Designing for a Symbiotic Future: Lessons from the 2023 Thessalian Floods

Edited by Vaso Trova and Fabiano Micocci

Urban Design Lab
Dept. of Architecture
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Erasmus + Blended Intensive Program “Hybrid Urbanscapes”
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Introduction

Vaso Trova and Fabiano Micocci
University of Thessaly

Throughout history, humans have reshaped the environment to meet their needs, often in ways that appear confrontational. Forests are cleared to make way for agriculture and expanding cities, hills are excavated for raw materials, rivers are diverted, coastlines are reclaimed, and landscapes are reconstructed to suit human ambition. The 20th and 21st centuries, in particular, have been marked by an unshakable faith in technology, empowering humans to dominate nature, remold landscapes, and impose control over natural forces. Nature, once revered and feared, has been increasingly perceived as something to be tamed –like a domesticated animal that must submit to human will– while technology has served as the primary instrument of this dominance.

However, this confidence in human supremacy over nature is frequently tested, often shattered, by extreme environmental events. The devastating floods in Thessaly –first after Ianos storm in 2020 and later after Daniel and Elias storms in 2023– serve as stark reminders of nature’s unpredictable power. These disasters challenge conventional urban planning approaches, raising urgent questions: How can we rethink the relationship between nature and the built environment, not through force and rigid control but with understanding and empathy? How can we acknowledge the dynamism and resilience of natural forces –particularly water– and shift from an adversarial stance to one of adaptation and coexistence?

More than a century ago, during the emergence of modern urban planning, Patrick Geddes, a visionary philosopher, biologist, sociologist, and urban planner, championed the idea that urban design must be rooted in the specific context of a place –its landscape, geography, and inherent potential– rather than an abstract, imposed vision dictated by the authority of planners. A hundred years later, this principle remains

as relevant as ever. How can contemporary urban design foster a harmonious balance between human settlements and the natural world, rather than perpetuating a cycle of conflict and resistance?

Since the 1970s, the concept of sustainability has become a crucial element in urban discourse, adding new layers of complexity to how cities are planned and developed. The 21st century has placed climate change at the center of this discussion. According to the European Commission for Climate Change, the coming years will bring increased incidents of prolonged rainfall, leading to riverine flooding, while short but intense cloudbursts will trigger urban (pluvial) floods. Additionally, there is a growing occurrence of extreme rainfall-induced flooding, even in the absence of overflowing rivers or bodies of water. River flooding has already become one of Europe's most frequent and costly natural disasters, affecting millions of people and causing significant economic damage over the past three decades. With climate change intensifying, the frequency and severity of such events are expected to escalate, making it imperative to rethink our approach to urban resilience and flood management.

In response to these pressing challenges, the Erasmus + Blended Intensive Program "Hybrid Urbanscapes" was organized in July 2024 by the Urban Design Lab of the Department of Architecture at the University of Thessaly. This interdisciplinary initiative brought together 34 Greek and international students, both online and on-site, alongside 12 distinguished faculty members from leading academic institutions, including Anhalt University of Applied Sciences (Germany), Università degli Studi di Napoli Federico II (Italy), ENSA Nantes (France), University of Córdoba (Argentina), Euromed University of Fez (Morocco), University of Tokyo (Japan), and Eindhoven University of Technology (Netherlands). The program fostered a dynamic exchange of ideas, encouraging participants to explore forward-thinking urban strategies that integrate ecological principles, climate resilience, and the evolving interplay between human settlements and natural ecosystems. Through lectures, site visits, and collaborative design work, students engaged with real-world urban and environmental challenges.

This volume brings together the knowledge and creative explorations that emerged from the workshop. It includes a collection of lectures delivered during the workshop, as well as documentation of field visits to critical sites affected by extreme flooding in September 2023 – the Giannouli neighborhood in Larisa, Lake Karla, and the village of Mikro in Pelion. These locations, deeply impacted by climate-related disasters, served as case studies for envisioning resilient urban and territorial futures.

Additionally, the volume showcases a series of student design projects developed in four design studios at the Department of Architecture, University of Thessaly, during the winter of 2023 and spring of 2024. These projects, which were presented and exhibited during the workshop in Volos, propose innovative approaches to reimagining the delicate balance between river systems, water management, and the built environment, offering critical insights into sustainable urban futures.

As we navigate the complexities of the 21st century, the question remains: Can we move beyond the traditional paradigm of human-versus-nature and instead cultivate an approach where urban design and nature work in synergy? The future of sustainable cities depends on our ability to design with nature rather than against it – adapting, learning, and fostering resilience in the face of an ever-changing world.

PART A

Redefining Urban Landscapes: Water, Sustainability and Resilient Cities

The growing awareness of the need for a harmonious relationship between water and riverside or coastal cities has sparked new approaches to urban and landscape design. This shift in perspective emphasizes sustainable development, resilience, and the integration of natural and built environments. The following chapter explores key discussions from the “Hybrid Urbanscapes” workshop, where experts introduced innovative concepts and forward-thinking design strategies aimed at fostering a symbiotic future. These ideas not only reimagine urban spaces but also seek to enhance ecological equilibrium and foster a more profound connection between cities and their surrounding waterways, ultimately shaping a more adaptive and sustainable future.

Fig. 1

Fig. 2

Living with water

Kaon Ko
Tokyo University of Science

The archipelago that is Japan has long been blessed with and cursed by water. Oceans provide robust fishing industries and aquaculture, but tsunami may strike anywhere along its long coastlines; heavy rainfall and typhoons from the sky enrich the soil and forests, but also cause overflowing of rivers; clean water and hot springs from the ground are abundant throughout the country, but it is also prone to landslides and subsidence. Throughout the country, such geographical and climatic conditions have had direct and significant repercussions, as 98 percent of all municipalities have reportedly experienced flood related damages or sediment disasters in the past decade.[1] In addition, habitable area of this mountainous nation is only less than 30 percent of its total land area, pushing most of its citizens to live in the lowlands at 0 to 100 meters above sea level.

Geological research show that the rivers in Japan were mostly tame, with undisturbed peat in the backswamp, until the 12th century. Technologies for building embankments developed from necessity, after heavy rain and other natural disasters increasingly began to cause damages to the land, first with domestically developed techniques and later via imported techniques by engineers from the Netherlands.[2] Over time, however, embankments have caused raised riverbeds by allowing sediments to settle more on the riverbed over time – as a result, there are well over 200 cases in the country where the river water level is higher than the surrounding land, and the only way to combat this issue in cities are often to build higher embankments.

Life in cities

Waterscape in Japanese cities had been vibrant with everyday lives and leisure. In some religious festivals, a small shrine might be seen carried by men through the shallows of the ocean. In the city of Tokyo, for example, there is a complex tapestry of diverse waterscapes formed by over a hundred rivers of various sizes, canals, former rivers turned into underground culverts, moat around Edo castle, lakes, and Tokyo Bay. Until around the mid-century, rivers and canals served as primary modes of transportation in the city, and moreover a measure of preventing fire from spreading. People enjoyed fishing and boat races, and swimming lessons were held.[3] On the

1 Ministry of Land, Infrastructure, Transport and Tourism, *2018 Data*, accessed July 10, 2024, https://www.mlit.go.jp/river/pamphlet_jirei/kasen/gaiyou/panf/pdf/c1.pdf.

2 Hideo Nakajima, "Kasen Teibou Gijutsu no Hensen," accessed July 10, 2024, https://www.jice.or.jp/cms/kokudo/pdf/reports/committee/embankment/nakajima.pdf.

3 Hidenobu Jinnai, *Mizu no Tokyo* (Tokyo: Iwanami Shoten, 1993).

Figure 1
People await the water bus on September 5, 1954. On the other side of the river, on the left is a former Ryogoku Kokugikan, the national sumo wrestling stadium. Source: Jinnai, Hidenobu. *Mizu no Tokyo*. Tokyo: Iwanami Shoten, 1993.

Figure 2
Waterscape in Oji, Tokyo in the early 1900s. Teahouses were situated in such scenic spots by the water. Source: Jinnai, Hidenobu. *Mizu no Tokyo*. Tokyo: Iwanami Shoten, 1993.

beach, shellfish gathering was a popular weekend activity. When literary people and industrialists commissioned villas sited by the river, the primary building facade often faced the water rather than the streets. Familiarity with water and its behavior was part of life, a source of both fear and enjoyment, but also livelihood. [fig 1, 2]

Rapid economic growth combined with preparations for the Tokyo Olympics held in 1964 instigated Tokyo's large scale urban reform. As a result of the infrastructural development of highways, monorails, and high-speed railways, many canals were filled in or paved over; in particular, elevated highways in the city were built over rivers because they are public property. Thus, the waterways became more of a background to the city, with deteriorating water quality and functionally replaced by autoroutes. Embankments and seawalls were also constructed at large scales, distancing people from sensory experience of the water and thus altering their relationships. [fig 3]

Post-disasters, urban and architectural approaches

The catastrophic Tohoku earthquake and tsunami on March 11, 2011, which saw tsunami height up to 40.5 meters, caused the relocation of 329,000 households in the aftermath. While its scale was unprecedented, it was not the first. The same areas had been afflicted by multiple tsunamis back in 1933 and 1896.[4] In a case along the coast of Ishinomaki, a large pine forest planted for disaster mitigation purposes were cut down when a new fishing port was built in the 1970s, likely aggravating the effects of tsunami in 2011.[5] Following each disaster, lessons were learned but some were forgotten. Modern disaster mitigation has become almost synonymous with a massive infrastructural interventions in the aftermath, such as levees, embankments, or sophisticated underground drainage systems in the greater Tokyo area. In another area, seawalls that had been built prior to 2011 at 10 meters high proved to be insufficient in certain areas during the last disaster; higher seawalls were subsequently constructed, completely obliterating the view of the water from the land in many areas. [fig. 4]

While the country's vulnerability to disasters is widely recognized, half century prior to Tohoku disaster, postwar reconstruction and housing shortage had to be addressed urgently. With limited inhabitable area in Japan, as previously mentioned, ingenious solutions were called for. The Metabolism movement, from 1959-1970, was a postwar urban and architectural movement initiated by Kenzo Tange, which proposed "a radical makeover of the land."[6] The Metabolists expressed different approaches to remake the land. Faced with issues of density, high cost of land, and vulnerability to earthquakes and flooding, one solution was to extend into the sea, by extending reclaimed land into the bay. Another proposal was to create artificial ground.

The artificial ground is a kind of platform, a floor raised above the ground. Historically, Japanese houses and storage buildings were often elevated on stilts, for protection from vermin and flooding, and for maximizing ventilation in the humid climate. Shrines and temples also have raised floors, some more extreme depending on the surrounding landscape. In all cases, the floor is more than its physical functionality; it has been a source of significant cultural significance. In the Metabolism movement, the artificial ground was manifested at different scales: Examples include a single-family residence (Sky House, Kikutake Kiyonori, 1965) to large collective housing developments (Sakaide Artificial Ground, Otaka Masato, 1968-86) to extensive urban scale, in the master plans for Tokyo Bay (independently proposed by Otaka, Kurokawa, Tange and Kikutake between 1958-60).

4 Shin Aiba et al., *Tsunami no Aida, Ikirareta Mura* (Tokyo: Kajima Institute Publishing Co., Ltd., 2019).

5 Daisuke Saito, *Ishinomaki 2011–2021* (Tokyo: Grafica Henshushitsu, 2021).

6 Rem Koolhaas and Hans Ulrich Obrist et al., *Project Japan: Metabolism Talks* (Los Angeles: Taschen America LLC, 2011).

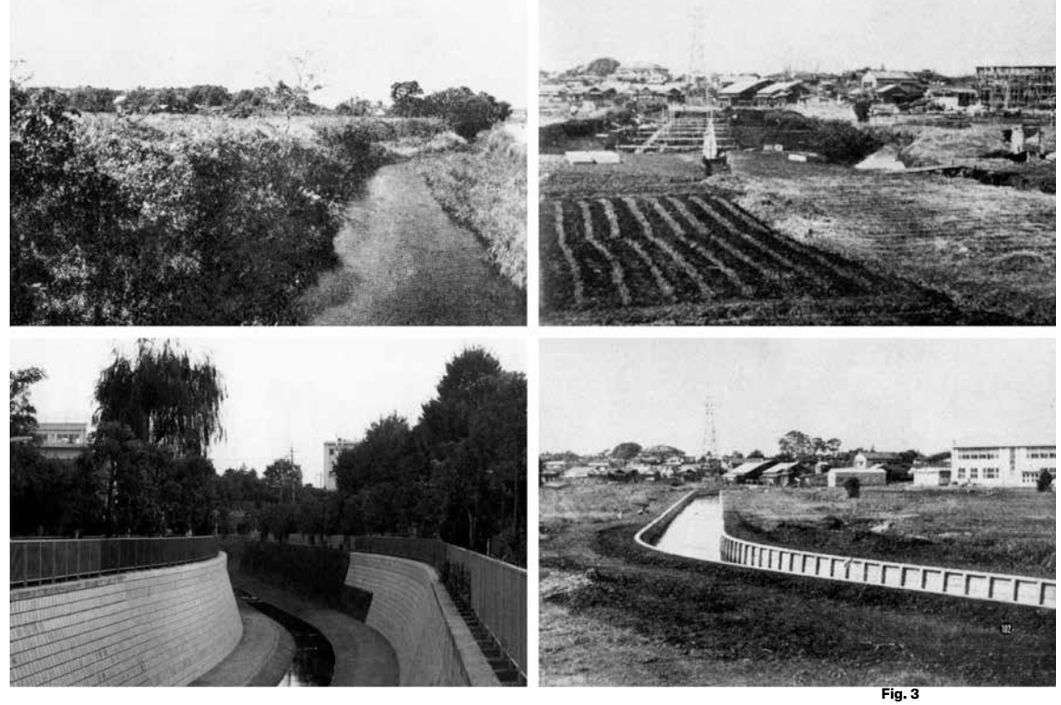

Fig. 3

Figure 3
Changes seen in the waterscape along Myoshoji River, clockwise from top left, from 1942 to 1992. In the process of urbanization, small to medium sized rivers that ran through the farmlands became increasingly distant. Source: Jinnai, Hidenobu. *Mizu no Tokyo*. Tokyo: Iwanami Shoten, 1993.

