, and atmospheric pressure in the surrounding area.

Each node of the rhizome develops in phases, where the first phase is a planned intervention in space, using surplus materials found on site, and the latter phases are auto-generative. The nodes are shaped with piled-up local stone and excess soil from digging, supplemented with targeted disposal of construction waste. The strategy is based on utilizing the existing qualities of a site as the driving force for the intervention, following the philosophy of Anne Lacaton and Jean-Philippe Vassal saying: “Never demolish. Never subtract, remove, or replace. Always add, transform, and utilize, with and for the inhabitants”[36]. By using this method no new materials are needed for the construction of nodes, there are no excess materials left after the node-shaping process and construction waste is being repurposed.

Following the initial phase of creating a node, improved life conditions are established within its perimeter, be it sunlight exposure, temperature, or moisture levels. During the second phase, the node is freely inhabited by a variety of species that find its microclimate an adequate habitat. Each habitat further evolves through several stages until reaching equilibrium. The timeline is not fixed and can vary widely, because some environments may reach their climax relatively quickly, in a matter of decades, while others may continue to change and evolve over a few centuries. During the second phase, the initial microclimates are further altered by the established ecosystems themselves, co-creating symbioments[37] with improved air quality, temperature regulation, wind reduction, and humidity optimization.

The third and final phase of development is designed for perpetuity. According to G. Clément, neglected areas of the Third Landscape foster higher diversity than the managed ones[38], in other words, in the absence of human interaction, each node becomes a refuge area for diversity. Furthermore, since these areas are subject to inconstant evolution, they

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[35] According to Croatian Meteorological and Hydrological Service's annual precipitation report for 2023.

[36] Harvard University News article: *“Never demolish. Always transform, with and for the inhabitants”: Anne Lacaton delivers inaugural Jaqueline Tyrwhitt Urban Design Lecture,* www.gsd.harvard.edu

[37] The concept of a "symbioment," while less conventional, extends the idea of the environment to emphasize its formation and sustenance through symbiotic relationships. It represents a shift from viewing the environment as a separate entity to understanding it as a dynamic, interactive network of relationships in which symbiosis plays a central role.

[38] Rephrased from Clément Gilles, Manifesto of the Third Landscape (London: Spector Books, 2007)

become more resilient and adaptive to change. “The inconstancy of biological systems is a guarantee of resistance to time. Whereas constant evolution presents a risk of collapse, inconstant evolution unfolds without hiatus through successive recoveries”[39]. The variations of conditions within each node typology, paired with its autonomous and unhindered development, ensure both the biodiversity of species and resilience to a spectrum of unpredictable climate events.

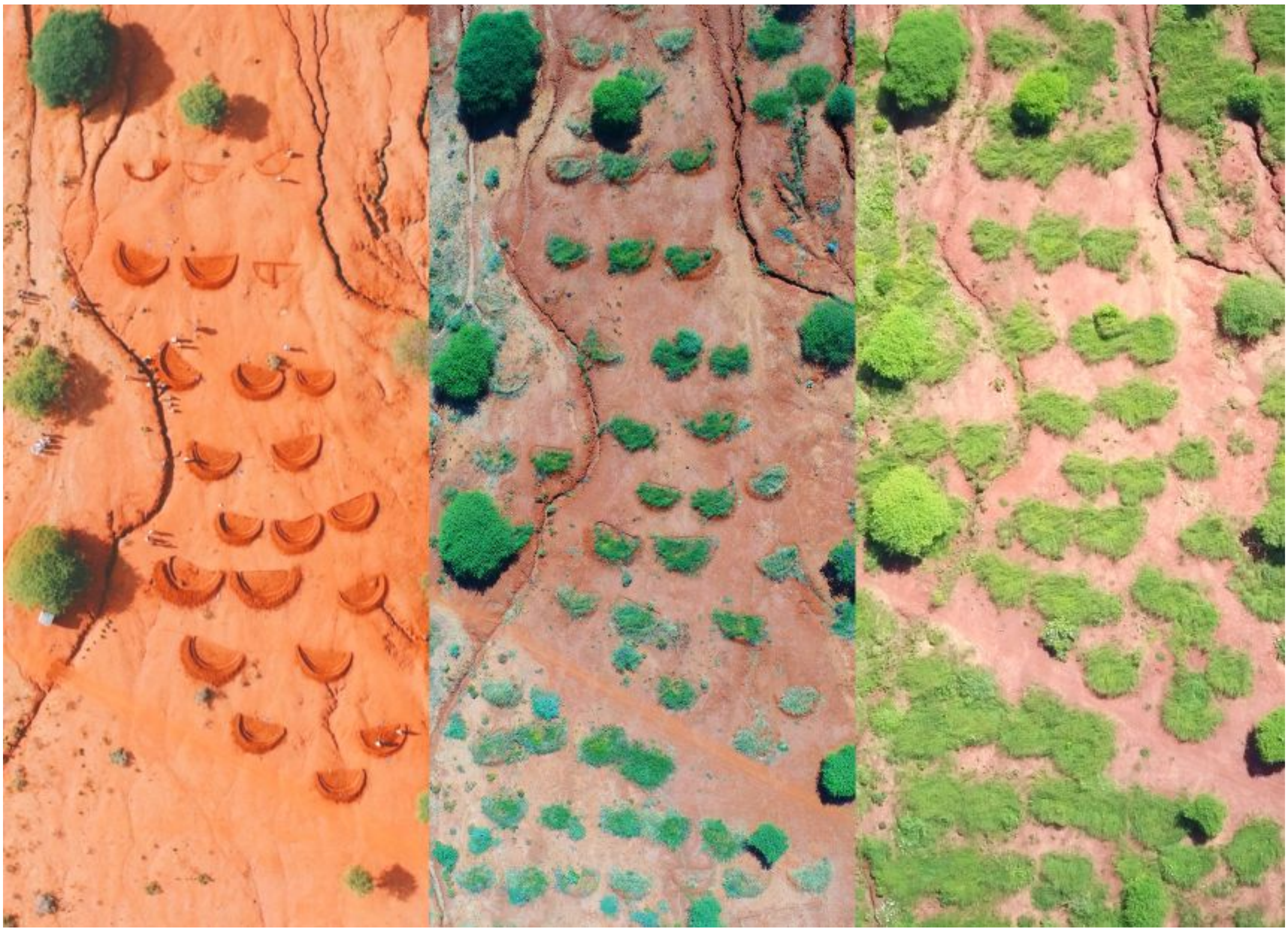

Image 25 A composite arerial image from 2018 to 2020, showing the stages of a regreening project in Pembamoto, Tanzania. The halfmoon shaped “bunds” are dug out by humans and then left to collect water and enable autonomous regreening of the area.

During the second and third phases, if the space surrounding a node is unused or neglected, a habitat has an opportunity to spread. This autonomous spreading of symbioments can also be planned if future scenarios evoke the need. During times of crisis, value systems often undergo significant shifts, potentially elevating the importance of nature and its resources to a primary position in societal priorities. The speculative concept of planning the non-planned acknowledges the dynamic and often unpredictable nature of cities and ecosystems, striving to create environments that are resilient, responsive, and conducive to organic development and innovation. For that same reason, the function of each node is not fixed, but subject to change freely according to various

[39] Clément Gilles, Manifesto of the Third Landscape (London: Spector Books, 2007), 27.

future scenarios. For better visualization of the development process and adaptive capacity of the node typologies see Figures 25 - 30 in the project's graphic folder.

While the primary intervention of placing and building a node is planned and voluntary, its further development, spreading, and interaction with the surroundings are autonomous by design. The perimeter of a node defines an area of non-doing, letting the natural processes unfold on their own, without unnecessary interference. The concept of non-doing arises in the Taoist philosophy and finds its application in agriculture, environmental conservation, landscape architecture, art, architecture, and urbanism. Masanobu Fukuoka, a Japanese do-nothing farmer, describes the human understanding of nature as insufficient, leading to the perpetual investment of excess energy and deterioration of natural systems. His agricultural methods rely on the inherent fertility and self-sustaining processes of natural ecosystems when left undisturbed by human intervention. He also states that through this process, human nature, or better to say their habitus, evolves: "The ultimate goal of farming is not the growing of crops but the cultivation and perfection of human beings"[40]. While observing natural processes, and letting them unfold autonomously, humans have a way of understanding and learning to respect them, consequently developing the knowledge to be able to care for them appropriately. In this manner, the proposed intervention in the physical space within the university campus can help form the psychological space among its users, towards building the symbiotic habitus. Visualizations of the project's outcome are presented in Figures 31-32 in the project's graphic map.

Once established, this kind of habitus leads to regenerative and circular thinking, fostering a new approach to "doing" that emphasizes the value and interconnectedness of life forms and the continuous cycle of resources. It encourages practices that not only maintain but also enhance the ecological and social environment.

[40] Fukuoka, Masanobu, *The One-Straw Revolution: An Introduction to Natural Farming* (New York: New York Review Books Classics, 2009.), 138.

3. Conclusion: The Symbiotic Habitus as a Driver for Resilience

The exploration and implementation of the Symbiotic Habitus within the Rijeka University campus represent a speculative juncture in the paradigms of spatial planning and ecological integration, marked by a conscientious shift towards an ecologically integrated urban model. This project, based on local context, research, and ecological understanding, demonstrates a forward-thinking approach to urban development. It addresses the urgent need for cities to adapt to environmental challenges while fostering biodiversity and sustainable coexistence with nature.

The strategic implementation of various node typologies — Collecting, Extricating, Protecting, Harvesting, Storing, and Observing nodes — reflects a deep comprehension of ecological systems and their functionalities. These nodes are not merely aesthetic additions but are infrastructural components that enhance the ecological dynamics of the campus. Their progression from deliberate design to natural evolution epitomizes the concept of 'non-doing', a principle that respects the autonomy of natural processes and underscores minimal human interference. The project's alignment with non-doing principles offers a nuanced understanding of urban ecosystems, facilitating the transition from conventional anthropocentric models to a more inclusive, biocentric paradigm.