Fig. 4

Fig. 5

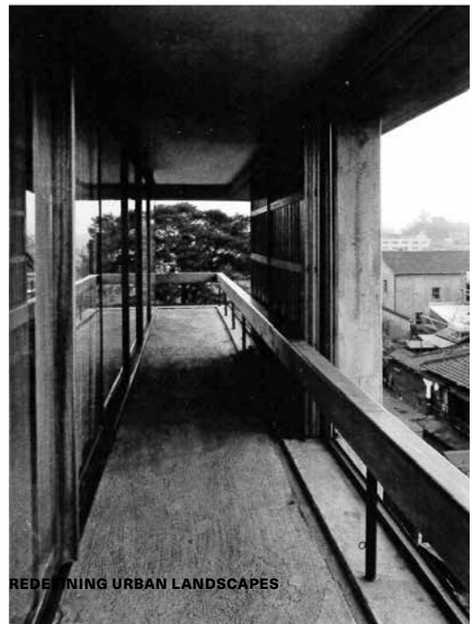

Figure 4
The damage brought by the Tohoku earthquake and tsunami in 2011 was extensive. Source: "Higashi-nihon Daishinsai 100-mai no Kiroku," https://www.jiji.com/jc/d4?p=lat216&d=d4_quake. Published March 2011.

Figure 5
Sky House, 1965, by Kikutake. A residence in Tokyo for his own family, raised 6.6 meters above ground on a site adjacent to a hill. A removable unit called "movenette" hangs below, functioning as children's room. Source: Oshima, Ken Tadashi. *Between Land and Sea*. Zurich: Lars Müller Publishers, 2016.

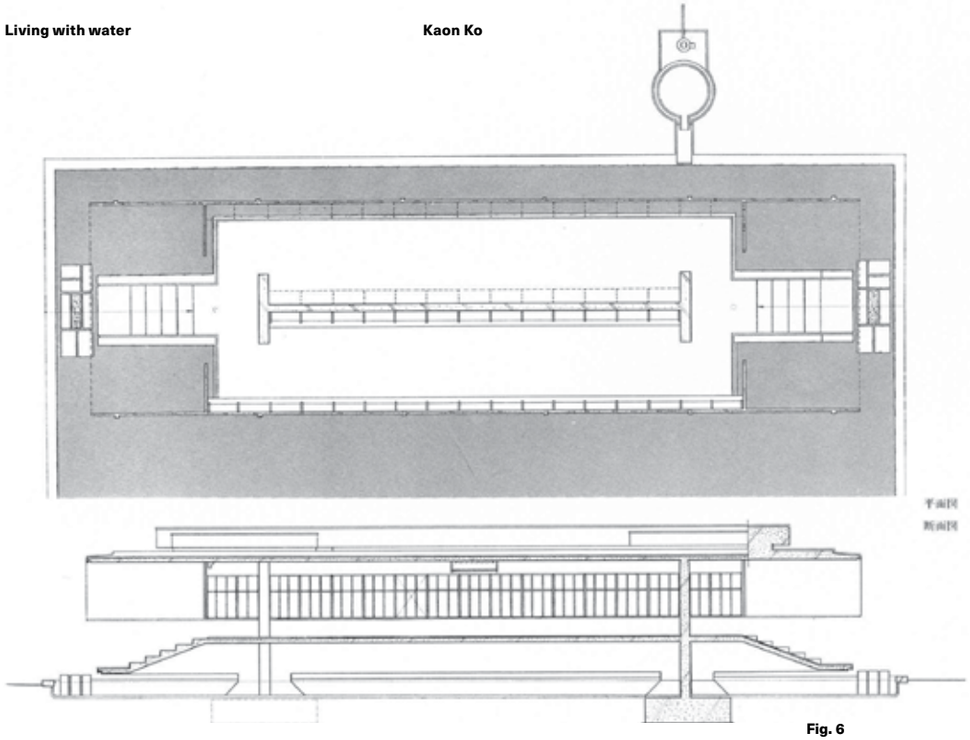

Fig. 6

One of the fascinating Metabolist figures who took on this idea of elevated structures to modern architecture is Kikutake Kiyonori (1928-2011). Born in Kurume, in southern Japan, into a family of landlords overseeing many sharecroppers, Kikutake family witnessed repeated flooding of their farm-lands. There "he witnessed how solid shrine structures made of stone could withstand floods, while temporal wooden elements could be easily replaced. Life entailed constantly adapting to the changing natural environment."[7] The experience had profound effect on him as he engaged in the ideas of floating, above the floodplain on land, but also floating on the ocean, from small residential work to large scale public projects. **[fig. 5, 6]**

The fear and joy associated with water in our lives is scaleless. From infrastructure to architecture, physical distances created between water and the people over rapid development of cities may have pushed the aspect of fear to be more heightened. It is certainly sensible that technologies have been exerted in the form of disaster mitigation to ensure further protection of people and the land, having experienced disasters repeatedly and with growing threat to cities caused by ongoing climate changes. From traditional to contemporary, as architecture always contend with ways to engage with the land, some measures taken seem rather obvious and others more radical.

7 Ken Tadashi Oshima, *Between Land and Sea* (Zurich: Lars Müller Publishers, 2016).

Figure 6
Tokuunji Temple Columbarium, 1965, by Kikutake. The floor is set about 1.3 meters above ground. Steps hanging from the raised floor do not touch the ground, and the longitudinal walls also hang from the beams. Below the entire structure is a shallow pond that distinctly isolates the living world from the afterlife. Source: Oshima, Ken Tadashi. *Between Land and Sea*. Zurich: Lars Müller Publishers, 2016.

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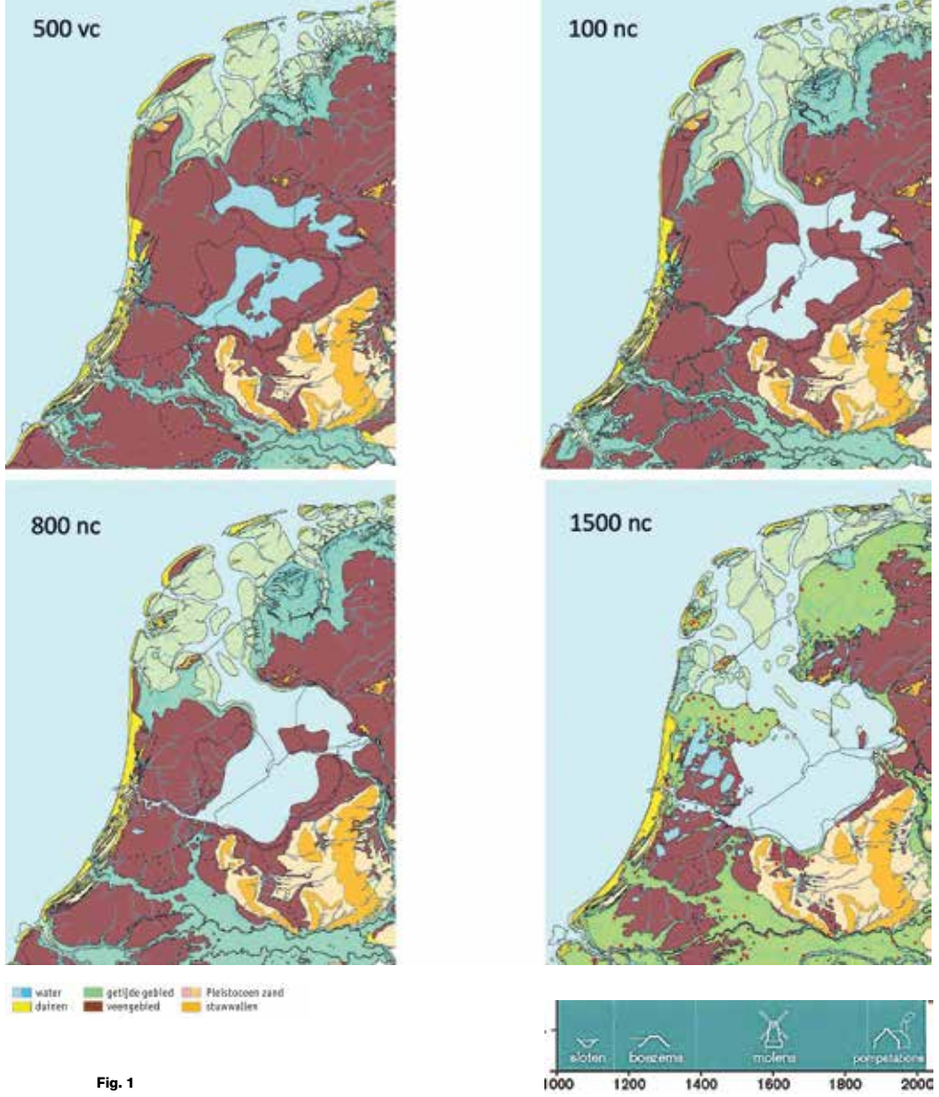


Fig. 1

Disruptions and continuities in Dutch design

Like Bijlsma
Eindhoven University of Technology

The Dutch design tradition may be characterized as a functional approach which merges landscape design and architecture. It is driven by a constant quest for innovation in form, which is the outcome of an interplay between nature, technology and human needs. This essay will focus on iconic Dutch design examples where the public sphere has been designed to create a new urban or natural identity by changing user habits or interactions. The question thus arises as to whether the Dutch approach is a contemporal one, or rather one that builds on tradition.

Initial observation suggests that this phenomenon is relatively recent, emerging around the 1990s with radical projects such as the WEST 8 design for the Schouwburgplein in Rotterdam and the MVRDV project for the World Exhibition in Hannover. However, its roots extend far beyond this period, tracing back to the Netherlands' distinctive geographical and historical context. It is firmly embedded in the country's imperative to regulate water, reclaim land, and cultivate sustainable environments.

Technology, nature and habitat

At the heart of Dutch design is the seamless integration of natural processes and technological interventions. This principle is historically rooted in the country's centuries-long struggle with water within the natural dynamics of the delta. Auke van der Woud's research[1] explains how Dutch engineering has shaped the landscape for human needs using technology in a broad sense. Technology is understood here as the application of scientific or systematic (engineering and architectural) knowledge to achieve specific objectives for the occupation of land. It includes the invention of new building materials and construction techniques, but also tools for measurement.

The technology used to create new forms of settlement has taken different forms over time. It led to major changes in the landscape, driven by urban needs. **[fig. 1]** In the Middle Ages, the technology of mound building was used – especially in Friesland, the northern part of the country – to

1 Auke van der Woud, *Het Lege Land: De Ruimtelijke Ordening van Nederland 1798–1848* (Amsterdam: Uitgeverij Atlas Contact, 1987).

Figure 1
"Dynamic Landscape: Natural Processes and Technological Artifacts Shaping Dutch Delta Inhabitation," *Deltares*.

Fig. 2

provide safe living conditions for small communities. These interventions in the landscape were accompanied by the drainage of the surrounding farmland by means of ditches. The next step in fixing the natural dynamics of the deltaic system was the creation of polders around the year 1200. These were low-lying, fertile areas that were reclaimed for agricultural use by means of boezems – a storage area for excess water in polder systems that would eventually be drained into rivers, lakes or the sea. Around 1600, the invention of the watermill made it possible to reclaim larger areas of land, leading to the iconic Dutch landscape[2] depicted by famous Dutch landscape painters in the 17th century. [fig. 2]

The creation of farmland in the polders was initiated by city authorities and driven by the large increase in the urban population. It was triggered by the excavation of peat areas around the cities for urban use. When the peat was completely removed, lakes were created with their fertile clay soils under water. These fertile soils were made suitable for agricultural use by famous 'droogmakerijen', such as the now World Heritage Beemster. The water pumped up in a polder by pumping stations or mills is temporarily stored in these boezems before it can eventually be drained into rivers, lakes or the sea.

In the 20th century some mayor changes were made in the natural system of the Delta. One was the introduction of the Afsluitdijk. [fig. 3] It was crucial for water management in the Netherlands, as it provided better flood protection and a more stable water level, which improved the drainage of

2 John Dixon Hunt, *The Dutch Garden in the Seventeenth Century* (Cambridge, MA: Harvard University Press, 1990).

Figure 2
"Fixing the Delta Stage 1: Left: *Land Reclamation from 1300*, *De Bosatlas van de Geschiedeniscanon*. Right: *A polderlandscape with a windmill*, painting by Johan Hendrik Doeleman (1848-1913).

Figure 3
"Fixing the Delta Stage 2: Afsluitdijk and Its Icons," *Canon van Flevoland*.

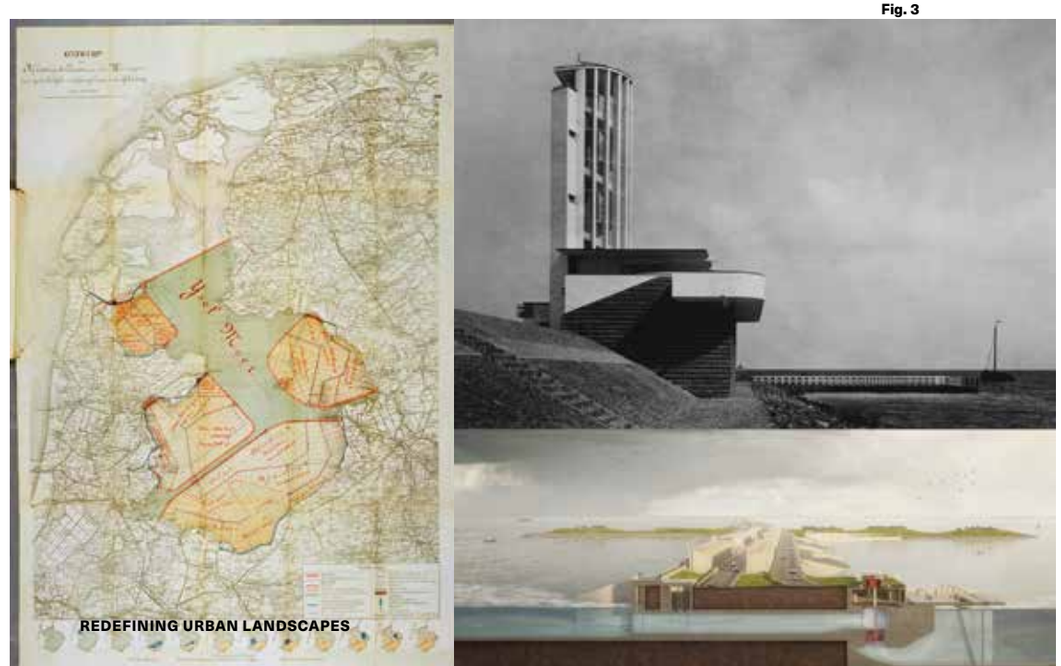
polders and the supply of drinking water. On the agricultural front, the reclamation of the new polders led to a huge expansion of fertile farmland, allowing the Netherlands to increase its agricultural production and founding its position as one of the world's leading agricultural exporters.

Another major change was the agrarian reform, which took place from the 1920s onwards. The subdivision of agricultural land on a small scale – which took place from the Middle Ages on – led to inefficiencies in production. The consolidation of rural land on a larger scale enabled the rationalization of the production process and the expansion of farms. The process resulted in the loss of natural areas, apart from a few nature reserves.