Incorporating these wilderness structures within the urban framework of the university campus serves a triple purpose. Firstly, it enhances the resilience and adaptability of the urban ecosystem, preparing it for various environmental contingencies. Secondly, it helps build a new habitus characterized by an awareness of the interdependence of all living and non-living elements. And thirdly, it functions as a living laboratory for ecological and urban studies, providing valuable data and insights that can inform broader spatial planning strategies.

The integration of the campus's existing natural and anthropogenic elements into the project’s framework illustrates the potential for adaptive reuse and sustainable development in spatial planning. This approach not only addresses the potentials and needs of the campus but also sets a precedent for future urban development projects, emphasizing the importance of careful resource management, circular methods application, and minimal energy investment.

In conclusion, the Symbiotic Habitus project at the Rijeka University campus emerges as a critical and timely initiative in the realm of strategic planning. It represents a paradigm shift towards a new urban development model prioritizing ecological integrity and resilience, ensuring that urban spaces not only support human life but also foster a thriving, diverse ecosystem. As cities continue to face increasing environmental pressures, the principles and practices exemplified in this project offer a compelling and necessary direction for future development.

4. Thesaurus

Adaptive Capacity: Adaptive capacity is the intrinsic ability of a system, community, or individual to adjust and adapt to changes, stresses, or disturbances, and, if necessary, to undergo transformative changes in response to environmental, social, or economic shifts. This concept is integral in various fields, particularly in climate change adaptation, where it denotes the potential of societies, ecosystems, or economies to modify their practices, behaviors, and policies to mitigate the adverse effects of climate change and capitalize on new opportunities presented by changing conditions. Adaptive capacity involves aspects such as resilience, learning, flexibility, and innovation. It is determined by factors like available resources, infrastructure, knowledge, technology, and social and institutional structures. High adaptive capacity enables entities to cope with and recover from shocks, maintain essential functions in the face of long-term stresses, and reorganize or evolve in ways that maintain their core attributes while embracing new conditions and opportunities. In the context of sustainability and environmental management, enhancing adaptive capacity is seen as key to building resilience against the backdrop of global environmental change.

Anthropocentric / Symbiocentric: Anthropocentrism is a worldview that places humans at the center of concern, often prioritizing human needs and perspectives over those of other forms of life. This human-centered approach has historically influenced much of human interaction with the natural world, leading to practices and policies that may disregard the needs and rights of non-human entities. Symbiocentrism, in contrast, offers a more interconnected perspective, emphasizing the mutual relationships and dependencies among various species, including humans. It advocates for a holistic approach to understanding and interacting with the natural world, where the well-being of the entire ecosystem, comprising both living and non-living components, is considered. Symbiocentrism promotes a shift from human dominance to coexistence, recognizing the value of biodiversity and the intricate web of life in which humans are just one part. This perspective is increasingly relevant in discussions on environmental ethics, conservation, and sustainable development, as it underscores the need for an integrated approach that respects and preserves the balance of ecosystems.

Care: Care, as a concept, extends beyond mere concern or attention; it embodies a range of practices, attitudes, and values characterized by responsibility, maintenance, ethical commitment, and emotional investment toward others. This multifaceted term transcends human relationships to encompass care for animals, plants, objects, and the environment. In social and environmental contexts, care involves an active engagement in nurturing, preserving, improving, and empathizing with the well-being of individuals, communities, and ecosystems. The concept of care is gaining prominence in various disciplines, including health, social policy, environmental ethics, and philosophy. It emphasizes the importance of sustaining supportive networks and relationships that foster the flourishing of life in all its forms. Care challenges dominant paradigms of detachment and exploitation, advocating for an approach that values connection, interdependence, and the nurturing of life. It encourages practices that are responsive to the needs and vulnerabilities of others, promoting a more compassionate and sustainable way of interacting with the world.

Companion Species: The concept of "companion species," popularized by Donna Haraway, refers to the myriad species (animals, plants, microorganisms) with which humans live in close association and have co-evolved. This concept expands beyond the traditional human-pet relationship to encompass a wide array of human-nonhuman interactions. Companion species relationships are characterized by deep, reciprocal connections that entail significant biological, cultural, and ethical dimensions. The idea emphasizes mutual dependence and the co-shaping of life experiences, challenging the notion of human exceptionalism and highlighting the complex, intertwined histories and destinies of different species. Companion species are not merely adjuncts to human life but are integral to it, influencing and being influenced by human culture, behavior, and well-being. This concept foregrounds the importance of acknowledging and respecting these relationships, and understanding them as vital components of ecological and social systems. It encourages a more empathetic and responsible approach to our interactions with other species, recognizing their intrinsic value and the need for ethical cohabitation.

Entanglement: Entanglement, a term borrowed from quantum physics, has been metaphorically extended to various fields such as social sciences, humanities, and environmental studies to describe the complex state of being intricately intertwined or interrelated. It signifies a condition where multiple entities, be they objects, ideas, beings, or systems, are so deeply connected that their properties or states cannot be described independently of each other. This interconnectedness implies that changes or actions affecting one entity will have implications for the others. Entanglement challenges conventional notions of isolated, independent existence, suggesting that the nature of things can only be fully understood in relation to their connections and interactions with others. In social and ecological contexts, it represents the complex web of relationships that define systems, emphasizing the need for holistic approaches to understanding and addressing issues. Entanglement underscores the interdependency of elements within a system, highlighting how seemingly separate phenomena are interconnected and co-dependent, shaping and being shaped by one another.

Environment / Symbioment: The term "environment" typically refers to the natural world or the physical and biological factors that make up the surroundings and affect the survival, development, and evolution of organisms. It encompasses the air, water, land, climate, and other living organisms that interact in a particular area. The environment plays a crucial role in shaping life on Earth, providing the necessary conditions and resources for various forms of life. The concept of a "symbioment," while less conventional, extends the idea of the environment to emphasize its formation and sustenance through symbiotic relationships. This term suggests that environments are not merely passive backdrops for life but are actively co-created and maintained by the interactions and interdependencies among their constituent living and non-living components. A symbioment underscores the integral role of symbiosis and cooperation in the formation, functioning, and evolution of ecological systems. It represents a shift from viewing the environment as a separate entity to understanding it as a dynamic, interactive network of relationships in which symbiosis plays a central role.

Gaia: The Gaia hypothesis, formulated by scientist James Lovelock and co-developed with Lynn Margulis, presents the Earth as a self-regulating, complex system composed of the biosphere, atmosphere, hydrospheres, and pedosphere, all working synergistically to maintain and perpetuate the conditions for life. This hypothesis challenges traditional views of the Earth as merely a passive backdrop for life, proposing instead that living organisms interact with their inorganic surroundings in ways that affect the Earth's surface and climate, creating a feedback loop that sustains life. The Gaia hypothesis has far-reaching implications in fields like ecology, Earth science, and environmental philosophy, promoting a holistic understanding of Earth's systems. It suggests that life on Earth functions collectively, akin to a single organism, to maintain homeostasis and balance. The concept has spurred debates and research on planetary health, the impact of human activities on Earth's systems, and the need for sustainable practices that support the Earth's ability to self-regulate.

Habitus: Habitus is a sociological concept developed by Pierre Bourdieu, referring to the deeply ingrained habits, skills, dispositions, and ways of thinking that individuals acquire through their life experiences, particularly in their early years. It encompasses the totality of learned habits, bodily skills, styles, tastes, and other non-discursive knowledge that might be acquired from the cultural and social conditions of one's upbringing. Habitus shapes an individual's perceptions, attitudes, and actions, influencing how they navigate and interpret their social world. It operates at a subconscious level, subtly guiding choices and behaviors in a way that reinforces existing social structures and class divisions. The concept is crucial in understanding how social and cultural background can impact an individual's life trajectory and worldview. Habitus is dynamic, evolving over time as individuals encounter new experiences and environments, yet it remains deeply rooted in early socialization, reflecting the enduring influence of social and cultural contexts on human behavior and thought.

Holobiont: A holobiont is a term used in biology to describe a host organism and its symbiotic microorganisms, including bacteria, fungi, and viruses. This concept represents an organism as a complex, integrated community of the host and its associated microbiome. The holobiont underscores the interdependence of the host and its microbial companions, where the collective genome, known as the hologenome, contributes to the health, development, and evolution of the entire assemblage. This holistic view of an organism challenges the traditional perception of living entities as isolated units and instead presents them as ecosystems comprising various symbiotic relationships. The concept of the holobiont is significant in understanding phenomena like disease, development, and evolution, highlighting the essential role of symbiotic interactions in shaping life. It reflects a paradigm shift in biology and ecology, emphasizing the complex networks of interdependence that characterize living systems and the need to consider these networks in understanding organismal biology.

More-than-human: The term "more-than-human" encompasses a worldview that extends beyond human experiences and concerns, recognizing and valuing the lives, agencies, and existences of non-human entities. This concept is increasingly influential in fields such as environmental ethics, ecology, anthropology, and philosophy, where there is growing recognition of the significant roles played by animals, plants, landscapes, and even inanimate objects in ecological and social systems. It challenges anthropocentric perspectives, advocating for an inclusive and interconnected approach that values the relationships between humans and other forms of life and matter. The more-than-human perspective fosters a deeper understanding of ecological processes and encourages practices that are respectful and protective of the diverse forms of life on Earth. It highlights the complex web of interactions and dependencies that define ecosystems and social systems, emphasizing the need for approaches that acknowledge and honor these connections. This perspective is crucial for addressing environmental challenges, as it promotes a holistic understanding of the Earth's ecosystems and the intricate relationships that sustain them.

Rhizomatic: The term "rhizomatic," inspired by the botanical concept of a rhizome, a horizontally growing underground plant stem, is used in philosophical and theoretical contexts to describe non-linear, non-hierarchical, and interconnected ways of thinking and organizing knowledge. Popularized by Gilles Deleuze and Félix Guattari, rhizomatic thinking contrasts with traditional, tree-like hierarchical structures and systems. It embraces the idea of multiplicity, connection, and unpredictability, suggesting that knowledge, social structures, and cultural phenomena can spread in diverse and unexpected directions, much like the unpredictable growth patterns of rhizomes. Rhizomatic approaches value the connections and relationships between different elements, recognizing the fluid and dynamic nature of knowledge and social organization. This perspective encourages open-ended exploration and understanding, challenging fixed categories and rigid structures. Rhizomatic thinking is applicable in various fields, including education, social sciences, and cultural studies, offering an alternative framework for understanding complexity, diversity, and the interconnectedness of ideas and phenomena.