The landscape and architectural tradition that emerged from this technology was one that sought to safeguard, protect and exploit the landscape. These interventions were coupled by iconic architectural landmarks, like dykes, watermills, landscape patterns and monuments. The initiative for these interventions was initially taken by municipalities with the objective of ensuring the safety of water resources and the protection of agricultural produce. In the 20th century, major public works such as the Afsluitdijk and the IJsselmeerpolders provided the same services for the country as a whole and transformed the natural Delta into a public landscape. Monuments were created by architects and landscape architects, including the Dudok Afsluitdijk and the Zeeland Deltawerken, while new rational agricultural landscapes and villages were designed in the New Lands of the IJsselmeerpolders, like Emmeloord, Dronten and Almere.

The role of design was pivotal, exerting a profound influence on the configuration of watercourses, landscape patterns and land uses, as well as on the behavior and interaction of people who inhabited these newly

Fig. 3



created spaces. There was a strong conviction in the physical and social engineering of the environment, whereby the physical environment would impact the conduct of its inhabitants. As the design approach evolved from functional design and the segregation of functions to multifunctional and relational approaches in the 1970s, attributes such as hybridity and flexibility emerged as pivotal considerations, supported by new architectural forms and landscape technologies.

Idealistic approaches for an urban society

The discourse on the democratization of public landscapes and the emergence of national urban planning policies after the Second World War led to new approaches to landscape design. The objective was to establish innovative urban environments that could facilitate the formation of a new society, in which the values of democracy, emancipation and ecology were the central themes. This resulted in the conceptualization of new natural and human environments, facilitated by the use of experimental and artistic visual imagery, like the urban concept of New Babylon[3] by the artist Constant Nieuwenhuys and the Playgronds project of Jacoba Mulder and Aldo van Eyck in the deprived Amsterdam city center. The concept of New Nature was further developed by policymakers, who provided support for experimental projects such as the Oostvaardersplassen in the New Land of IJsselmeerpolder.

At the heart of Nieuwenhuys's New Babylon [fig. 4] was the notion of a world in which traditional social structures would dissolve, giving way to a dynamic, playful urban environment driven by creativity and human interaction. New Babylon imagined a future society of 'homo ludens', where technological advances would liberate people from labour and allow them to engage in constant creative and spatial exploration. In this utopian vision, public space – a structure which was conceived to be above the existing landscape – was not static but constantly adaptable, responding to the desires and movements of its inhabitants. The creation of human interaction was established by redefining traditional architectural tools. New Babylon radically questions the way architecture relates to the human environment, unravelling its functions (shelter, privacy, interaction) and creating new hierarchies (human interaction). The perception of space is not guided by traditional architectural elements such as walls and constructions, but by the use of new architectural means (light, reflection, transparency) in a theatrical and dynamic setting.

3 Constant Nieuwenhuys, introduction to *New Babylon: Exhibition Catalogue* (Den Haag: Gemeentemuseum, 1974).

Fig. 4

Figure 4
"Constant, *New Babylon* (1959-1974): A New Architecture of Senses," *Gemeentemuseum Den Haag*.

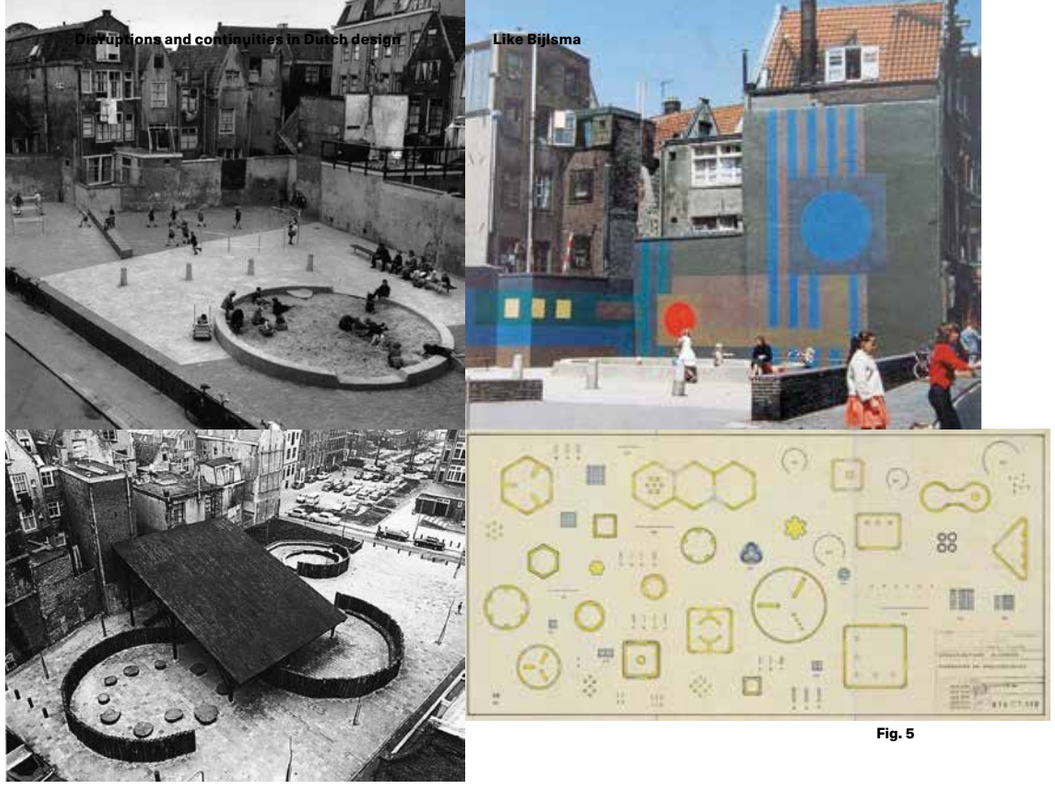


Fig. 5

The Playgrounds project by Jacoba Mulder and Aldo van Eyck has a similar conceptual basis. It is rooted in the belief that public space should encourage creativity, freedom and interaction. Although the project differs in scale and scope from New Babylon – which is a speculative, utopian vision of a global urban system – the tangible, local Playgrounds interventions reflect complementary ideas about the role of public space in supporting human agency and play.

Rejecting the modernist notion of rigid, functional urban planning, Van Eyck instead created playgrounds designed for a variety of users: children, parents and passers-by. He did this by introducing a series of abstract forms into an existing situation, such as benches, climbing frames, sandpits and low walls, which could be used in different ways by different users. He also used canopies and color to create specific 'spaces' within the existing

Figure 5
"Mulder and Van Eyck, *Playgrounds* (1955): Architecture of Social Interaction," *Gemeente Amsterdam*.

Fig. 6

urban fabric. Van Eyck saw play as a fundamental human need and designed spaces that allowed users to shape their environment and interact creatively with others. In this project, Van Eyck sought to redefine public space as something that should be adaptive and user-driven, emphasizing the potential of individuals to shape their environment rather than conform to pre-defined uses or behaviors. [fig. 5]

In the same period, another concept came up which also questioned the modern functionalist approach, although from another perspective. The concept of 'New Nature' was being developed by practitioners in urban planning and ecological landscape management. It was a design philosophy that advocates the integration of natural processes into man-made environments. [fig. 6] It led to the creation of natural parks that were not managed by humans, to allow autonomous ecological processes to form new 'authentic ecological' landscapes within the controlled Dutch Delta land and water management system. In these New Natures, the boundaries between human intervention and environmental adaptation are blurred, creating public spaces that can change in response to both natural processes and human desires. One of the first examples is the nature reserve 'Oostvaardersplassen', which was created on a site in the New Land of the IJsselmeerpolders that was originally zoned as an industrial area.

Design aspects included, apart from landscape and water management, the introduction of 'probable' authentic indigenous species, which would form a balanced ecosystem and would in itself be able to maintain the area -avoiding any human intervention. For that reason, specific grazers

Figure 6
"New Nature: From Parks (1970) to Landscape Corridors (1990)," *WUR*.

were introduced, who would be able to perform maintenance jobs, such as Shetland horses and Galloway cattle.

While these projects may appear to be disparate, they share a common thread: an experimental approach that challenges traditional boundaries and offers new insights into the relationship between humans, the environment, and society. The projects serve as experimental platforms for novel concepts, spanning from nature and ecology to society and urbanism. They challenge conventional paradigms and emphasize the notion of liberation from traditional constraints. This is exemplified by the freedom of nature to evolve unhindered in Oostvaardersplassen, and the autonomy of individuals to shape their urban environments and social roles in New Babylon and the Playgrounds of van Eyck.[4] All these projects prioritize self-determination and autonomy in how systems function, whether ecological or societal.

4 Liliane Lefaivre and Alexander Tzonis, *Aldo van Eyck, Humanist Rebel* (Rotterdam: 010 Uitgevers, 1999).

Conceptual approaches in the nineties

The 'Superdutch' projects from the 1990s introduced a new perspective to the integrated Dutch design tradition by featuring iconic images on the front. These projects signal a shift towards conceptualism in Dutch design. New narratives are introduced to explore social, cultural and environmental issues, transforming urban spaces into conceptual artworks that stimulate thought and discussion. This shift towards conceptualism results in design where ideas take precedence over form.

By pushing the boundaries of formal conventions and incorporating cultural and social commentary into designs, urban environments gain a reflective layer of political concerns, as in MVRDV's World Expo project (2000). In this building – an exhibition on Dutch landscapes – the physical stratification of the landscape is arranged in a different order. Remarkably, the polders – which are physically the lowest areas of the country – are placed on top of the building, expressing the supremacy of political forces (and the typically Dutch political process of 'poldering') over natural ones.

Furthermore, the MVRDV project, entitled 'The Mountain' (2021), represents a conceptualization of contemporary thoughts on the public landscape, achieved through the monumentalization of the design. The design can be seen as a literal architectural interpretation of Patrick Geddes' 'valley section', adapted to meet the needs of contemporary urban environments in terms of walkability, sociability, mixed-use and ecology. **[fig. 7]**

Another example of Dutch conceptualism can be seen in the work of WEST 8, including the Rotterdam Schouwburgplein project (1997) and the

Fig. 7

Figure 7
MVRDV, Left: "Dutch Pavilion, World Exhibition, 2000," Right: "The Valley Residential Complex, 2021," "Creation of Public Landscape Icons Displaying Political Concepts," *MVRDV*.

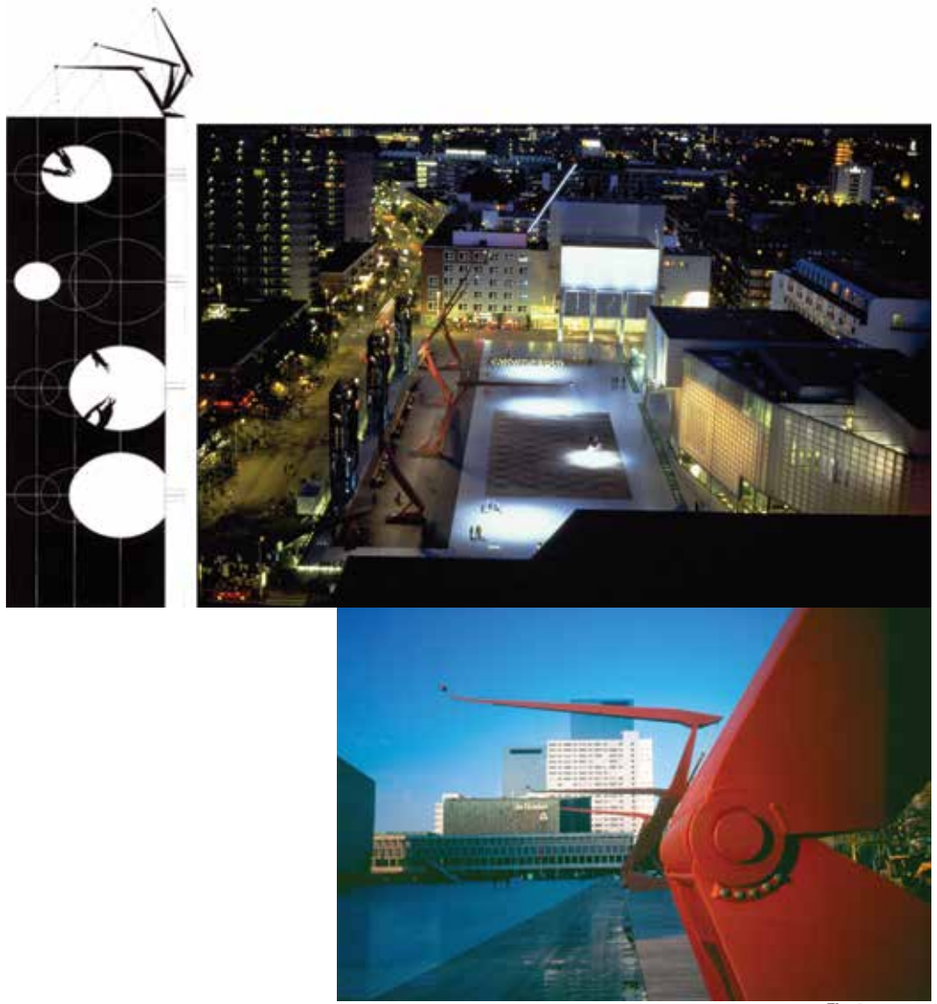


Fig. 8

Figure 8
WEST 8, "Schouwburgplein Rotterdam: A Stage for the City, 1997," "Creation of Public Landscape Interaction with Architectural Elements," *WEST 8*.

Highway Habitat (1995) for the Deltaworks. [fig. 8] The new urban narratives introduced here are directly translated into formal tools for engaging in public space, creating human or non-human interaction, and thus reshaping how architecture and urban spaces are experienced and understood. However, there are instances where the concept and narrative of these spaces, which emphasize community engagement, interaction, and flexibility in use, do not align with their actual, everyday functioning.

Conclusion

This essay focuses on iconic Dutch design projects, concepts and experiments where the public sphere - the space where the interplay between natural processes, technology and human needs gets its specific form- has been designed to create a new urban or natural identity. The discussed examples show us that the concepts behind the designs play with the reshaping, re combining or re arrangement of the elements. The Dutch approach is both modern and traditional – contemporal in form, by radically changing forms and habits, but at the same time traditional because it builds on disciplinary traditions and implementation practices. The blurring of borders between architecture, urban planning and landscape constantly takes its specific form in reacting to contemporary challenges. The innovative character is coupled with a narrative that challenges established traditions, conventional urban and architectural forms, and ingrained habits.

In the Netherlands, the landscape is not just a natural or functional space, but it is an embodiment of cultural identity, and thus a public space. The reclamation of land from the sea, the management of waterways, and the careful planning of urban environments all reflects a collective narrative of human resilience and ingenuity[5]. This tradition extends into the present day, where design continues to reflect contemporary values, mostly related to urban policies. The public landscape is seen as a living entity, a part of the national heritage that is continually shaped and reshaped by contemporary needs.

5 Deltares, BoschSlabbers, and Sweco, *Op Waterbasis: Grenzen aan de Maakbaarheid van ons Water- en Bodemsysteem* (Delft: Deltares, 2021).

Like Bijlsma studied geography and architecture. She is the co-founder of SUBoffice architects and works currently as a researcher at the PBL Netherlands Environmental Assessment Agency and as a graduation tutor at the Eindhoven University of Technology. She is a specialist in relating dwelling typologies to urban cultures and policies. She carried out studies on Dutch New Towns, Delta Cities and 1970s Heritage. She was editor of the architectural review *OASE* and *ROOILIJN* and is now in the editorial board of *FORUM*. In 2013 she was a guest professor at the Munich University of Applied Sciences and she is a regular guest critic at the DIA at Dessau in Germany. In 2017 she won the Rotterdam Architecture Prize and in 2019 she was member of the jury of Europan, a housing competition for young European architects.

The landscape has (and as) a consequence

Daniela Colafranceschi
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The theme of this BIP and the reasons for our Workshop

The thematic proposed by this workshop "Hybrid Landscapes" expresses three levels – in terms of scale and concept – of criticality, strongly in emergency because of the catastrophic events of 2023 in these areas.

Three levels that my discipline, landscape architecture, intercepts and crosses transversally, according to a distinct and complementary adhesion to each of them: the level of the city, the landscape level and the level of the dwelling.

The level of the city is the one where the waterproofing of the soil, the constriction of banks or the covering of rivers, enhances the violence of the water.

We must improve the management capacity of rivers in cities, their banks and everything that is an obstacle to water; improve the ability of urban areas to absorb and drain water, with soils that are permeable. We often talk about the sponge city, the porosity of the city, and so on.

The landscape level, where at distinct scales and within an ecological thought of waterways we must move towards an adaptive development of territories; generate far-sighted landscapes from an ecological, social and cultural point of view.

Landscape architecture is the practice of parsimony and regeneration, even for extreme scenarios, past, present or future.

The level of the dwelling, as the most direct, the domestic one, because we are affected by it as people, as persons, as bodies; it is the most intimate level, the one closest to us, the one that touches us the most. As much as we are the cause, it represents the hardest consequence to face. And especially, It's the most tangible problem because it is an expression of intangible values.

Therefore, above all these three levels is water. The floods, the storm, the destruction.

As in other similar geographical areas, in the alteration of an environmental condition, drastic and congenital situations arise; both in a broader sense, referring to the scarcity of available resources whatever they may be, to marginality, to the poverty of contexts – present or consequent – which determine new, different, sometimes unforeseen if not unpredictable situations, which now characterizes our Mediterranean area.

We are here to investigate how especially the RELATIONAL design thinking can cross all these conditions.

As we well know, we live constantly in a state of relationship, which structures our life and our contexts. We know that the city is made up of systems, networks, lines, in relation to each other; that architecture works when it generates a relationship with its context; that the landscape is a relationship between territory, society, culture; that our living is living within the relationships between us and others, between us and everything else.

Water as identity

The landscape is the result of the interaction between man and nature, it is the history of this interaction and the result of the culture that has stratified within it.

Water is the history of our territory; water is its writing, its culture, its face.

It is the element that has conditioned and characterized the evolution of territories in their urban, rural, coastal, river, mountain, hilly character, designing the physiognomy of the territory, well beyond a soil dimension. It has determined the construction of spaces, habitats, functional, morphological, social complexities and cultural identities.

A landscape also designed by the shaping or destroying action of men.

An identity heritage – that of water – where there is no difference between physical space and liquid space.

Its character, its representation of our needs, its presence in every form of life in the world, is never the same; it is never a monotonous repetition that cyclically manifests itself according to obvious predictability. On the contrary, water presents its functions to us according to articulations and models which in their flow and reflux give rise to different geographies and histories which shape and modify – depending on the territory and times it inhabits – the interactions with other physical and historical factors.

Perception, memory, symbol, emotional values and belonging make water a place.

Therefore, water gives place, and it is precisely the case to say it: it gives place, it generates place, water is a place.

An element that has a transversal and unifying value, but also a marker of distinctions and multiplicity.

Although catastrophic events make water a destructive force of places, they generate landscapes that we must transform into new places. Again and again, constantly.

Water as destruction: absent or excessive

Over the last two years, in the conferences of my Scientific Society we have dealt first with the theme of Arid, then with that of Water. Topics that seem to address opposing values; compared to the water that "isn't there", the water that "is there" seems to refer to the other side of the coin.

And yet it is the same side of the same coin. 'The water that is missing and the water that abounds' measure in the contemporary world a phenomenology of water that continues to be transversal in its involvement in our lives and our interaction with it. As short-sighted and harmful people or as responsible and conscious 'friends'.

It is the same problem, the same challenge for landscape design.

Even in these destructive phenomena due to storms and floods, landscape architecture is called upon to interpret and decode those characters and values of transversality and difference, of anomaly and emergency, to activate a reversal strategy which converts the project from criticality into the opportunity to take on a condition, to offer a new possible dimension as the result of (and starting from) a transformation.

Because current phenomena, – the slow ones, the dramatically imminent ones, the sudden and devastating ones, – are conditions where a pact between us and the water is broken, modified, and where we are, in most cases, the cause of an alteration of balance. We are the authors of a change of equilibrium, of an alteration of this relationship; a relationship – the one with water – that is never obvious or taken for granted.

Phenomena, processes, which require a continuous 'reset' of the landscape project which from time to time relies on transformative attitudes that should be able to interpret and anticipate the new conditions of reality within a far-sighted projection. Therefore, a constant learning to transform, to be able to respond according to 'an equal and opposite force' to the many questions, – I would like to say – to the great 'thirst for design' of our landscapes. The project responds to the explosive force of the transformations underway with the strength of its new syntax. It is in this sense that our projects are expressions of research methodologies.

The Landscape consequently

We, therefore, ask ourselves how and what '*forward-looking landscapes'* can be in this sense.

Landscape architecture is called to understand, interpret, decode those characters and values of 'difference', of anomaly, of emergency, and of neuralgia for which the project is converted into a creation and valorization mechanism with minimal economies. It becomes a strategy for turning critical issues into opportunities, which in assuming a condition offers a new possible dimension as the result of a modification that becomes a new starting point.

The landscape project triggers and engages a strategy of regeneration, of sustenance, which is completely new, starting from a new condition that reality presents to us.

Because it is true that floods and inundations, in addition to characterizing certain geographical dimensions, are also an ongoing environmental phenomenon of which we are the cause, authors, accomplices.

And it is also true that if we probably are little able to prevent and intervene in their causes, we can certainly intervene in their effects.

Landscape design as negotiation

The damage and catastrophes resulting from these facts can be addressed as opportunities: I believe that it is not important what we see in these dimensions, but how we see them! Or at least, be able to see them in another way.

Being here in Volos, knowing the consequences of the floods suffered in 2023, teaches us and forces us to know how to see, read, and interpret these realities, these contexts. It's like wearing the right glasses to be able to look at them, which means including them, compensating them, reinserting them into a discourse, an imaginary, a conferring of meaning, returning them to a system of relationships, to a network of meaning, to give it back a landscape identity.

It is in this sense that these landscapes are not spaces of silence, but precisely eloquent landscapes, far-sighted landscapes.

It is therefore a question of understanding the phenomena of flooding and inundation linked to water as a key with which to interpret fragile and at-risk landscapes, in the most varied meanings, and of verifying how

landscape architecture can be a practice of parsimony and regeneration, also for extreme scenarios, past, present or future.

The need for an ever-new balance on the part of the landscape project, an equilibrium which is underlined in a sense of strengthening and emergency with the term of 'negotiation'.

> The negotiation between the landscape project and water and its excesses of aridity alternating with floods that characterize the new course of the climate also in the territories of Western and Central Europe, needs new agreements and effective solutions that are capable of create the conditions for a renewed peaceful coexistence, now lost, between man and Nature, both in the spaces of the agricultural countryside and, as we will see, in those of the cities.[1]

1 Maria Livia Olivetti, "Arido: Projects and Actions for Far-Sighted Landscapes," *IASLA* 17.

I expressed the 'RELATIONAL' value because we know that the first thing that the new eyeglasses make clear to us is to ask ourselves which models of a relational quality can work for the purposes of the landscape project.

Tim Ingold in his books like 'Correspondences' or 'Lines' expresses well the concept that *the difference, if we want, is not how much you know, but how well you know. Who is in possession of knowledge and can tell, in the sense not only of being able to narrate stories of the world, but also of having a perceptive awareness finely tempered of what surrounds him.*

Among the latest issues of Ri-Vista, the most important one in Italy for my discipline, there is the one entitled *'Co-evolution'*. A term that invites us to place the relationship between elements, concepts and materials in an equal and symbiotic relationship.

> It is a question, once again, of recognizing one of the constitutive oppositions of modern scientific thought, that between 'relationships and elements', which inexorably divides those who deal with the 'bricks of matter' using the tools of measurement and quantification, from those who it asks – starting from the study of form – what the patterns are, the characters of order, organization, relationships, producing maps.[2]

2 Lucina Caravaggi, "Co-Evolution," *RiVista*, no. 2 (2023).

A concept that invites us to use and be aware of this suffix 'Co' understood as relationships, connections, bonds, which extends the meaning to a direct, intimate relationships that involve our body as well as our reasons and feelings.

An invitation to overcome, to break that binary system with which we have formed our way of thinking, and which has put us and constantly puts us before the dualisms 'man-nature', 'nature-culture' 'natural-anthropic'... also 'society and environment'

We should try to think about them as single, unitary concepts.

'Nature-culture', for example, finds within 'Landscape' a maximum common denominator (and not a minimum multiple), precisely because it is a concept - that of landscape - which helps us to understand and understand the Earth: the phenomena, the changes, the challenges. It is a code, in common with the two terms that qualify the project.

We must get out of a system of dualisms to interpret the dimension of contemporary landscape.

Addressing these problems separately simply means not treating them.

An attitude of co-evolution feeds the project culture.

Here, therefore, is the need for an equilibrium that this workshop hopes for.

Disciplinary contamination as a necessary hybridization as a model of progress.

Fuel curiosity, increase one's sensitivity, one's conscience, with respect to the themes and topics that the environmental condition presents to us.

To this dimension of patterns and networks in relation to the landscape project, in addition to the value of Ecology, the dimension of Time is added, as an entity that adds another level of dynamism, in the imagination of landscapes and its design interpretations. A further level of action and feedback that influence the attitude to consider projects.

As Christophe Girot says:

> LANDING: Landing is the first act of site acknowledgment, and it marks the beginning of the odyssey of the project. Landing usually invokes displacement and change of speed (as in arrival), but it also conveys the idea of touching ground and reaching for the confines of an unknown world. It describes the specific moment when a designer still does not know anything about a place and yet is prepared to embark on a lengthy process of discovery. Landing therefore, invokes the passage from the unknown to the known, from the vastness of the outside world to the more exact boundaries of a specific project.[3]

3 Christophe Girot, "Four Trace Concepts in Landscape Architecture," in *Recovering Landscape*, ed. James Corner (1999).

Fig. 1-5

Figure 1-5
Atelier Descombes Rampini + Superpositions, "The Renaturation of the Aire River in Geneva," Landezine Award. Source: https://landezine-award.com/atelier-descombes-rampini/.

Dealing with the long times of mutations involves the exit of projects from predetermined temporal and spatial formats to enter elastic dimensions capable of dealing with large climatic transformations and their consequences in profoundly different time frames.

To this and above all, there are climate changes, events, and modifications in assets to which the project must respond, according to continuous and new negotiation.

Reconcile imbalances, operate a co-transformation between environmental elements and participatory architecture choices, for shared projects across rural, agricultural and urban landscapes. The landscape as the system of interacting ecosystems, which co-evolve at different scales and guides the work of the landscape architect.

And in this sense, our gaze educated in the perception and reading of totality takes relational thinking as its cornerstone in the awareness of a cancellation of edges and the consequent awareness of a unity of times and spaces that is hybrid, complex, inclusive, mixed. It recomposes the stories of places within a landscape narrative that is unique and unitary.

The landscape is always interrelationship in its cultural, social and anthropological impact. It declines its being a material and intangible heritage by representing a never fixed and stable statute of 'space and society'. In this sense it is its own meaning of 'place'.

An example

It may be useful for what has been expressed in this text, to present the case study of the Renaturation of the Aire River in Geneva. A project designed by the Atelier Descombes Rampini+Superposition in 2015, which is very eloquent, emblematic and effective in its process of building a new landscape starting from a previous one that was already there. The new proposal succeeds in the objective and gives us a magnificent and surprising landscape. **[fig. 1-5]**

> The Aire River flows through valleys historically devoted to farming. From the late 19th century it was progressively canalized. In 2001 State of Geneva opened a competition with the idea of restoring the river to its original shape by destroying the canal. We instead proposed combining the canal with a vast divagation space for the river. In the process the canal becomes the pointer for the transformations, a reference line giving the possibility to understand the before and after. A becoming which superimposes both situations.

Well, this Workshop invites us to enter and reflect on this dimension.

We will do it as a privileged observatory, through experiences, proposals, projects, research, which will develop our universities.

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From 2007 to 2012, she is Head of International Relations and Erasmus activities, (Faculty of Architecture and then Departments OASI and DARTE of UNIRC). From 2011 to 2017, Coordinator of the PhD course in 'Architecture of Parks, Gardens and Regional Planning – where she has been professor since 1998 and since 2013, she is Professor Member for the PhD in 'Landscape and Environment' – La Sapienza University, Rome.
She is Member of the Scientific Committees of many European and International Masters and Institutions. Primary focus of her research is the landscape design, at different levels and scales, from the urban exterior to the territorial interventions, especially aimed at the Mediterranean area and their specific issues and complexities.
Among her initiatives, she was Director for the European Project: Changing Landscapes: Mediterranean Sensitive Areas Design (2008-2011) supported by EU funding (IT2 ERA10 code) in which was involved also the UTH of Volos.

W(h)at (the matt)er? Organic elements for responsible questions

Jean Marie Beslou
École Nationale Supérieure
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One of the questions during this workshop could have been, "what the matter with the water?"

Facing water as an organic element which makes us alive and also remains wild and non-controllable, how could we be responsible? What is the human place and of course, what the architect's behavior should be?

The city, the landscape, the dwelling

This workshop makes us reflect about the place that the water takes back in the city, on the human-made landscape or in front of the dwelling. How to consider the place of nature in relation to human beings. Why do we insist on dominating water when we observe that the water takes its natural place over the human-made "constructions" like cities, complex buildings or simple houses? How these constructions depend on their environment, be it natural or not.

The river, the lake, the sea

Considering the three situations that we analyzed, perhaps it could be intriguing to consider the problem from the elements point of view rather than from the human one.