Symbiogenesis: Symbiogenesis is a biological concept that describes the process by which separate organisms merge to form a single, new organism, often through symbiotic relationships. This theory, primarily developed by biologist Lynn Margulis, posits that cooperation and interdependence, rather than just competition, are significant driving forces in evolution. Symbiogenesis has been recognized as a crucial factor in the evolution of complex life forms. A well-known example is the origin of eukaryotic cells, where separate bacterial entities fused to form a new type of cell with organelles like mitochondria and chloroplasts. This process demonstrates the transformative power of symbiotic relationships in shaping life on Earth. Symbiogenesis challenges traditional notions of evolutionary change as solely driven by random mutations and natural selection, highlighting the role of cooperative and integrative interactions among different species in driving biological innovation and diversity.

Third Landscape: The term “Third Landscape,” coined by French gardener and thinker Gilles Clément, refers to the unused, neglected, or residual spaces in urban and rural environments. Examples include abandoned lots, railway embankments, industrial wastelands, and roadside verges. Clément argues that these spaces, often overlooked in urban planning and design, are important reservoirs of biodiversity and ecological potential. The Third Landscape concept emphasizes the ecological and cultural value of these areas, suggesting that they play a crucial role in supporting urban biodiversity, providing habitats for numerous species, and contributing to the ecological diversity and resilience of urban and rural ecosystems. The concept challenges traditional notions of landscaping and urban design, advocating for the recognition and preservation of these spontaneous, unmanaged spaces. It promotes a more inclusive and ecological approach to landscape design, recognizing the importance of all forms of nature, including those that exist in the margins and interstices of human-constructed environments.

Subnature: Subnature is a concept in architecture and urbanism that refers to elements often considered inferior or undesirable in the built environment, such as dirt, mud, weeds, decay, and industrial by-products. The term, coined by architectural theorist David Gissen, encourages a reevaluation and rethinking of these often neglected or marginalized aspects of urban nature. Subnature suggests that these elements play a crucial role in the ecological and cultural fabric of cities and should be thoughtfully integrated into urban design and planning. The concept challenges traditional perceptions of what constitutes "nature" in urban settings, advocating for a broader and more inclusive understanding. It proposes that acknowledging and creatively engaging with subnatural elements can lead to more sustainable, resilient, and ecologically rich urban environments. Subnature emphasizes the dynamic and ever-changing nature of urban ecosystems, highlighting the potential of these undervalued elements to contribute to the vitality and diversity of cityscapes.

5. Image sources:

- Image 01: *Connectivity Altas*, https://atlas.developmentseed.org, a collaboration between DevelopmentSeed, the University of Wisconsin-Madison Cartography Lab, and Dr. Parag Khanna, author of Connectography: Mapping the Future of Global Civilization
- Image 02: F. Ait-Touati, A. Arenes, A. Gregoire, *Terra Forma: A Book of Speculative Maps*, Cambridge, Massachusetts: MIT Press, 2022, Extract: Cartography Model SOL, Chap. 1
- Image 03: *New Scientist: Vineyards sit in moon-like craters on a volcano in Lanzarote*, photo: George Steinmetz, https://www.newscientist.com
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- Image 07: Noel Gough, *Performing imaginative inquiry: narrative experiments and rhizosemiotic play*, La Trobe University, Australia, 2015
- Image 08: Allen, S., Infrastructural Urbanism in *Points+Lines: Diagrams and Projects for the City* (New York: Princeton Architectural Press, 1999), 56., author: Louis Kahn, part of Philadelphia Planning Study
- Image 09: Author's work, part of *The Symbiotic Habitus* project
- Image 10: City Tool Box, *MO Hartera: Activating a Community* (article), https://www.citytoolbox.net/journal/mo-hartera-activating-a-community/, a learning online platform encouraging young people to take action in the city of Rijeka
- Image 11: Author's work, part of *The Symbiotic Habitus* project, made with Midjourney
- Image 12: Agro Klub website, https://www.agroklub.com/agrogalerija/lokve-u-krsu-15546/, location: Račišće, on the island Korčula, author: Alen Čikada
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- Image 14: Author's work, part of *The Symbiotic Habitus* project
- Image 15: Prof. Alexey Sergeev's webpage, from the album Flora of Qatar, https://www.asergeev.com/pictures/archives/compress/2015/1619/16.htm, author: A. Sergeev
- Image 16: Amusing Planet website, article: Citrus Gardens of Pantelleria, https://www.amusingplanet.com/2019/08/the-citrus-gardens-of-pantelleria.html, photo credit: AnimaMediterranea
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- Image 18: Islas del Mundo blog, http://lasislasdelmundo.blogspot.com/2015/10/lanzarote.html
- Image 19: Justdiggit, *Collaborating with Wyss Academy for Nature in Kenya*, https://justdiggit.org/news/collaborating-with-wyss-academy/
- Image 20: Unesco World Heritage Convention Website, *Aflaj Irrigation systems*, https://whc.unesco.org/en/list/1207/gallery/, Copyright: Editions Gelbart, Author: Jean-Jacques Gelbart
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Author’s Biography

Iva Peručić is an architect and urban planner, holding a Master's degree in Architecture and Urban Planning (mag. ing. arh. i urb.) from the University of Zagreb. Born on January 22, 1988, in Zagreb, Croatia, Peručić's journey in architecture began with her pre-graduate studies at the same university, further enriched by a photography course at the Design Studies in Zagreb.

Her professional experience is extensive and diverse, starting with model making at Log-urbis in Zagreb in 2006, followed by an internship at De Architekten Cie in Amsterdam. Peručić's significant contribution as an architect designer at Studio 3LHD from 2013 to 2017 was a defining period in her career. Since 2017, she has been spearheading her own studio, GROW Studio, focusing on innovative and sustainable design solutions.

Peručić is also known for her active engagement in ecological and artistic initiatives. She is a co-founder of the ecological association Green Flock/Zeleno Jato (2018), the artistic collective Paprat Kolektiv (2020), and the socio-artistic association Beton (2021). Her commitment to sustainability and community engagement is further exemplified in her role as a lecturer and designer at the Academy of Natural Construction, organized by Z.M.A.G. (Green Network of Activist Groups).

Her work extends beyond traditional architecture, with notable achievements in various competitions and exhibitions. Peručić was part of the architectural teams that won the first prize in the First Tower competition in Rotterdam (Architecten Cie, 2010) and the first prize in the competition for the construction of the Center for the Study of Natural Disasters, Istanbul (Radionica Arhitekture, 2011). She has also been recognized for her work at the 50th Zagreb Salon of Architecture and various art and design festivals like Design District Zagreb and Okolo/Around. With Paprat Kolektiv, in 2021. she exhibited her artwork at the 35. Youth Salon, Zagreb, and at the Magic Carpets residency in Guimaraes, Portugal.

Peručić’s architectural and urbanistic projects, both as part of Studio 3LHD and her own GROW Studio, demonstrate a keen focus on sustainable and context-sensitive design. Her work ranges from tourist zone development to sustainable urban studies, showcasing her versatility and commitment to blending architecture and urbanism with environmental consciousness. As an architect who integrates ecological awareness into her designs, Iva Peručić stands out for her innovative approach and advocating for a sustainable future.

Sveučilište u Rijeci

Sveučilišni specijalistički studij Urbani studiji

Iva Peručić

SIMBIOTSKI HABITUS

Poslijediplomski specijalistički rad

GRAFIČKA MAPA

Rijeka, siječanj 2024.