How could the problem be understood within the context of the natural considerations of Pineios river of Larissa, Lake Karla and the sea at Micro village. How strong are these kinds of waters in facing the unnatural structures.

The line, the point, the surface

We could also investigate a kind of synthetic lecture with the human hand drawing sketches: the line, the point and the surface.

And how it could be explained by Kandinsky's reflection on his book "the point, the line and the surface", written in 1926. The river could be the line, the lake, the point and the sea the surface. With those three themes nature and art are crossing themselves over human thinking. Without giving any answers, or solutions, isn't it interesting to mix the interdisciplinary lectures? Giving internal rules to get a free formal game.

The good, the bad & the ugly

Going further in the human cultural way, movies can also help us to understand as well as possible the basic beings, whatever their nature.

How the element of water is presented as a reacting human personality who express, explain its fight rights as nature. That's why, we could refer, beyond a kind of Saint Trinity, to the Sergio Leones movie 'The good, the bad and the ugly". Nothing is perfect, but we need each other to realize the natural way. In this workshop, to what do we refer as good, bad and ugly?

BLACK, WHITE & in-between

It is like considering the duality of black and white, with a thin touch of something unreal in the middle. What could be in between those two non-colors, those extremes?

Malevitch / Soulages

As well as the lecture of the Kasimir Malevitch "White square on white back", 1918, which goes further than the academic way of the understanding color structure, where the white is more than white. Or as the work of Pierre Soulages around the black notion and his "outre-noir", meaning perhaps "more than black", "over-black", or perhaps better "inner-black". There is something more in the color than the color itself.

Kandinsky

And what happens when you are over or in the natural element? Does it mean that the human being looks forward to its human health, its natural safety? The messages of a necessity of freedom or subliminal messages? Like Kandinsky's "Auf Weiss" painting realized in 1923, and its probably word game with the Ausweiss notion because of the beginning of a new "dark" regime at this period?

Wright

Perhaps it could be also about the double personality of Frank Lloyd Wright, whom some says he was wrong. Or not so right; was he more left?

Fig. 1

Everybody needs to say good, bad or ugly words about others, as if they were like Dr Jekyll and Mr. Hyde. And the spectators are in between. Does it mean humanity is in-between dark and light?

For some cultures and religions, the sky, the earth & the human compose a trinity, the human standing on the earth and under the sky.

But what about the place of the water? In those three parts (sky, earth, human) stay water: 13000km3 in the atmosphere, 1,4 Millard's km3 on the earth, it means 71% of the globe surface, and 45 liters constituting a man of 70kg, 65% of its body.

Water is a nutritive and vital element, but also a dangerous factor for humans.

Calm, dynamic, impetuous, stormy and vaporous, water has many personalities.

The man use and play with the different properties of the water: because of the 98% salted water on the earth, we harvest salt [fig. 1] because of its strongness, we transform it in energy as in the case of Barrage de la Rance at Saint Malo [fig. 2, 3] because of the floatability we use it for some transportation (Titanic, which has been sinked by solid water), because of its energetic composition we use it for the culture and health...

Figure 1
Marais Salant de Guérande, France.

Figure 2
Barrage de la Rance at Saint Malo.

Figure 3
Barrage de la Rance at Saint Malo. The dam fills with water during tide and produces energy as it leaves during low tide.

Fig. 2

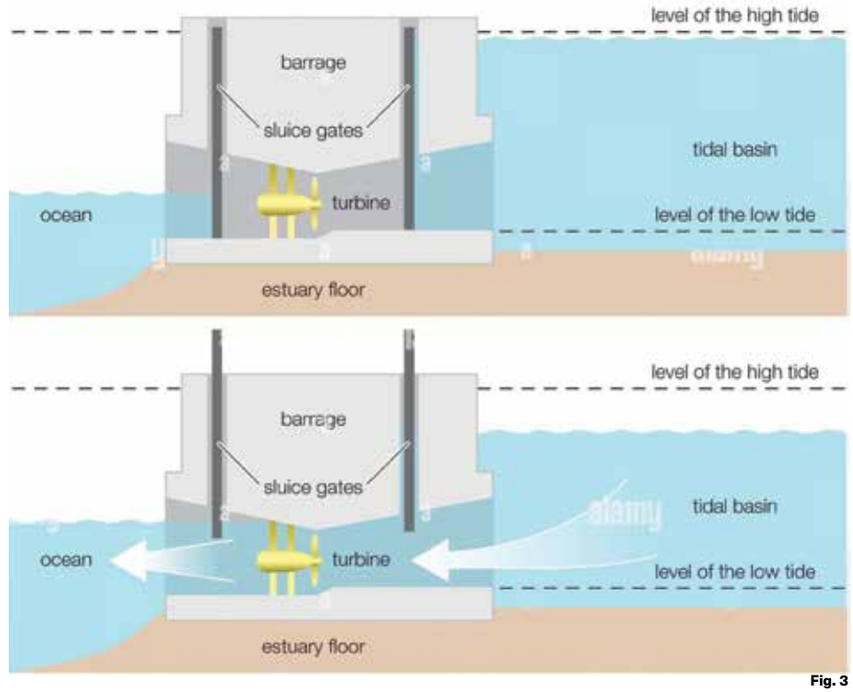


Fig. 3

Fig. 4

The water is also used until the mythologies, about disappeared cities like Atlantide or Utopia (Thomas More), as well as for Narcisse and the possibility of mirroring and loving his self. And we also have a water mirror in front of our Castle in Nantes. This kind of water mirror makes us think about how society makes cities narcissistic.

In France, the lake de Guerlédan, in Bretagne [fig. 4] is an artificial one, which was emptied in 2015 for maintenance. It was drained and offered the possibility to discover a part of the past. Ancient ruins re-appeared for three months.

The force of the water on the fire, like the element games which are sometimes domineering or breeder. As presented by the Chinese philosophy, earth breed metal, which breeds water, which breeds wood, which breed fire, which breed earth. Earth dominates water, which dominates fire, which dominates metal, which dominates wood, and which dominates earth. A natural circle with natural materials.

So does Hokusai explain the water dominating the fire in his painting "the Kanagawa big wave," 1830. This wave flows over the Fuji Mountain volcano which is the representation of the fire. [fig. 5]

Figure 4
Lake de Guerlédan, France. Canal locks submersed in the lake when constructed in the 30ies, are revealed in 2015 after the lake was temporarily drained for repairs.

Figure 5
Hokusai, *The Kanagawa big wave*, 1830.

Figure 6
Lebbeus Woods, *Quake City, from San Francisco: Inhabiting the Quake*, 1995.

Figure 7
Claude Parent, *Les Vagues,* 1965.

From Hokusais wave to Lebbeus Woods ones, "The San Francisco Project, Inhabiting the Quake, Quake city"; 1995, there is not so many distances. A dominating event on a natural element. [fig. 6]

The waves of Claude Parent, designed in 1969, also explain certainly the same meaning of the necessity to propose fluent spaces to live. Fluidity as construction (with fluid concrete), views in landscapes and skylines which are given more rounding ambiances. [fig. 7]

An un-ending universe for infinite situations, continuously between earth and sky.

This relationship between sky and earth is diffuse, the Hokusai's painting "Fugaku Sanjurokkei: Gaifu Kaisei", 1833, shows us two mountains, one blue (the sky) which descends, it goes down, and the other, red (the volcano), which rises. The limit is tenuous and make echoes to the work of Mark Rothko.

Those paintings remind me of a sky picture, photographed by Mickaël Auvret, from the swimming pool of Saint Malo which has been built in 1936, at the beginning of the paid leaves. A concrete enclosure retaining sea water which fills at high tide and offers the possibility of swimming near the beach during low tide. [fig. 8] The tide difference reaching 13 meters during strong coefficients in this part of the French coast.

Between earth and sea

So, the containing water need a particular structure, as well for the "Mégabassines" in France which are given a kind of uncertainly image of the water control.

Fig. 5

Fig. 6

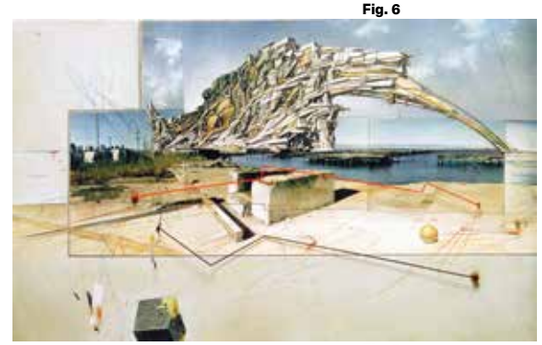
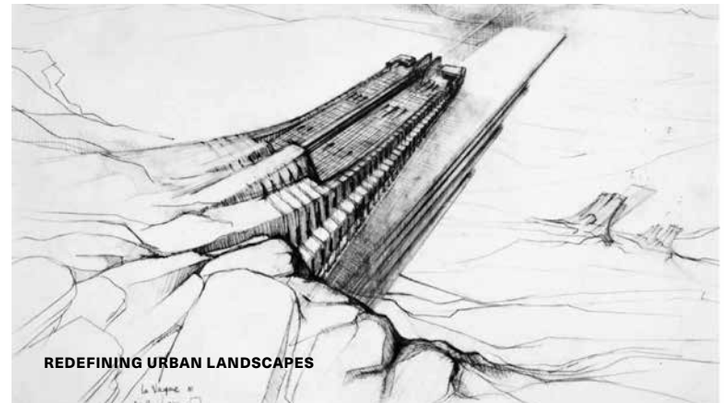


Fig. 7



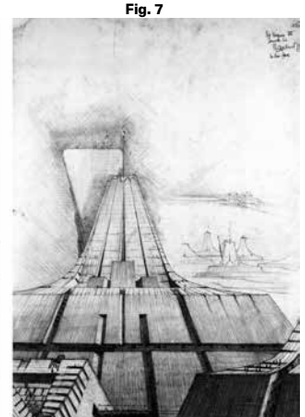


Fig. 8

Figure 8
Piscine de Mer St Malo, photographs taken by Mickaël Auvret, 2023.

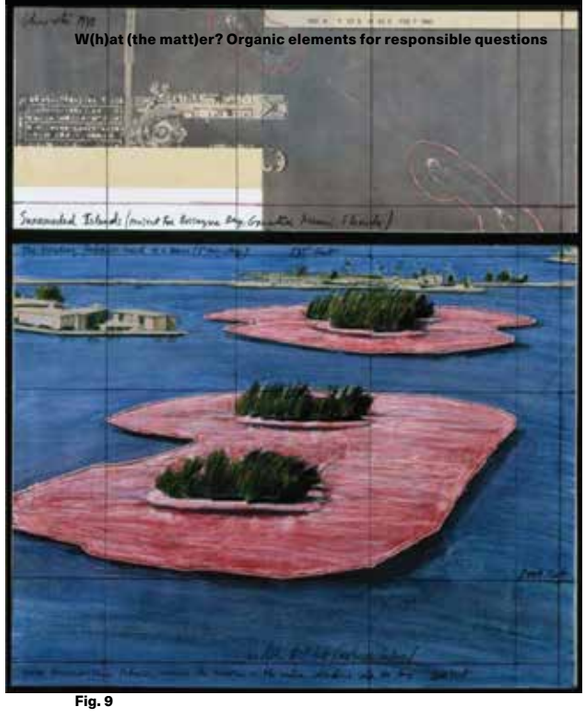


Fig. 9

Fig. 10

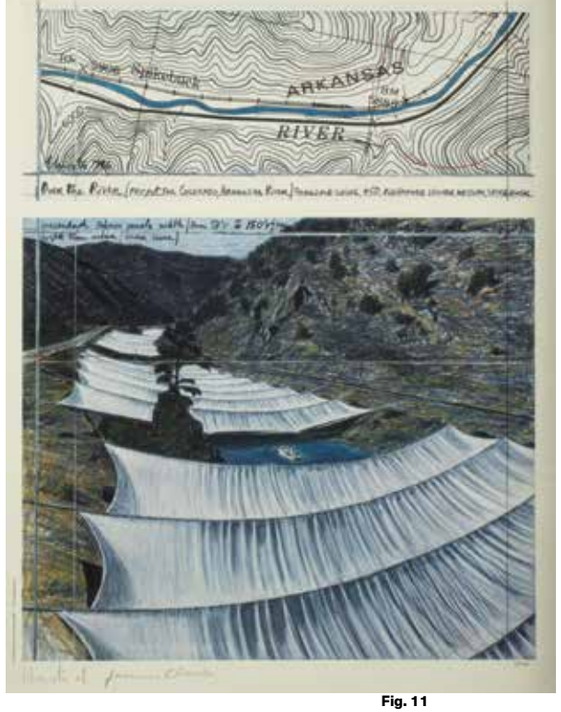


Fig. 11

Conversely, the encircled islands of Miami created by Christo symbolize another kind of limit between land and sea. Marked by pink rings, the islands further display the punctuation they offer on the bay of Miami. [fig. 9]

It depends on the point of view; where from do you place the spectator. Thus, in the works of artists Tadashi Kawamata and Christo & Jeann-Claude, "Under the water", 2016 [fig. 10] and "Over the River", 1992 [fig. 11] express the incessant questioning of the real place of water and its preservation. What it means depends on whether its user is placed above or below.

BIP's and then "Under water"

During the three previous BIPs we explored the question of organic architecture on the basis of fundamentals such as the elements which constitute our environment. From earth to fire, we then studyied water and its place in general but especially in its relationship to architecture. From the Free University of Berlin to the Bauhaus movement, the water is questioned on Greek territory. Are we able to make a sensible synthesis on such a vast subject? Suffice to say that we are underwater and that our questions overwhelm us.

Perhaps this is the attitude to have: knowing how to let yourself be carried by the elements and accept their nature rather than trying to tame them. Water itself does not seek to tame, it adapts, forms itself in contexts, interferes and always ends up finding its place.

One of the options is perhaps to follow the Bruce Lee advice, and trying to feel as near as possible what water can be and can bring.

"Empty your mind, be formless, shapeless, like water. If you put water into a cup, it becomes the cup. You put water into a bottle, and it becomes the bottle. You put it in a teapot it becomes the teapot. Now, water can flow, or it can crash. Be water my friend."

Jean-Marie Beslou is an architect and Maître de Conférence at École Nationale Supérieure d'Architecture de Nantes. He is a practicing architect in in his own practice Beslou Architecte.

Figure 9
Christo & Jeanne Claude,
Surrounded island, Miami, 1982

Figure 10
Kawamata, *Under the water*,
Centre Pompidou, Metz, 2016

Figure 11
Christo & Jeanne Claude,
Over the river, Arkansas river,
Colorado, 1992.