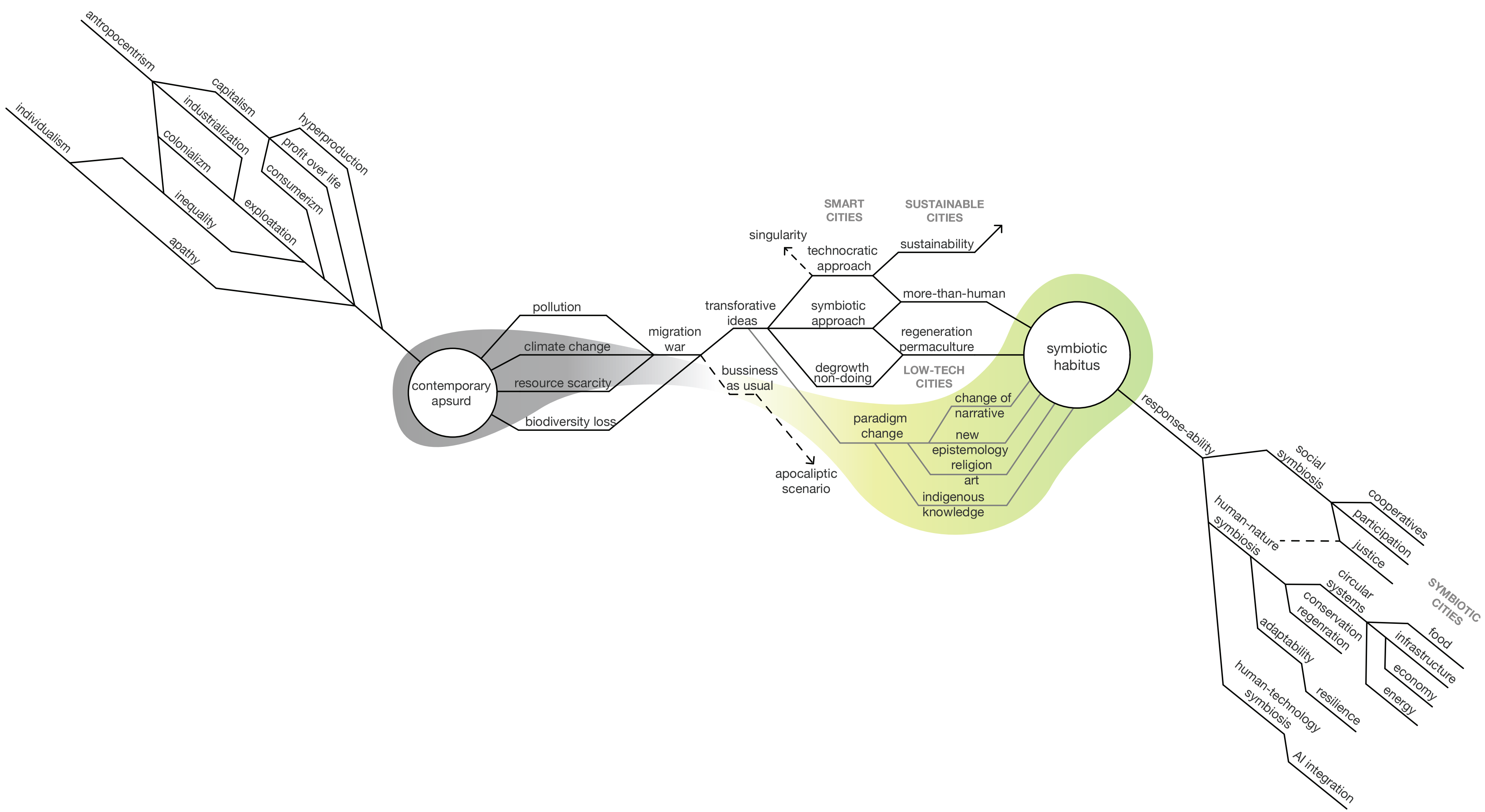


FIGURE 01

A diagram of explored concepts showing their relation and consequentiality. The left (grey) side showing the development of the current global situation, and the right (green) side showing a transition into possible future scenarios with an emphasys on the symbiotic approach.

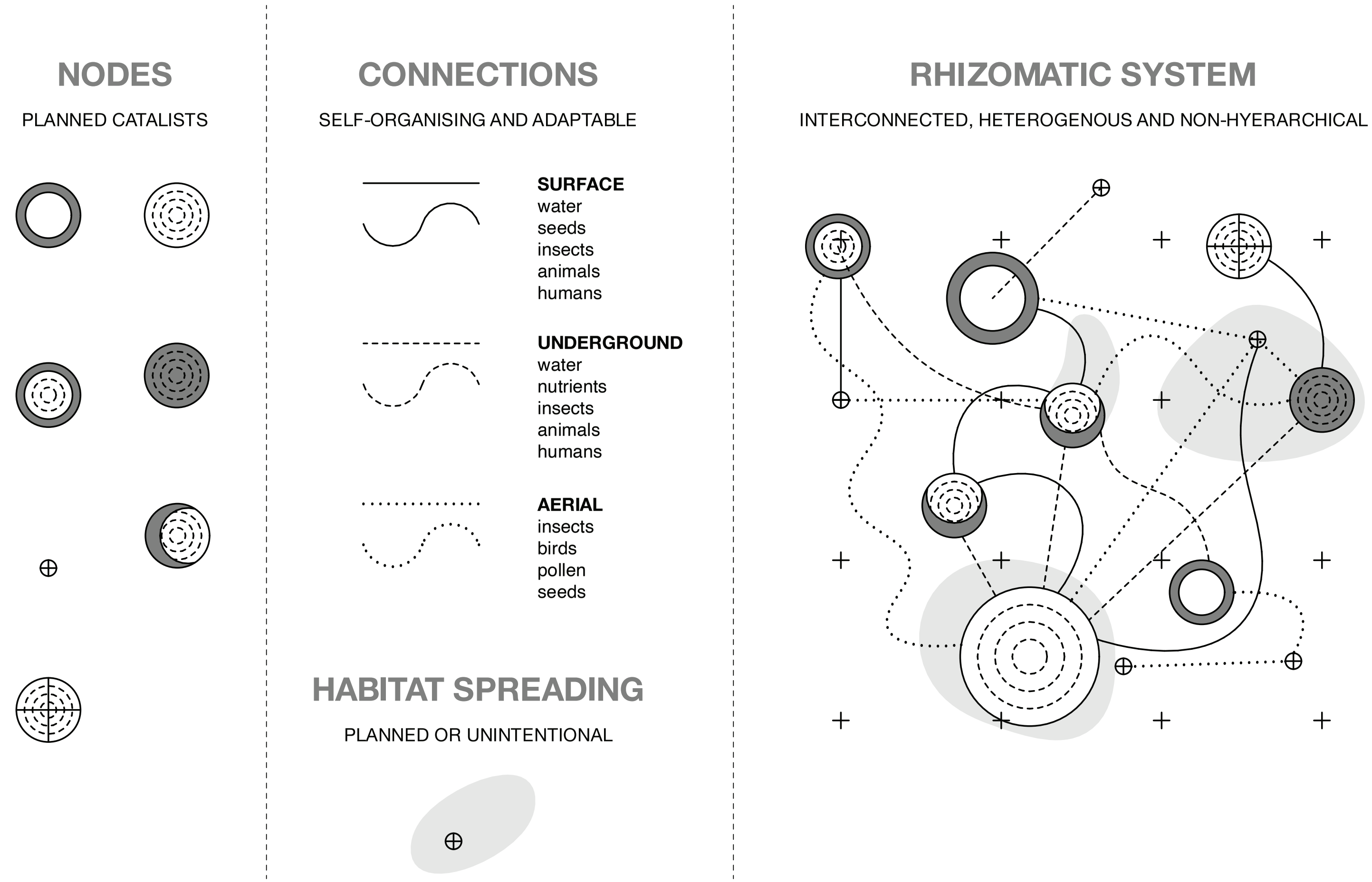
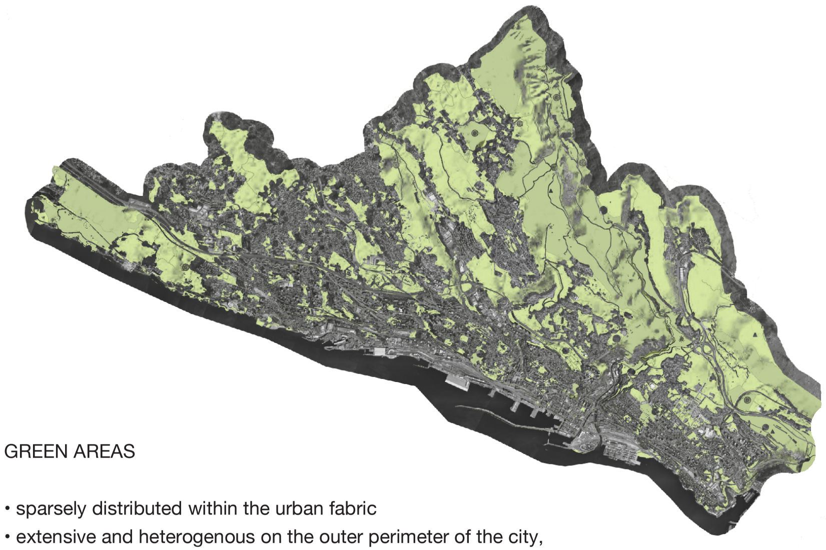


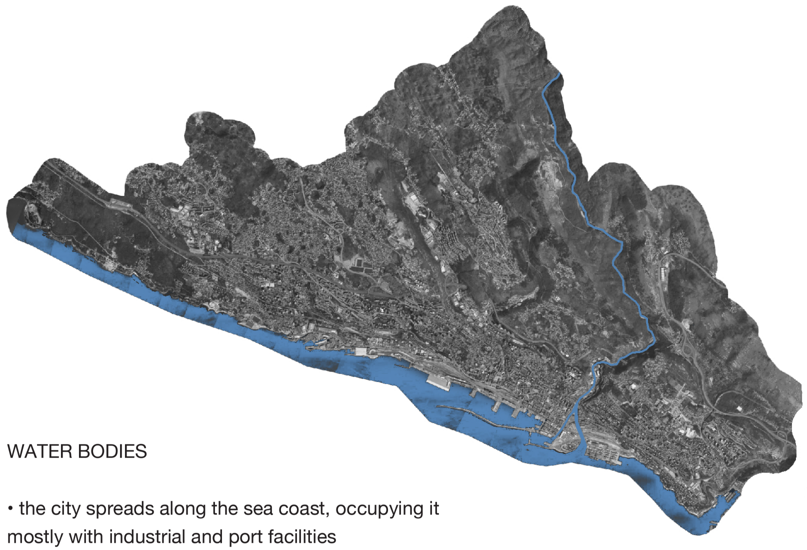
FIGURE 02

A pragmatic proposition for the assimilation of nature within the preexisting urban framework is the superposition of a new typology - a rhizomatic system of infrastructural wilderness. A diagram of the project's concept presents the main elements forming the proposed rhizomatic structure and their interrelation.