Fig. 1

Fig. 2

Fig.3

Organic Architecture and Elementary Design

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The *Great Wave of Kanagawa*, the most famous print of Hokusai (1760-1849) and the first in his series *Thirty-six Views of Mount Fuji* is probably also one of the most famous artistic depictions of water. [fig. 1] What we see is water as an elemental force and some tiny human beings, fishermen in three fragile boats of the Oshiokuri-bune type. But we do not only see water and the fishermen fulfilling their inescapably existential confrontation with *The Great Wave*; we also see, far in the distance, as if we were looking through a telescope formed by the wave, the Mount Fuji, with its other, but hidden, elemental force of the fire, metaphorically under control of the same great wave that forms our perspective, thus tamed and placid though in a different way not less threatening than the water but for the very moment mutely observant and resting in solitude to bide it´s time.

Such is the surrounding world in which human life unfolds, a world of dynamic change and interaction of elemental forces, leaving the human condition as a dreamlike passage on the white crest of a wave. Are not all the fishermen of Hokusai´s print peacefully sleeping in their boats?

Organic Architecture

Architecture as an attempt on appropriately reforming the world´s superficies may be conducted in recognition of our impuissance as against an indifferent and immovable nature. It may appear odd that the idea of opposition, rather than amalgamation, should be the nature of truly organic architecture. However, this opposition may be mitigated by a vantage point of spiritual creation, allowing for a critical yet poetical enactment of human presence in an inevitable field of elemental powers. This enactment springs from a position of constructive culture forming an archetypal composition opposing nature, thus adjusting a kind of wilderness to a humane environment, as Rayner Banham termed it, a “well- tempered environment”.

As one of the most famous examples of Organic Architecture we may think of *Fallingwater* by Frank Lloyd Wright, who coined the phrase *Organic*

Figure 1
Katsushika Hokusai, *The Great Wave.*

Figure 2
Frank Lloyd Wright,
Fallingwater. Photograph by
J. Kalvelage.

Figure 3
Frank Lloyd Wright,
Fallingwater. Photograph by
J. Kalvelage.

Architecture. And of course, from the vantage point of elemental design, the idea is that this house is not *on* the waterfall but *of* (thus part of) the waterfall, moreover even part of the water and therefore called *Fallingwater*. [fig. 2] Likewise it is the vessel for the fire [fig. 3] hovering in the air as much as rooted in the ground.

Another interesting composition of constructive thought is Mies van der Rohe´s *Seagram Building* of 1958 on Park Avenue, New Your City. The Seagram Building is the first skyscraper to be built of extruded bronze, a choice of materials clearly indicating the artificial character of the building, while at the same time it is stretching the idea of *artificiality* from the *unnatural* to an act of *spiritual creation*, thus evoking an unconscious archetypal memory.

Bronze, not to forget, is a metal alloy, the production an art in itself. The material resists corrosion and is accordingly as durable as noble metal, and it is, interestingly, unmagnetic. Bronze considered as one of the first alloying, has accompanied humankind for the longest period of urban civilization. Perhaps this elemental partnership can be an explanatory momentum for the understanding of the *Seagram Building* and it´s design, an enigmatic reference to and a connection with the Bronze Age as a crucial era of human culture. We see here Mies van der Rohe very close to Schinkel who claimed that “architecture is the continuation of nature in her constructive activity”. [fig. 4]

This provisional observation cannot be concluded without mentioning the parapets on the side streets confining the Seagram plaza, made of 40 pieces of green Italian marble (verd-antique), which are neither clearly a ledge nor a bench, though referred to as such and forming it in both ways, leaving in a mysterious way open what they are supposed to be; the two water basins, originally with 12 fountains, in the dark lighted from water level and the Ginkgo trees complementing the parapets contribute to the tableau of an archetypal phenomenological construction. If we want to know what “Baukunst” is, the term Mies preferred to “Architecture”, we see it here. [fig. 5]

The master-builder of St. Markus Church in Stockholm (1958-63), Sigurd Lewerentz, created an equally effective sphere of experience with a completely different language, which is in great measure due to the building process, based on handcraft of a kind of artisan-community comparable to a church masons guild. Presumably Mies should have appreciated the resulting manifestation, as it is, to speak with Le Corbusier, a “purely spiritual creation”. [fig. 5, 6]

Figure 4
Mies van der Rohe, Seagram Building. Photograph by J. Kalvelage.

Figure 5
Sigurd Lewerentz, Markus Church, Stockholm. Photograph by J. Kalvelage.

Figure 6
Sigurd Lewerentz, Markus Church, Stockholm. Photograph by J. Kalvelage.

Fig. 4

Fig. 5

Fig. 6

A very beautiful example of the kind of architecture which is here under consideration is the *Beyeler Foundation* in Riehen, Switzerland, built by Renzo Piano. A most reasonable cluster of linear spaces is elegantly stretching between a sculpture garden and a water-basin, the latter being ambiguously part of the inner exhibition-space and the surrounding landscape-garden, this underlined by the fact that the "Beyeler" is a true light-museum with a very differentiated but effective roof-and ceiling-construction. **[fig. 7]** It is most impressive to come across Claude Monet´s *Water-Lilies* (of 1916-19), even more so as they are in neighborly communication with the *Clouds* of Gerhard Richter, which are again corresponding with the natural light pouring from the ceiling construction. **[fig. 8, 9]**

Ancient Greek philosophy of pre-Socratic times developed the concept of the four basic elements *earth, water, air and fire*, which in the sequence of the BIP-workshops we were organizing, serve as a kind of underlying structure of the thematic units, *water* quite obviously being the topic of our event now here in Volos. This concept has not only influenced European culture and science, it appears, though in different variations, also in other cultures, thus being an almost universal insight, a truly classical interpretation of reality.

Beyond these classical elements, and any culture-specific additions, the interactive elemental balance seems to play a vital part in the way of the world, in terms of our civilization we may say, the stream of history.

By way of example, a few historical catastrophes, particularly connected with our field of architecture and urban planning, illustrate the interactive momentum of the classical elements in their relation to the fragility of our civilization. One is the Great Lisbon earthquake of 1755 with subsequent fires and a tsunami. Fissures 5 meters wide appeared within minutes in the city center, a fire started by candles turned into a firestorm and 40 minutes after the earthquake a tsunami in three consecutive waves flooded the lower part of the city. In less than one hour the main part of Lisbon was completely destroyed and thousands had died.

The 1906 earthquake in San Francisco, taking place on account of accumulated strain on the San Andreas Fault, destroying over 80% of the city and killing more than 3.000 people was the deadliest earthquake in the history of the United States.

The Great Kanto earthquake of 1923 was accompanied by extensive firestorms and fire whirl. Between 100.000 and 140.000 citizens of Edo, the

Figure 7
Renzo Piano, Fondation Beyeler, Riehen. Photograph by J. Kalvelage.

Figure 8
Claude Monet at Renzo Piano, Fondation Beyeler, Riehen. Photograph by J. Kalvelage.

Figure 9
Gerhard Richter at Renzo Piano, Fondation Beyeler, Riehen. Photograph by J. Kalvelage.

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Tokio of today, died. It is a strange anecdote that of all things the *Imperial Hotel*, designed and built by Frank Lloyd Wright, the organic architect par excellence withstood the disaster due to its architect´s philosophy, as he claims in his autobiography.

Similar catastrophes happened in Japan quite recently. In 2011 the Tohoku earthquake caused the Fukushima nuclear accident, an event that again reminds us to recalibrate and rethink our relationship with nature.

The historical event which is probably the most firmly established in our collective memory is the eruption of Mount Vesuvius in 79 AD and the extinction of Pompeii, where the human bodies interred in the ash have become a brutally natural reminder about the principles, priorities and the vigilance which we are to apply in the formation of our culture and civilization. **[fig. 10, 11]**

Back to Mount Fuji in Hokusai´s version of an ostensibly placid scene of a Japanese village under the quiescent-looking volcano with four apparently departing fishing boats. Four oarsmen, a tillerman and a crew of two more persons are visible on each boat. The villagers back on the strand are peacefully committed to the farm work between their reed huts. But the perfect idyll may be a delusion. Something is coming up and creeping into the image of the picturesque scenery possibly induced and represented by the strange beige fog, which is about to swallow the huts, likewise beige, of the village and very soon also the boats, which are beige as well in a worrisome compliance. And are not the oarsmen rowing backwards? Is *The Great Wave* expected to be the next scene? **[fig. 12]**

Johannes Kalvelage is a professor of Urban Design and Rural Planning in Magdeburg (1996-2006) and Dessau (2006-2024), Johannes Kalvelage studied Architecture at Darmstadt and Aachen. He is an Aachen graduate of Gottfried Böhm (1985).
He worked as an architect and urban planner in Berlin and Cologne and was co-founder of the “Kölner Bucht” partner agency in Cologne. Since 1998 he is practicing architect and urban planner in Magdeburg.
At Anhalt University Johannes Kalvelage was teaching at DIA (Dessau International Graduate School of Architecture), he has been Director of DAF Institute and visiting professor at Politecnico di Milano, Ecole Nationale Superieure d'Architecture de Nantes/ENSA Nantes, Universidade Lusofona de Lisboa, University of Thessaly/Volos and TOBB University of Economy and Technology Ankara. His research focuses on urban morphology and organic architecture.

Figure 10
Pompeii. Photograph by J. Kalvelage.

Figure 11
Pompeii. Photograph by J. Kalvelage.

Figure 12
Katsushika Hokusai, *Shore of Tago Bay, Ejiri,* Tokaido series.

Fig. 1

Re-Inhabiting

Monica Bertolino
Cordoba National University, Argentina

Crises, adversities and catastrophes of various kinds force us to rethink and redefine the values and paradigms on which we act in the different spheres and scales of inhabiting. Thus, questioning from the readings and interpretations we make about reality and the scenarios of action of our discipline, to the answers and actions we offer as urban landscape architects.

Faced with a global panorama, which manifests itself as a threatened and threatening social, urban and environmental scenario, it becomes imminent to investigate, reflect, explore and test, orienting ourselves to improve our common habitat, seeking to recover increasingly unbalanced balances. Sustainability seems to be an elusive chimera.

In this sense, Re-Habitar/Re-Inhabiting aims to question, critically reflect and generate contributions to assume these challenges, from different disciplinary facets and fields, involving academic, research and professional aspects.

Re-Inhabiting is proposed as a framework for rethinking and channeling explorations in search of more appropriate responses to inhabit a world that threatens to cease to be habitable, but that exists... And in which we need to assume new values to act in it in pursuit of better balances and conciliations, in the awareness of our belonging to the same ecosystem.

This forces us to critically review concepts and practices, to raise questions, to explore new ways of operating, as well as to detect potentialities capable of contributing to mitigate, prevent or reverse degradation or threat processes.

Within this complex contemporary panorama, issues and problems of an imminent agenda emerge. Certainly, it is understood that there are different scales, competencies and domains of problems, and that many are beyond our disciplinary possibilities.

The problems are extensive and varied, exposing with crudeness, social, political, economic and environmental vulnerabilities: pollution, overexploitation of soils and resources, scarcity of resources, real estate speculation, metropolization, climate change, desertification, floods, fires... expulsion, diasporas, xenophobia, segregation... population and territorial changes, wars... among others in a long list...

Figure 1
M. Bertolino, *Por un mundo major*, 2022.

What can we contribute from our discipline, knowing the need for multidisciplinary approaches to face complex challenges? We pose questions about strategy, about practices, about our own tools for reading, interpretation and intervention from our discipline and about interdisciplinary interaction:

What role should nature assume in the contemporary city?

What conciliations should we seek towards a more balanced relationship between nature and man- made environment?

What relationships can we perceive and propose between the city, architecture and the natural environment?

What role does the public assume in relation to the social context, its demands and the natural context and its dynamics?

What strategies do we propose in the face of adversities?

What partnerships can be proposed between infrastructure, public space, dwelling, and landscape? What strategies can we implement to re-enable the relationship between existing cities, the territory and the environment?

Could Hybrid, in the sense of conciliation and complementarities, constitute a base concept, and a procedure to face contemporary challenges? Looking for better conciliations, between Society, city, Environment?

On the other hand, natural systems, infrastructures, obsolete structures, abandoned spaces, remnants of the city fabric, could become potential supports for new strategies which can deal with the problems into a systemic strategy (Going deeper into what Gilles Clément says in Manifesto of the Third Landscape).

From research experiences as well as from the academic field, scientific events, biennials, as well as from the abundant bibliography and professional production, there emerge keys and perspectives oriented in the sense in which the discussions, reviews and objectives expressed are raised, such as: The need for a systemic/ ecosystemic vision, to reread the scenarios and reality and rethink our disciplinary actions in this sense; The recognition of the interaction of variables and the awareness that they affect and impact each other within the system; A dialectical relationship between, nature, territory, the city, architecture and landscape; The recognition of our human condition as part of the same ecosystem, and the consequent impact of our actions; The need to consider associations and complementarities between urban, architectural and landscape variables, such as infrastructures associated with public space, nature and programs; Blurring the boundaries between architecture and landscape, as active evolving system...Among others

A Hybrid Landscape as a synthesis of these reoriented and operational concepts, and as a strategy, could contribute to better socio-environmental balances. **[fig. 1]**

Considerations and works, from our professional experience

In relation to our professional and academic experience, located in the globalized world, from Latin America.

I share the idea that Architecture is about integrity linked to society, to time, to circumstances, to territory and to the context in a broad sense.

The interaction between geography, territory, nature, culture, and context defines most of the architectural and urban production. Notions of nature, beauty, matter, time and space in our continent claim these characteristics as their own. No doubt the dialogue between Nature and Culture defines most of the architectural and urban production.

Historically, the Latin American territory has been considered as something exuberant, exotic, immeasurable, representing the “other” and the promising land.

But this territory of utopias and promising lands is also a territory of inequalities and unbalance; foreign and local crisis leave their mark; and we often witness the horrifying coexistence of scientific development along with a shortage of the most basic needs. Such a complex scenario puts us in check to rethink the key points and values according to which we act and produce the foundations for inhabiting our American/Latin American continent.

In our studio together with Carlos Barrado, our job as architects, is driven and ruled by the sound observation and interpretation of our Context in a broad term, by its inherent poetry and also its problems; by time as circumstance and contingency, in the fragility of economic and social concerns, of global/local friction/fiction; in the display of our urbanities-other, our landscapes-other, incomplete, vulnerable, but plenty of potential, where we search out for poetry and beauty like dowsers, delving into reality, in order to feel inspiration from our surroundings.

The otherness that characterizes our territories then becomes an “Alterity” with the capabilities and the potential to requalify Latin American production.

Our work involves different intermingling scales and aspects: Works, on architecture, city, landscape, teaching activity, but also, essays, paintings,

Fig. 2

Fig. 3

objects. We produce bearing in mind a strong relationship with the environment, society, culture, in order to capture the deep sense of what we are committed to doing.

I present here some works related to the issues presented at the Workshop, regarding the necessary dialectic relationship between nature, architecture, city, with a systemic perspective.