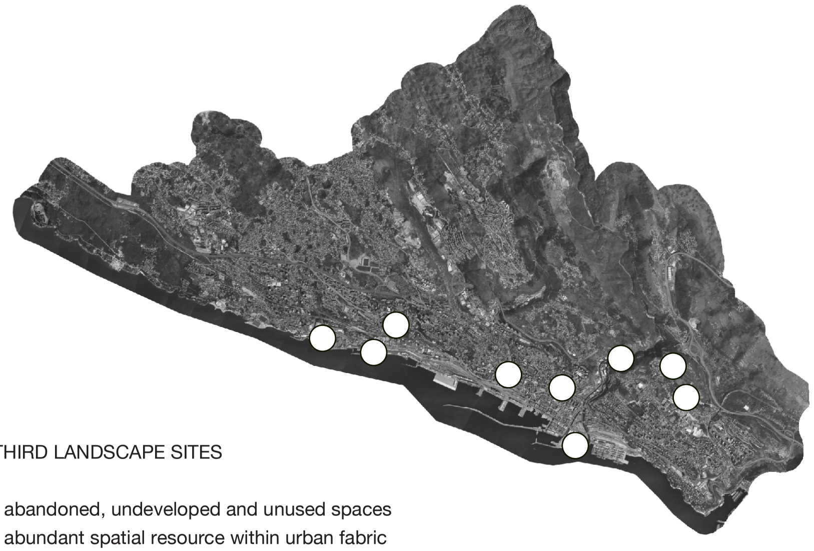
GREEN AREAS

• sparsely distributed within the urban fabric
• extensive and heterogenous on the outer perimeter of the city, housing mountain, river and coastal habitats



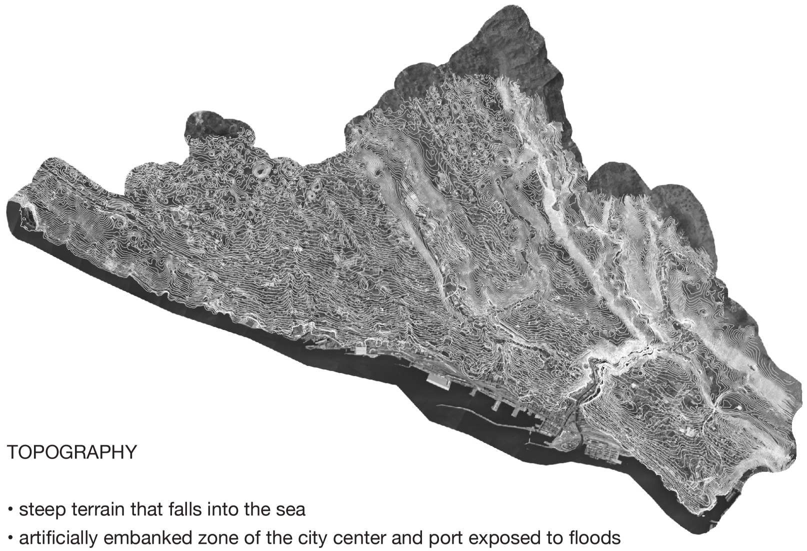
WATER BODIES

• the city spreads along the sea coast, occupying it mostly with industrial and port facilities
• canyon of the river Rječina cuts trough the topography and forms a deltaic estuary



THIRD LANDSCAPE SITES

• abandoned, undeveloped and unused spaces
• abundant spatial resource within urban fabric



TOPOGRAPHY

• steep terrain that falls into the sea
• artificially embanked zone of the city center and port exposed to floods

FIGURES 03 - 06

Maps of Rijeka showing its green areas, relation to the sea coast and Rječina river, its topography, and neglected spaces that already are of have the potential to become parts of the third landscape. These spaces include abandoned industrial complexes, unused military tunnels and the unfinished university campus.

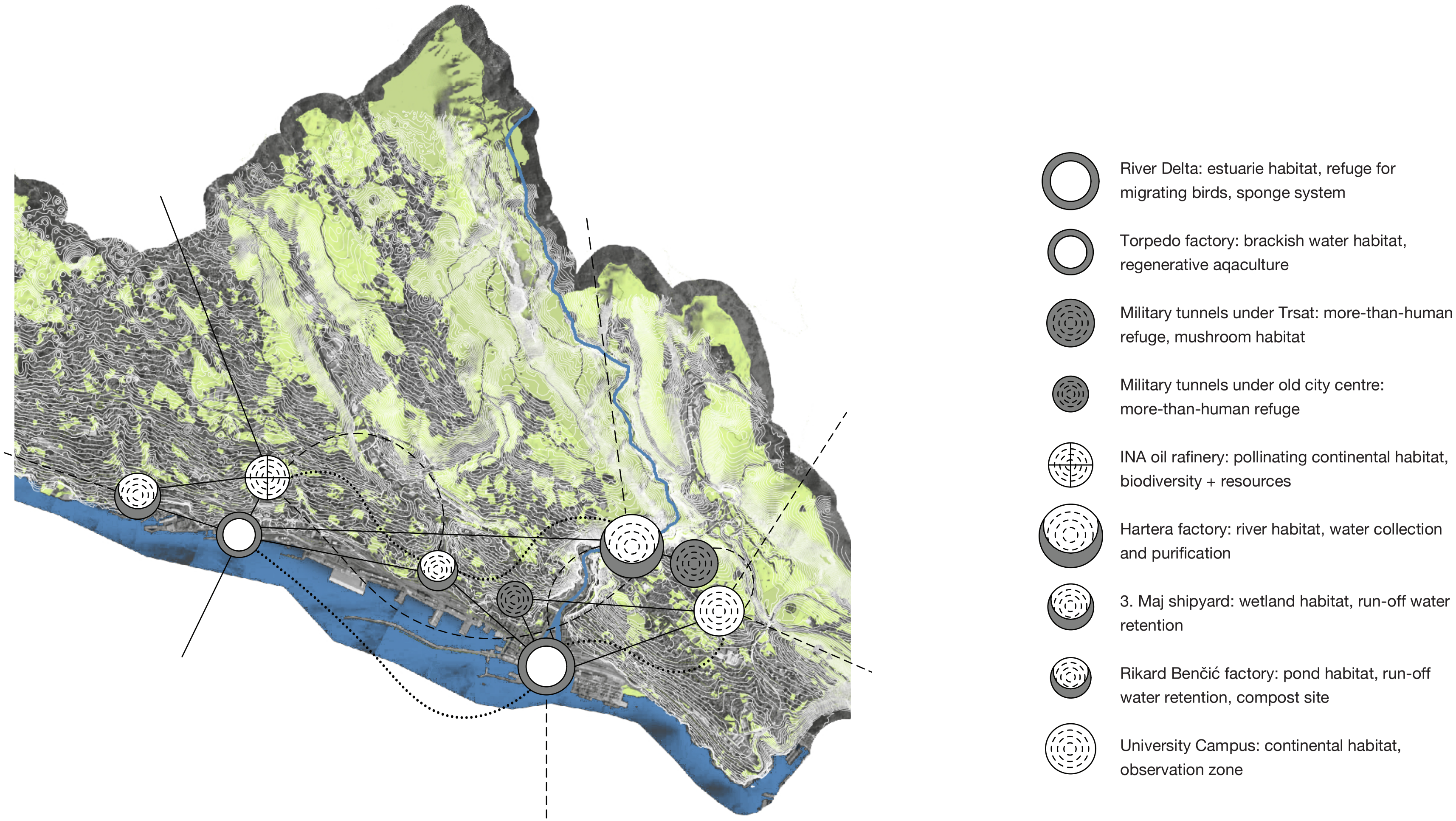


FIGURE 07

A rhizomatic network superimposed within Rijeka's urban fabric, with nodes placed in the existing and potential areas of the Third Landscape and prospective subterranean refuges. The connecting lines represent the various types of auto-generating links between the nodes, and between this rhizome and a larger, interconnected rhizomatic system.

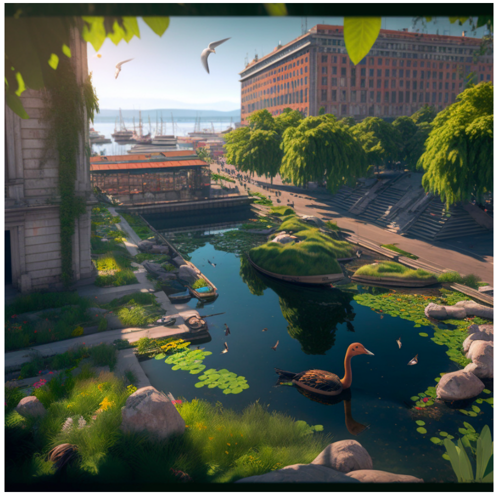
Torpedo factory brackish water habitat

Sudden changes in Medditeranean weather

Hartera river habitat and water purification

River Delta estuary habitat for migrating species

Seal level rise



Rječina river habitat within the urban structure

Unused tunnels as subterranean refuges

Symbiotic Habitus applied on the university campus

FIGURES 08 - 15

Speculative visualusations made with AI image generator showing the challenges and opportinities facing the future of Rijeka, according to predicted climate change scenarios and with the developement of proposed infrastructural nodes. The possible effects of climate change include sea level rise, species migrations, changes in precipitation and sudden weather events.