The Botanical Garden of Cordoba is part of a larger strategy that links the urban green system with the natural system of the river and native forest reserves and includes water reservoirs. For the building we opted for a póvera aesthetic, linked to the expression of local materials, local labor, in relation to the means of local production. **[fig. 2-3]**

The strategy of the green system, public spaces and bicycle lanes in the city of Cordoba, as the Program of recovery and creation of public spaces, through which abandoned and degraded spaces, remnants of the urban fabric and garbage dumps were reconverted, reaffirming the public space as instrument of social inclusion.

The project for the Suquía River and Cañada Interpretation Center and Public Space in Córdoba, designed as a systemic intervention along the Suquía River, associating the program and the public space with infrastructure to mitigate flooding due to rain, as well as water treatment of the river, thus contributing to improve water quality and the riverbanks.

Public spaces and mixed use programs. Green system, protecting the existing native forest reserve, including water infrastructure, as retention ponds, Collective orchards.

The work in the “sierras of Córdoba, Capilla del Monte” were propose as a broad strategy that includes various programs and especially a strategy of water reserves to help fight the frequent fires in the area. We worked to maintain and strengthen the native flora, minimizing the impact of existing buildings. **[fig. 4-5]** The educational farm, within these programs, is conceived as a sensory space, through 2 pavilions – one where bread and sweets are made, and the other that houses farm animals – both structures are crossed by the native flora. Water is considered a material and resource, and plays a playful and functional role, building a perimeter that is interspersed with the pavilions, and brings qualities, freshness and sound while including a reserve to mitigate the fire. Nature, animals, bread, the sound of water, the perfumes, the children’s voices ...all create a sensory atmosphere to learn from nature. **[fig. 6, 7-8]**

Figure 2-3
Bertolino Barrado Achitects.
Botanical garden.

Fig. 4

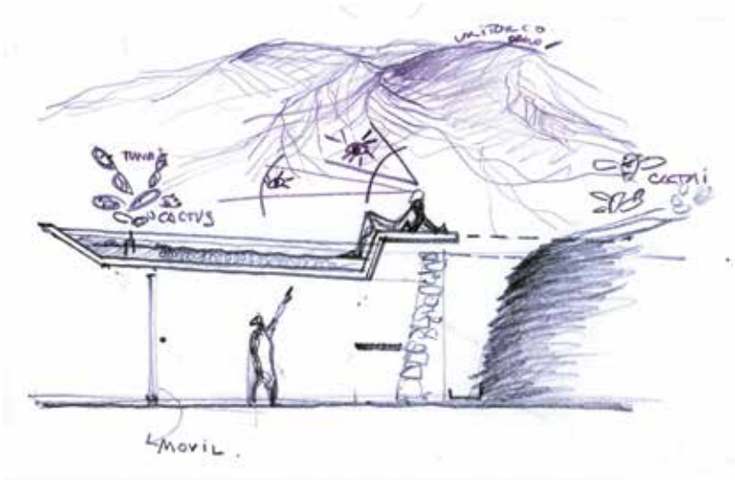

Fig. 5

Figure 4-5
Bertolino Barrado Achitects.
Interventions Cordoba mountains.

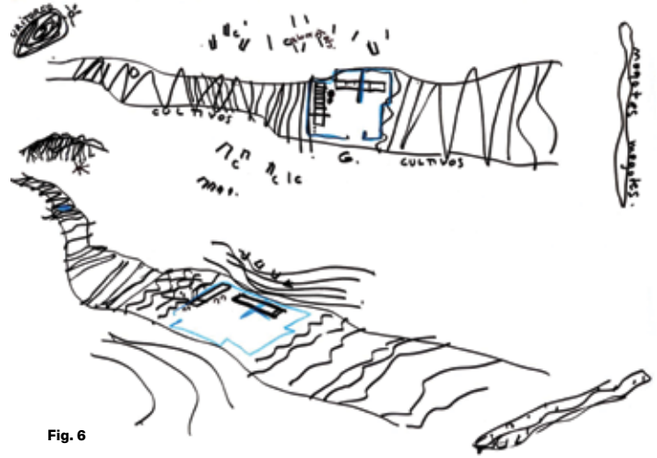

Fig. 6

Fig. 7

Figure 6
Bertolino Barrado Achitects.
Croquis ubicacion Educational Farm Pavillions.

Fig. 8

Fig. 9

Figure 7-9
Bertolino Barrado Achitects,
Farm Pavilions.

In these cases, water is considered as matter, as a resource, or as part of a reserve strategy, or urban storm water regulation, or fire mitigation.

Regarding specific study cases, I mention the work within the framework of RedSur as an inter- university network for academic exchange, at the undergraduate, graduate and research fields, working on emerging issues in vulnerable contexts. It is worth mentioning that the University of Thessaly is part of RedSur, and numerous workshops and cooperation in undergraduate and graduate programs have been carried out.

The present Erasmus Workshop, BIP, clearly focused on the questions and concerns expressed here, starting from adversities and disasters, which unmask unsolved problems, counterproductive actions, negative interactions between territory, city, infrastructure, production, housing, among other variables to be considered; highlighting the need to review the values on which the readings and practices in the urban territorial context have been based, calling for operational reflections that promote new strategies on the consideration of "hybrid landscapes" as an instrument for new conciliations between nature and artifice, contributing to reestablish damaged balances, mitigate the consequences of catastrophes and possibly reduce the recurrence of the episodes.

The experience of the different disaster scenarios and their particular problems – Karla Lake, Larissa, Volos, Trikala, Mikro – together with the process proposed, allowed the full awareness of the pressing needs, revealing new conciliations between nature and artifice.

Perhaps the complexity lies in the sound understanding of the different landscapes be them urban, human, cultural, sensorial...

Landscape as integrity.

...And, in the face of the challenges of the contemporary global panorama, we need to rethink, seeking better socio-environmental balances... to contribute to Re-Inhabiting a World that already exists, but that has become increasingly dysfunctional.

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Monica Bertolino and Carlos Barrado have founded the Bertolino - Barrado Architecture firm, which focuses on architectural, urban and landscape design. The firm has received numerous awards and notable mentions, among them: 2022 Soy Arquitecta- Project Award; 2012 Konex Award; 2011 ARQ Clarín prize; nomination for the 2011 and 2013 Marcus Prize in Milwaukee; 2010 VII Iberoamerican Biennial Award for Architecture and Urbanism; 2002 Quito PanAmerican Biennial, International Honorable Mention; the 2000 Vitruvio Award, among others. Projects by Bertolino - Barrado have been published in national and international books, magazines, and tv documentaries.

Sustainable Urban Drainage Systems: a comprehensive approach to urban flood risk management in Padova

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Vittore Negretto
Iuav University of Venice

Introduction

Urban flooding presents a significant challenge, particularly in cities facing intense and unpredictable precipitation events. This paper draws extensively from the comprehensive strategies and principles outlined in the book "Linee Guida per il Drenaggio Urbano Sostenibile"[1] and developed by Iuav University of Venice in collaboration with the Municipality of Padova and the Environment Office as a continuation of the activities under the Sustainable Energy and Climate Action Plan (SECAP). The focus is on the city of Padova's approach to mitigating urban flooding. By implementing Sustainable Urban Drainage Systems (SUDS) and integrating these into urban planning and infrastructure design, Padova aims to strengthen its resilience against extreme weather events, improve water management, and contribute to the overall sustainability of the urban environment. The journey began in the past decade when, in 2016, Padova became one of the first Italian municipalities to draft guidelines for the adaptation plan. This effort was followed by the approval of the SECAP, in which the Municipality laid the groundwork for the first coordinated effort among its sectors toward climate action. This trajectory has been consistently upheld by the Municipality, which has further supported it with additional training and awareness initiatives, including the 2021 adaptation guidelines and the masterplan for the adaptation of the industrial area, which is set to be delivered by the end of 2024. The present paper analyzes, summarizes, and presents the innovative principles that have enabled the Municipality of Padova to emerge as a leader among Italian municipalities in studying and experimenting with technologies designed to adapt the urban environments from the damages caused by intense rainfall.

1 V. Negretto, E. Giacomello, N. Romanato, and B. Gava, *Linee guida per il drenaggio urbano sostenibile* (CORILA editore, 2022).

Urban Flooding and Climate Change

Urbanization has led to significant changes in land use, with increased impermeable surfaces exacerbating the challenges of managing stormwater runoff. In Padova, as in many other cities, the traditional drainage systems are often overwhelmed during intense rainfall events, leading to urban flooding[2].

The response of urban environments and management systems is not uniform and homogeneous. This difference can be amplified by localized, temporary factors, such as blocked drains due to poor maintenance or malfunctioning mechanical systems. Other local factors related to the disposal network can influence the response of certain areas, such as undersized pipelines or inadequately drained depressed zones.

The increasing frequency and intensity of rainfall events, often referred to as "cloudbursts," pose a growing risk to urban areas. Padova has not been immune to these phenomena, with several instances of flooding recorded in recent years. These events highlight the vulnerability of urban infrastructure to climate change and underscore the need for adaptive measures. The traditional urban drainage systems, designed to manage moderate and infrequent rainfall, are no longer sufficient to cope with the volume and speed of water generated during intense storms.

2 ARPAV Veneto, *Intense Precipitation Events in Padua* (2022), Interreg Response.

New Perspectives for Sustainable Urban Drainage

The impermeabilization of urban soils has significant impacts on the hydrological cycle, complicating the management of intense precipitation events. The primary effects include increased surface runoff, due to reduced infiltration and evapotranspiration capacities, and shortened times of concentration. As a result, compared to permeable soils, impermeable surfaces generate a larger quantity of water that must be managed within a shorter time frame.

The context of the different Italian approaches to hydraulic management is dealt with in the publication by Pasi et al. [3] comparing the main Italian approaches with Anglo-Saxon ones. This study shows that in Veneto, as in some other Italian regions, the approach to compensating for the impacts of urbanization on the water cycle remains strongly tied to the principle of hydraulic invariance. This principle dictates that any transformation of land use should not contribute to increasing the peak flow of the receiving water body. Hydraulic invariance requires the quantification and provision of a detention volume to compensate for the effects of urbanization, thereby placing the burden of the resulting impermeabilization on the entity proposing the transformation.

3 R. Pasi, V. Negretto, and F. Musco, *Diversi approcci al drenaggio urbano sostenibile: un confronto tra il contesto normativo inglese e quello italiano* (Franco Angeli, 2019), Archivio Studi Urbani e Regionali.

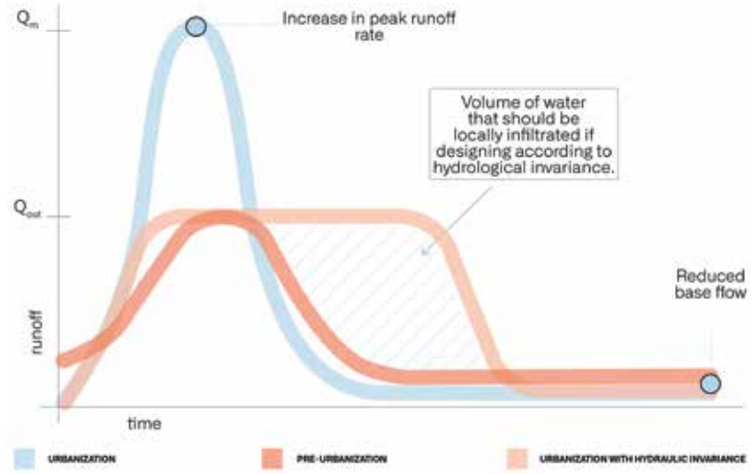

Fig. 1

However, the establishment of such detention volumes is not intended to retain runoff locally but rather to maintain the formation of peak flows at the basin scale. The objective is to artificially maintain the maximum outflow from the urbanized area within the limits of pre-urbanization conditions. Hydraulic invariance, therefore, concerns the maximum discharge rate that can flow downstream in a given time, not the total volume of runoff. It is evident that the urbanization of an agricultural field, for example, while adhering to the principle of hydraulic invariance, will not eliminate impacts on the hydrological cycle; only the peak discharge rate leaving the urbanized area will remain "unvaried".

Pasi et al. (2019) highlights that other impacts on the hydrological cycle must also be considered, such as the total runoff volume exiting the transformed area. In some Italian contexts, such as the Lombardia Region, the concept of invariance has been extended to include hydrological invariance. This principle asserts that the volumes discharged into the receiving water bodies (sewers, rivers, etc.) from transformed areas should not exceed those existing before the transformation. Therefore, the increased runoff caused by new development and the resulting impermeabilization must be managed locally through infiltration and reuse. **[fig. 1]**

Figure 1
Conceptual schematic representing runoff (on the vertical axis) in relation to time (on the horizontal axis). The response to the same type of rainfall event is depicted for the same area under three different conditions. In pre-urbanization conditions, the area generates a lower total runoff because part of it is infiltrated, and the peak outflow rate is relatively low. In urbanized conditions, the area responds quickly to the rainfall event, resulting in a significantly higher peak outflow rate and a greater total runoff due to the reduction of soil available for infiltration caused by urbanization. In urbanized conditions following the principle of hydraulic invariance, the peak outflow rate is artificially maintained at the pre-urbanization level by storing excess volumes in basins, which are then gradually released, leading to a total volume that is higher than the pre-urbanized state and equal to that of the urbanized state. Source: Negretto et al. 2022.

Given the frequent flooding recorded in Padova and in many other cities, it would be prudent to move beyond the approach of merely maintaining the runoff generated by urban soils during each rainfall event, whether in terms of flow rate (hydraulic) or volume (hydrological). The management of runoff becomes problematic with frequent intense rainfall events; therefore, an approach that aims for "variance" of the current hydraulic and hydrological imbalance through widespread and systematic interventions would be more appropriate. This would improve the territories' responses to the stresses caused by intense rainfall while simultaneously pursuing benefits for ordinary rainfall as well.

A Hierarchy of Priorities for Intervention

The hierarchy of priorities guides the selection of techniques for designing interventions, favoring principles that provide greater benefits at both local and basin scales. Higher-priority principles are preferred as they yield more significant outcomes, even during minor rainfall events, with subsequent runoff managed by lower-priority principles. If implementing a higher-priority principle is not feasible, lower levels can be considered. The hierarchy of principles presented here is inspired by the Anglo-Saxon approach detailed by Woods-Ballard [4] and further analyzed in Pasi et al. The framework based on principles is extensively explored in Negretto [5] where its connections to various indicators are also discussed. The following summary distills the core logic of this approach, offering a concise explanation tailored for policymakers.

This approach is applied with a focus on water quality, as rainwater often collects pollutants from surfaces. These contaminants, particularly concentrated in the "first flush", necessitate preemptive assessment and filtration measures. Treating polluted water close to its source is recommended, as it simplifies isolation and management. Various first-flush treatment devices, including sustainable techniques, are available and provide broader benefits than conventional first-flush tanks. **[fig. 2]**

It is advisable to treat this potentially polluted water as close as possible to the source of contamination since it is easier to isolate potentially polluting areas and manage treatment points. Various devices exist for treating first flush water, including some of the sustainable techniques listed in the following chapter, which offer a broader range of benefits than the widely used first flush tanks.