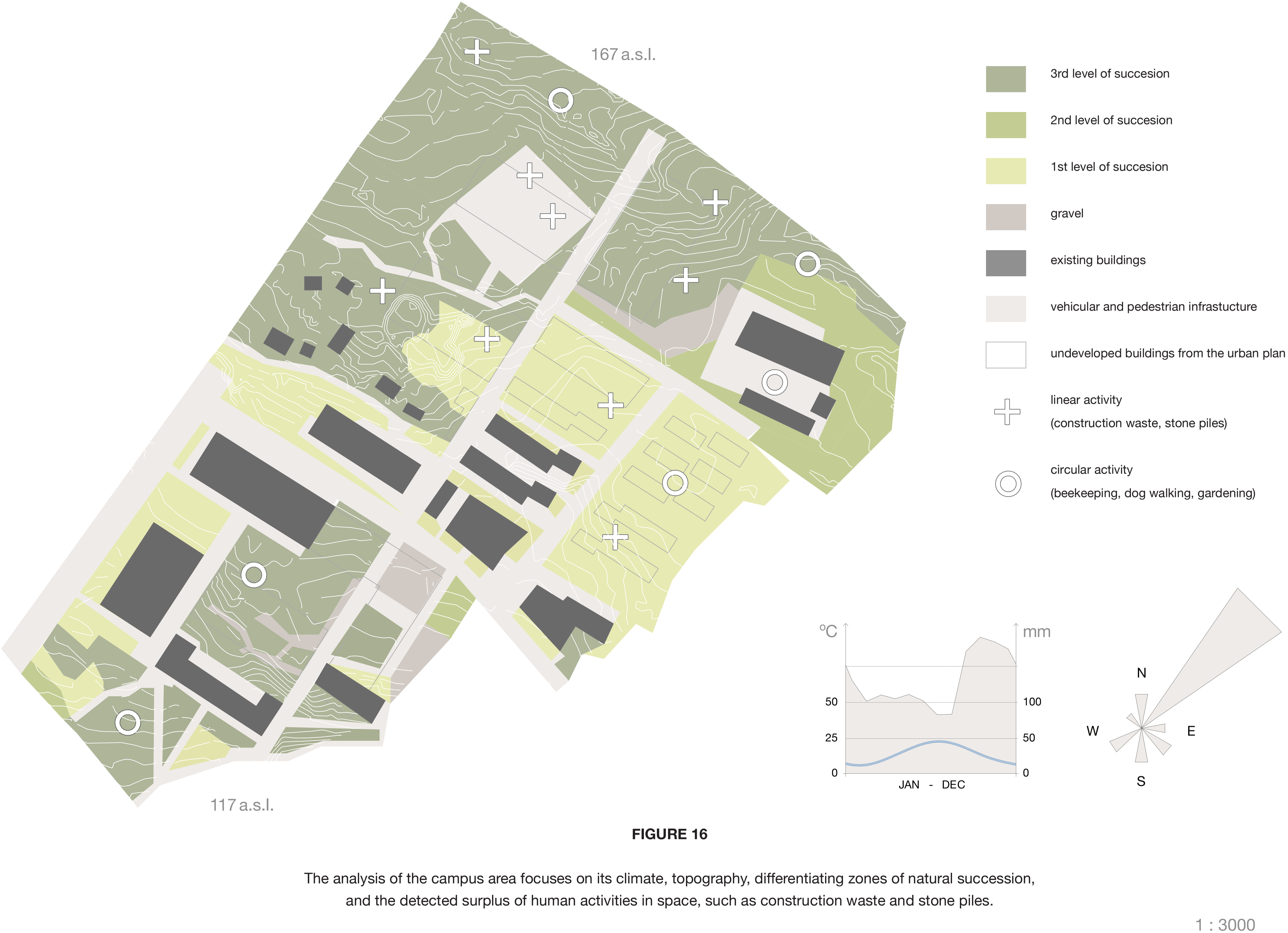


FIGURE 16

The analysis of the campus area focuses on its climate, topography, differentiating zones of natural succession, and the detected surplus of human activities in space, such as construction waste and stone piles.

FIGURE 17

A herbarium of encountered plant species within campus grounds presents a specific variety of the Third Landscape flora, consisting of indigenous and exogenous, wild and cultivated plants. Inconsistent evolution of the area casued by repurposing of the space resulted in high biodiversity and a resilient array of species.

FIGURES 18 - 21

Research images showing some of the existing areas of succesion mapped within campus grounds. There are different levels of succesion found: from annual plants growing on construction waste piles, through pollinating meadows to areas with shrubs and trees.

OVERLAP AND CONNECTION OF HETEROGENEOUS ENTITIES

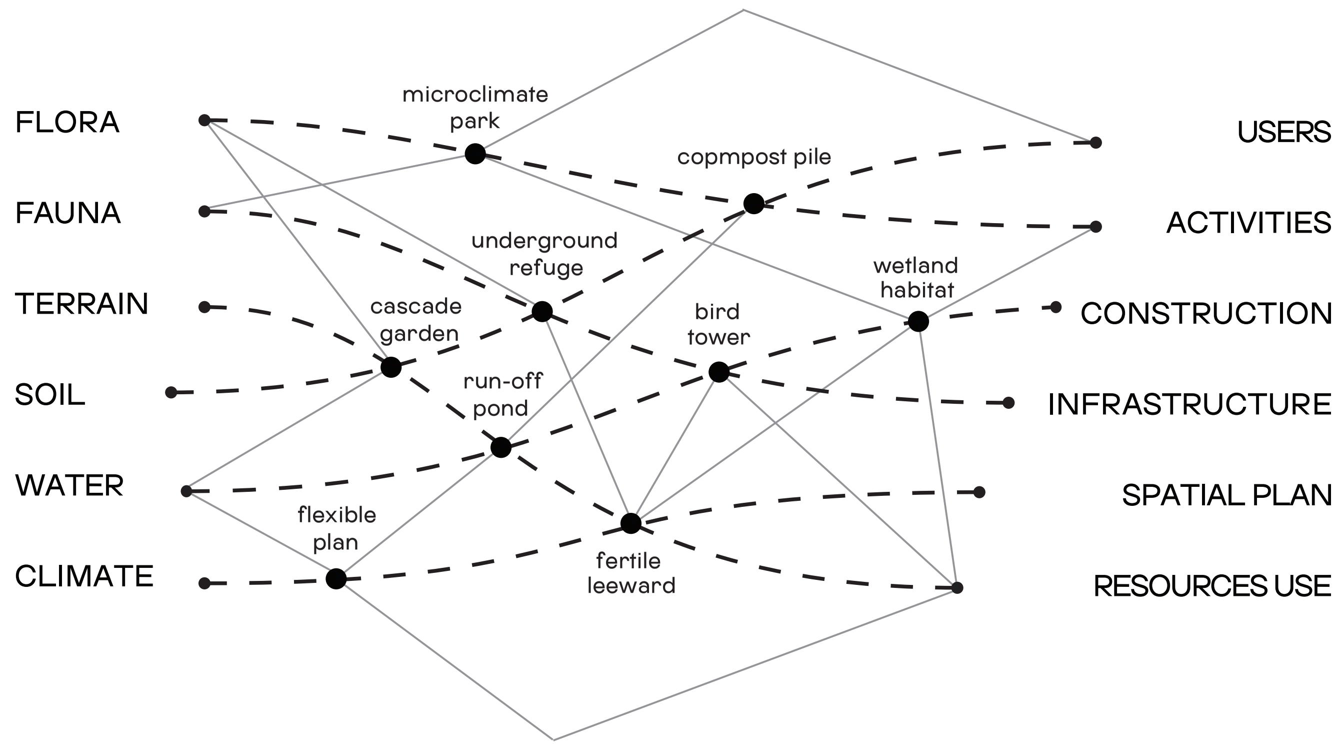


FIGURE 22

Node typologies and their functions within campus arise from overlapping and connecting the heterogeneous entities encountered in the reasearch phase of the project.

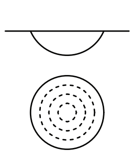
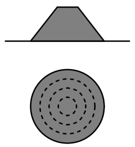
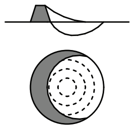
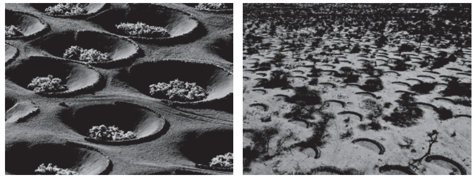
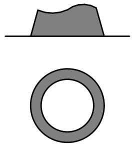
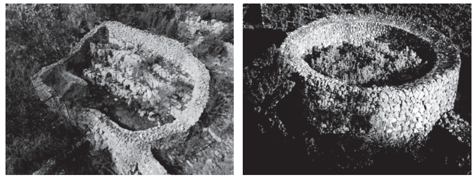
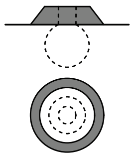
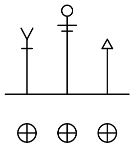
NODE	SYMBOL	CLIMATE SCENARIO	SCALE	FUNCTION	USERS	REFERENCES
COLLECTING		DESERT-LIKE: - harvesting moisture for plant growth MONSOON-LIKE: - run-off water management	S M L	S: RAIN GARDEN COMPOST/FIRE PIT M: SWAMP POND L: LAKE WETLAND	microorganisms funghi water plants and algae fish and aquatics insects birds, reptiles, mammals humans	
EXTRICATING		DESERT-LIKE: - sand mound for rooting plants MONSOON-LIKE: - dry area above flooding level	M L	M: DIVERSITY MOUND L: FLOOD ISLAND BIRD NESTER	microorganisms funghi meadow plants insects birds, reptiles, mammals humans	
GATHERING		DESERT-LIKE: - wind shelter, moisture harvesting MONSOON-LIKE: - wind shelter, sun harvesting, run-off water and erosion management	S M L	Facing uphill: ANTI-EROSION TERRACE SPONGE SYSTEM FERTILITY PIT Facing south or downhill: SUN GARDEN WIND SHELTER (all scales)	microorganisms funghi edible and sensitive plants insects birds, reptiles, mammals humans	
PROTECTING		DESERT-LIKE: - wind and sun shelter, moisture harvesting MONSOON-LIKE: - wind shelter, water harvesting	S M	S: WALLED GARDEN SHELTER M: PRESERVATION CIRCLE WATER HARVESTER	microorganisms algae funghi edible and sensitive plants insects birds, reptiles, mammals humans	
STORING		DESERT-LIKE: - water storage, cooler, shelter MONSOON-LIKE: - dry storage, shelter	S M L	S: SEED BANK WATER / FIRE KEEPER FEEDER M: LAIR, BIRD/BAT TOWER UNDERGROUND SILO L: UNDERGROUND SHELTER	microorganisms algae aquatics funghi birds mammals humans	
OBSERVING		BOTH SCENARIOS: - sensors for more-than-human participation - weather station - above-ground shelter (for flying organisms)	ONE SIZE	SENSOR MOUNT LOOKOUT FEEDER-NESTER PLANT CLIMBER BEEHIVE HOLDER	climbing plants bees birds humans AI	

FIGURE 23

A table of designed infrastructural typologies, proposed for the developement of the Symbiotic Habitus. Each tipology is flexible according to its possible scales, requirements of the climate scenario, functions, and users.

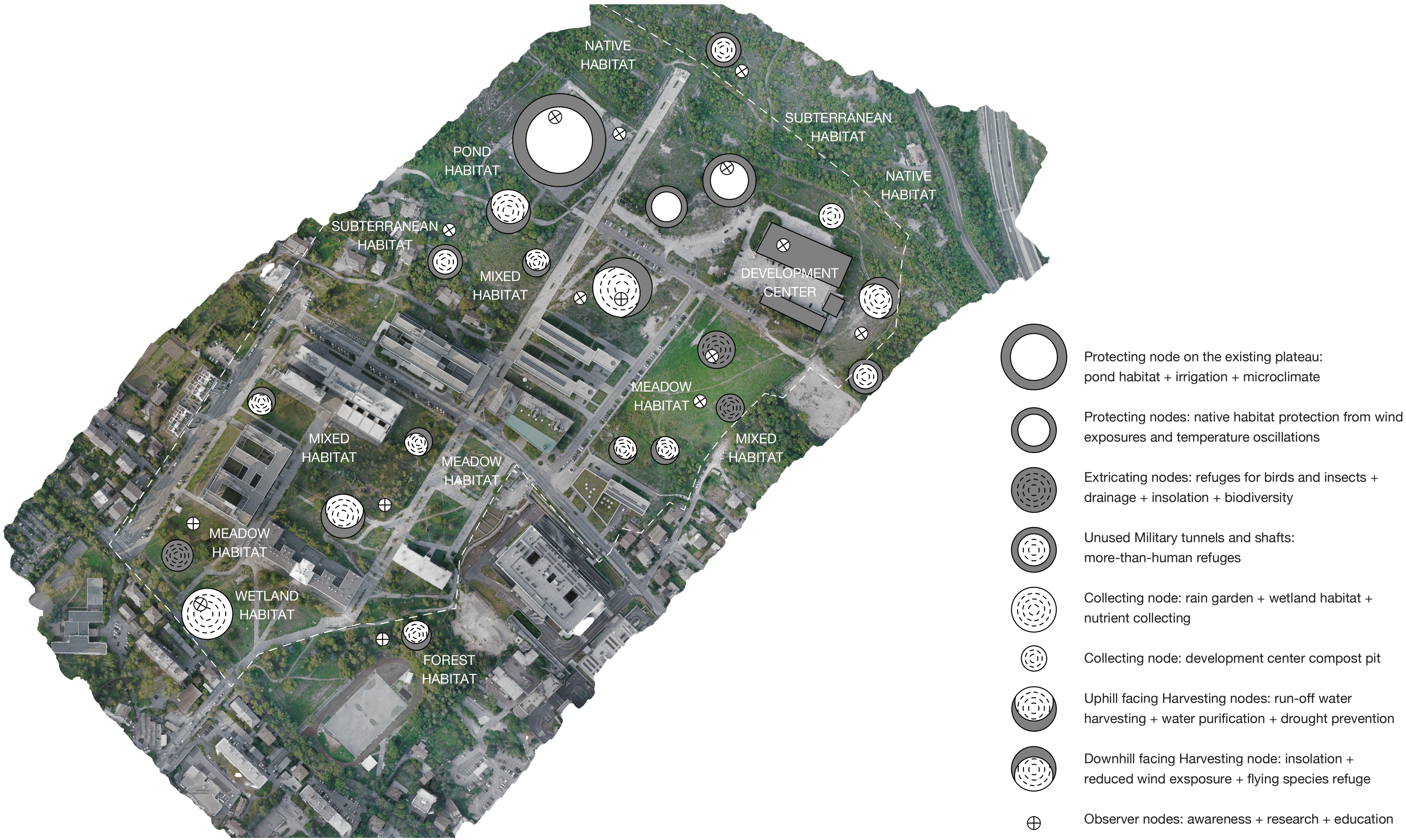


FIGURE 24

A map of the proposed intervention within campus grounds, showing a variety of existing and future habitats. Each habitat is supported by one or several infrastructural nodes, providing them adequate micro-envrionmental conditions such as temperature, wind exposure and moisture.

FIGURE 25

Node development phases from the planned initial spatial intervention, through autonomous development, to the habitat creating its own microclimate and resilience. Presented on the example of a Harvesting node.

FIGURE 26

A map showing the interconnectedness and heterogeneity of the campus rhizome. After the planned intervention of building the nodes, a variety of habitats are left to autonomously develop and create links of interrelations. The higher the number of links, the more adaptable and resilient the system.

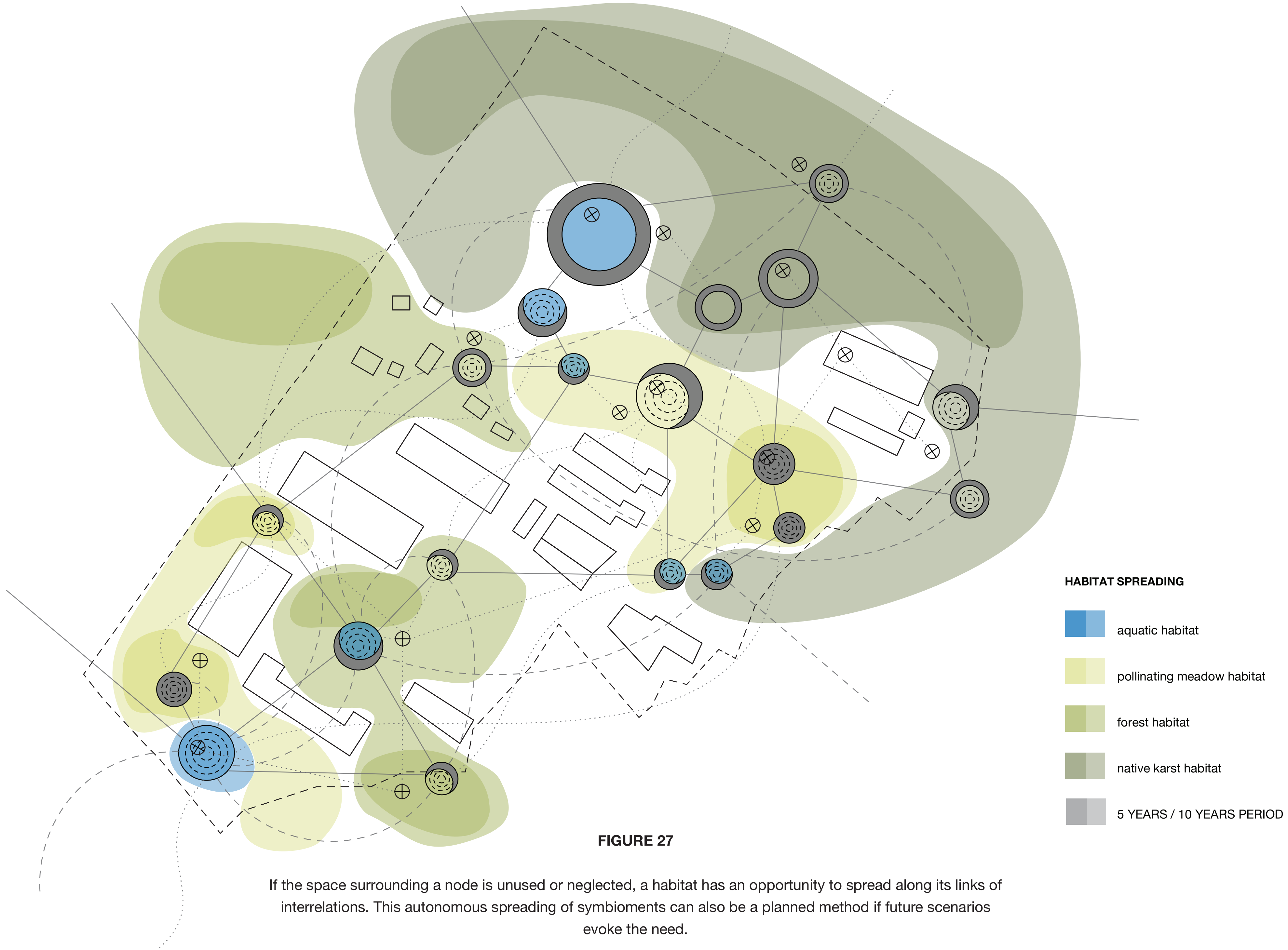


FIGURE 27

If the space surrounding a node is unused or neglected, a habitat has an opportunity to spread along its links of interrelations. This autonomous spreading of symbioments can also be a planned method if future scenarios evoke the need.

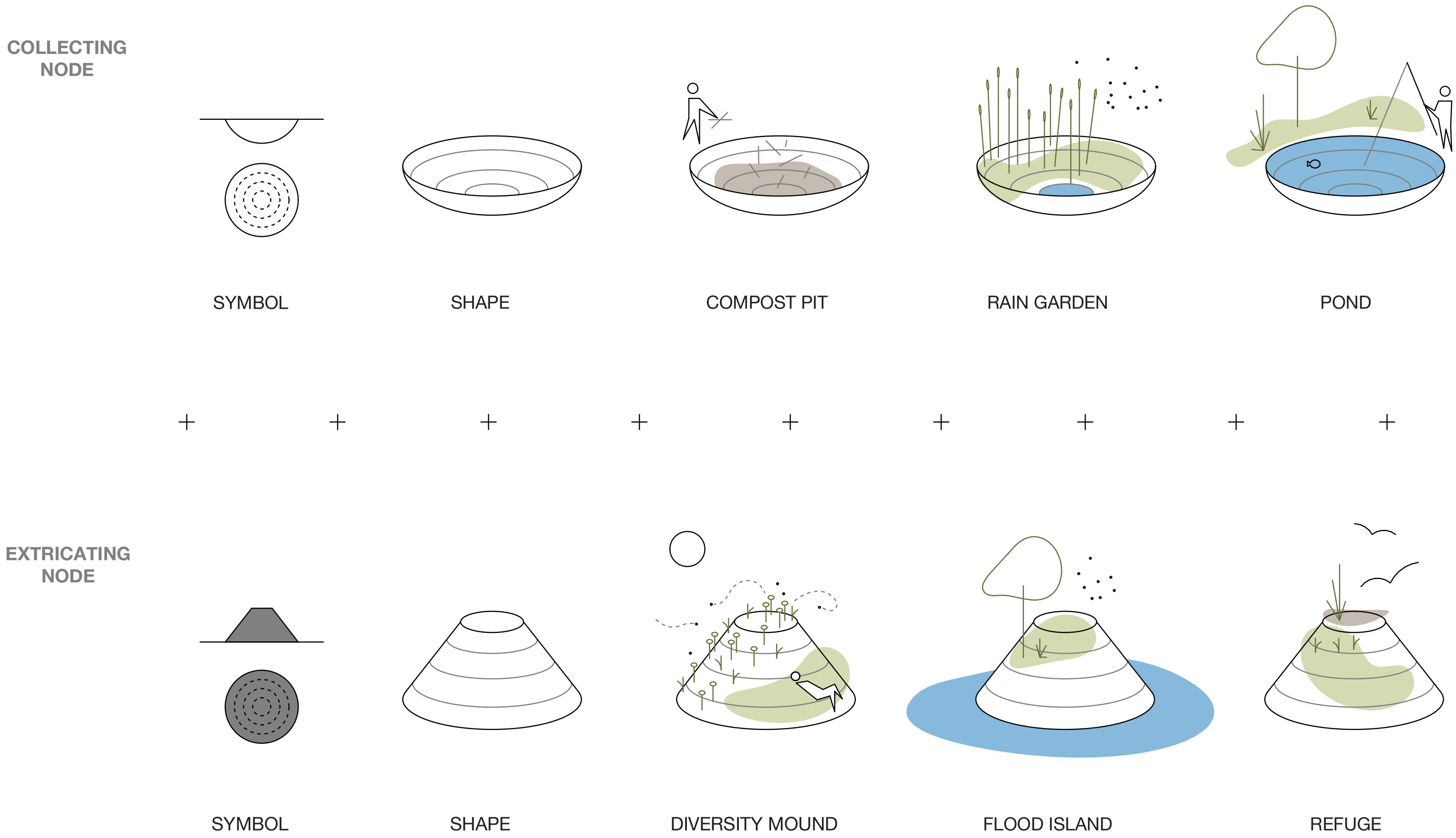


FIGURE 28

The function of each node is not fixed, but subject to change freely according to various future needs. High adaptive capacity of the nodes, makes them resilient to a wide spectrum of future scenarios.

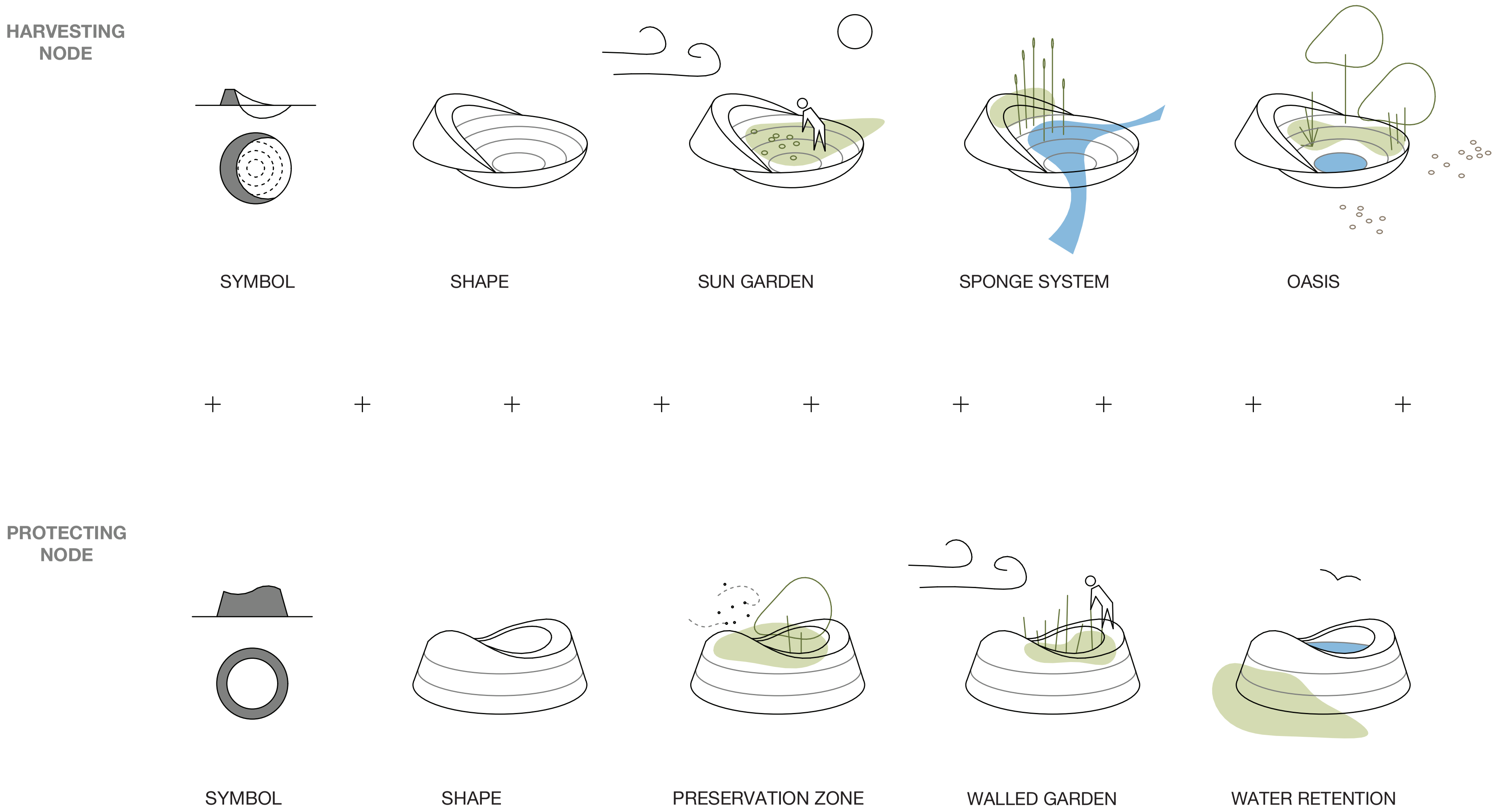


FIGURE 29

The function of each node is not fixed, but subject to change freely according to various future needs. High adaptive capacity of the nodes, makes them resilient to a wide spectrum of future scenarios.

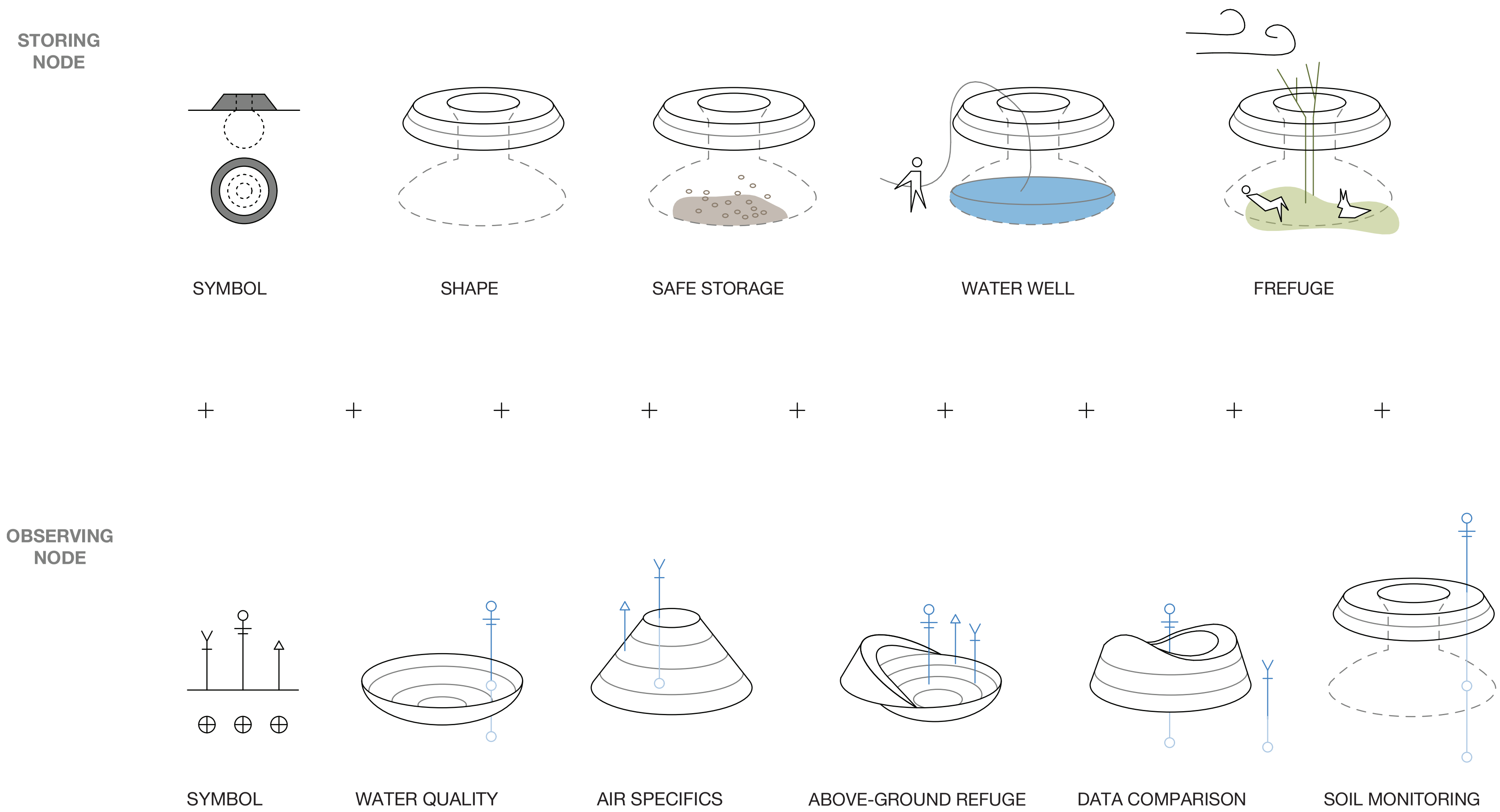


FIGURE 30

The function of each node is not fixed, but subject to change freely according to various future needs. High adaptive capacity of the nodes, makes them resilient to a wide spectrum of future scenarios.

FIGURE 31

Visualization of the initial itervention phase on campus. The former military building is o turned into a development center where the constriuction waste is collected, sorted and mixed with local soil to shape the infrastructural nodes.

FIGURE 32

After the initial intervention, the habitats within nodes develop independently, creating their own microclimates.
The variety of habitats, their biodiversity and interconnectedness form a resilient rhizomatic network.