4 B. Woods-Ballard, S. Wilson, H. Udele-Clark, S. Illman, R. Ashley, and R. Kellagher, *The SuDS Manual* (Construction Industry Research & Information Association, 2015), Report C753, 2nd ed.

5 V. Negretto, "Systemic Approaches and Principles for Urban Stormwater Management," in *Climate Change Adaptation, Flood Risks, and Beyond. State of Play in the Science-Policy-Action Nexus*, ed. M. Granceri, F. Musco, and F. Magni (Springer, 2024), Planning for Climate Cities series.

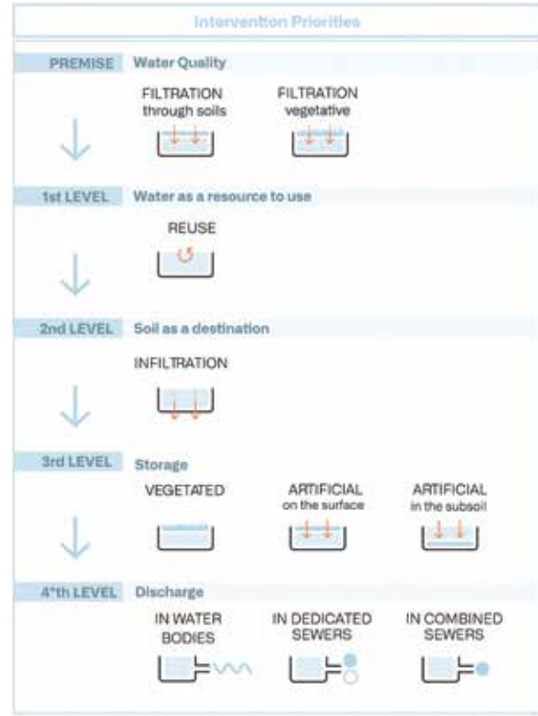

Fig. 2

The primary priority in the hierarchy is on-site water reuse, which reduces runoff and future water demand. This principle is crucial as it minimizes the need to manage large volumes of water, particularly during intense rainfall. Reuse applications vary, commonly involving irrigation and non-potable uses. However, to effectively handle excess water during major events, reuse must be combined with lower-priority principles.

Directing runoff to the soil is the next priority, as it promotes infiltration, mimicking natural processes and supporting vegetation. This approach reduces runoff and can be implemented through appropriate surface design. By adopting these techniques, it is possible to enhance hydrological stability and retain water locally.

Runoff attenuation, the third priority, involves temporarily storing stormwater to reduce outflow rates. Although this principle offers fewer benefits, it is useful for managing intense events, often in conjunction with

Figure 2
The diagram presents a hierarchy of urban runoff management strategies, prioritizing interventions to ensure water quality. The top priority is water reuse, followed by soil infiltration to mimic natural processes. The next level involves temporary storage, using vegetated areas or artificial solutions. The least preferred option is discharging runoff into water bodies or sewers, reserved for situations where other methods are not viable. The hierarchy aims to promote sustainability and minimize environmental impact. Source: Negretto et al. 2022.

infiltration or reuse. The most sustainable attenuation areas are vegetated, followed by surface and then underground structures.

The final priority is direct discharge into receiving bodies, which should be employed only when other options are unfeasible, and in minimal quantities. Discharge into water bodies is preferred over sewer systems, with combined sewers being the least desirable option.

Implementation of SUDS in Padova: Savelli Square as a case study operative test

The design of SUDS must be evaluated based on the availability of suitable spaces, surfaces, and locations, considering both the attractiveness and effectiveness of the installation. Open spaces form the resilient framework of the built city and can serve multiple functions. Rethinking the design of future interventions can allow the adaptation of the existing city while simultaneously improving the quality of public space. In this classification, particular importance has been given to the system of open spaces and communication routes, but these techniques can also be adopted in other contexts.

The Savelli Square SUDS project aims to significantly reduce climate risks, both in terms of hydraulic impacts and the urban heat island effect, in an area that encompasses approximately 200 business offices in the tertiary sector. The intervention involves the use of stormwater collection and storage systems that reduce the hydraulic load on the urban sewer network. The intervention, which was funded with 829.000 euros by the Ministry of the Environment, transformed what was once a large asphalt area devoid of greenery into a square that still maintains parking spaces serving the existing businesses. However, the area now features permeable paving instead of impermeable asphalt, along with pedestrian and cycling paths, new urban furniture, trees, greenery, and charging stations for electric vehicles. The square itself encompasses 6,800 square meters, with 2,000 square meters dedicated to a grassland area designed for high rainwater absorption. The remaining 4,800 square meters, consisting of roads and parking areas, are paved with a special light-colored, highly permeable aggregate. This pavement technology not only reduces the square's impermeable surface area but also minimizes solar heat absorption, leading to a cooler environment.

The parking facilities within the square, designed to serve local businesses, include a total of 114 spaces, with 53 designated as paid parking, 59 as free spaces (including 5 reserved for disabled individuals), and infrastructure in place for the installation of 16 electric vehicle charging stations. These considerations underscore the square's role in supporting both sustainable transportation and accessibility. From an ecological perspective, the square integrates significant green infrastructure. A total of 52 trees – holm oaks, linden trees, hornbeams, and tulip trees – along with approximately 300 herbaceous plants, have been strategically planted to mitigate the urban heat island effect. Recent research highlights that in urban areas devoid of vegetation, temperatures can be up to five degrees Celsius higher compared to other city neighborhoods with extensive greenery. The introduction of this vegetation is expected to significantly reduce ambient temperatures within the square and its surrounding areas, contributing to improved microclimatic conditions.

The design documents report that for a 10 millimeters rainfall event or 10 liters per square meter, the hydrological benefit for the entire square results in 68000 liters of water being absorbed by the soil rather than contributing to surface runoff. This absorption process not only alleviates the burden on stormwater drainage systems but also supports groundwater recharge, thereby enhancing the local hydrological cycle.

During the planning of Savelli Square, several specific SUDS techniques were implemented that fully adhere to the previously outlined intervention principles of filtration, reuse, infiltration, storage, and discharge. Permeable pavements were utilized to allow water to infiltrate through the surface, effectively filtering runoff and promoting natural groundwater recharge. Rainwater harvesting systems were incorporated to capture and store rainwater, facilitating its reuse and thereby reducing both the demand on potable water supplies and the overall volume of runoff. Additionally, vegetated swales and bioretention areas were established to provide further filtration of stormwater, remove pollutants, and enhance infiltration into the ground. Collectively, these solutions not only address immediate water management needs but also contribute to sustainable urban climate adaptation by sequentially applying the principles of filtration (1), reuse (2), infiltration (3), storage (4), and responsible discharge (5). [fig. 3]

Fig. 3

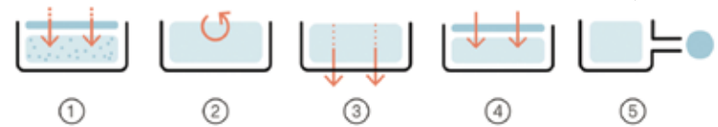

Figure 3
Savelli Square's intervention principles applied to the case study test.

Fig. 4

Fig. 5

Figure 4
Permeable pedestrian pathway and raingardens with trees within, designed to receive, absorb, and infiltrate rainwater volumes. Source: PadovaOggi.it

Figure 5
Drone aerial view of the Savelli Square. Source: PadovaOggi.it

Conclusion

Padova's approach to urban drainage represents a forward-thinking response to the challenges posed by climate change and urbanization. By adopting SUDS, the city not only addresses the immediate risks of urban flooding but also contributes to broader environmental goals. SUDS, indeed, respond to both hydraulic and hydrogeologic invariance approaches. Adopting both these management principles as guides for compensation gives soils an active role in both mitigating flooding and supporting all phases of the hydrological cycle. The positive effects also include increased soil infiltration, greater evapotranspiration benefiting the microclimate and air quality, and the potential reuse of water as a resource. Incorporating this consideration into the design of urban drainage systems enhances their effectiveness even in the face of frequent precipitation, providing tangible benefits in everyday situations. The integration of SUDS into urban planning demonstrates the potential for cities to evolve towards more sustainable and resilient futures. Continued investment in these systems, coupled with ongoing monitoring and adaptation, will be essential as climate patterns continue to change.

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The Campi Flegrei supervolcano: challenges, risks and opportunities for an integrated management of a complex territorial system

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In the current context, marked by an escalating environmental and socioeconomic crisis, landscape management emerges as one of the most complex challenges to address. This complexity is particularly evident in regions characterized by a confluence of environmental, historical, social, and economic factors that continuously interact and overlap. While the natural beauty and cultural richness of these regions are undeniable, they should not overshadow the intricate balance between sustainable development and environmental risk management, especially in an era when climate change and urban pressures render this task even more daunting.

Awareness of the environmental crisis gained significant traction after World War II, as accelerated industrialization and unchecked urbanization began to manifest clear signs of environmental degradation. The publication of "The Limits to Growth" by the Club of Rome in 1972 marked a turning point, prompting numerous critical reflections on development models and the collateral effects of industrial and urban expansion[1].

The Stockholm Conference of 1972, considered the first global environmental summit, and the Rio Earth Summit in 1992, spurred a new global consciousness about environmental policies, leading to a series of initiatives and agreements that have since influenced international planning practices.

Within this context, the concept of sustainability, as outlined in the Brundtland Report of 1987[2] becomes fundamental. "*Our Common Future*" provided a definition of sustainable development that continues to guide global environmental policies: development that "meets the needs of the present without compromising the ability of future generations to meet their own needs".

1 Donella H. Meadows, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (New York: Universe Books, 1972).

2 Gro Harlem Brundtland, *Our Common Future: Report of the World Commission on Environment and Development* (Geneva: UN-Dokument A/42/427, 1987).

The Brundtland Report represented a significant paradigm shift in how societies approach environmental challenges, influencing both global and local policies.

The importance of this concept lies in its ability to integrate the economic, social, and environmental dimensions of human progress, aiming for a balance that allows prosperity without depleting natural resources or harming the environment.

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015[3], further articulated this vision, providing specific targets to guide actions at both global and local levels. SDG 11, "*Sustainable Cities and Communities*", recognizes the need for integrated planning that can improve quality of life and ensure community resilience in the face of environmental and social changes.

More broadly, other SDGs address critical environmental issues, such as climate action (Goal 13), biodiversity (Goals 14 and 15), and energy resources (Goals 6 and 7). These goals aim to protect nature and ecosystems, addressing crucial issues like climate change mitigation, biodiversity conservation, equitable access to natural resources, and the broader dissemination of renewable energy sources.

However, achieving these goals is contingent on educating not only the younger generations but society at large to become agents of change. People need the knowledge, skills, values, and attitudes that will empower them to contribute to sustainable development[4], as explicitly recognized in Target 4.7 of the 2030 Agenda. This target aims to develop competencies that allow individuals to reflect on actions, considering their future social, cultural, economic, and environmental impact from both local and global perspectives.

The pursuit of sustainable development goals, however, must confront significant challenges, such as unplanned urban growth, land consumption, environmental degradation, and insufficiently sustainable production and mobility systems. These challenges continuously threaten the quality of life of both ecosystems and communities. Such threats risk compromising environmental and cultural assets, as evidenced by numerous cases of uncontrolled urbanization and the degradation of historic landscapes.

These difficulties are even more pronounced in managing complex and vulnerable territories, often characterized by natural and anthropogenic risks that necessitate careful reflection on the relationship between risk,

3 United Nations, *Transforming Our World: The 2030 Agenda for Sustainable Development* (New York: United Nations, 2015).

4 ASviS, *Target 4.7: Education for Sustainable Development and Global Citizenship* (Rome, 2022).

Fig. 1

landscape quality, and community well-being. These territories require an integrated approach that does not limit itself to addressing environmental threats by promoting sustainable development, but that observes mitigation principles that respect the intrinsic values of these places, both from an environmental and social point of view.

At the heart of Campania, a region in Southern Italy with unique geological and cultural characteristics, lies the extraordinary and complex landscape of the Phlegraean Fields (Campi Flegrei)[5].

This active volcanic area, located west of Naples, was home to the first colonies of Magna Graecia as early as the 8th century BCE. The name "Campi Flegrei" derives from the Greek term "phlegraios," meaning "fiery," in reference to the "burning fields." The area includes the municipalities of

5 Park of the Campi Flegrei, accessed August 24, 2024, https://parcodeicampiflegrei.it/.

Figure 1
The crater system of Campi Flegrei.

Bacoli, Monte di Procida, Pozzuoli, Quarto, Giugliano in Campania, and part of the city of Naples. [fig. 1]

The region is rich in archaeological remains that attest to a long and complex history of human settlement. It has been the backdrop to mythologies and legends, such as those narrated by Homer and Virgil, and has seen the construction of Roman villas and temples over the centuries, making it a destination of the Grand Tour from the 17th to the 19th centuries, with visible remains still present today [6].

6 *Napoli e dintorni. Guide to Italy of the Touring Club Italiano* (Milan, 1976).

The area is home to important archaeological sites, such as the Macellum of Pozzuoli, an ancient Roman market, and the Amphitheater of Pozzuoli, one of the largest Roman amphitheaters in the world, the sunken city of Baia, an important underwater archaeological site dating back to the 3rd century BC and many other sites of inestimable value.

The Phlegraean Fields are a mosaic of heterogeneous landscapes and extraordinary geological phenomena that extend within a 450 km^2 quiescent caldera, with a diameter of 15-18 km, connected to the sea and the island systems, the Domitian coast, and the city of Naples.

The Phlegraean Fields represent an emblematic case where landscape beauty and environmental fragility are intertwined. Their complexity stems from a combination of natural and human factors: volcanic geology, bradyseismic risk (the rise and fall of the Earth's crust due to volcanic activity), and historical and urban stratification. These aspects reveal a unique territory characterized by both challenges and opportunities from a landscape and social perspective, offering a significant insight into the tension between natural beauty and development pressures, as well as between physical and social form.

Unlike the more famous Mount Vesuvius, the Phlegraean Fields are not characterized by a single major volcanic structure but rather by a volcanic field that has been active for over 80,000 years, with 19 volcanic centers located within and near a depressed area known as the caldera.

The caldera is the result of at least two highly intense explosive eruptions that have radically altered the morphology of the territory, shaping it into what it is today. The two eruptions, which occurred tens of thousands of years ago, are known as the Campanian Ignimbrite eruption, which took place approximately 40,000 years ago (considered the most violent explosive eruption in the Mediterranean, with an estimated volume of volcanic products around 300 km^3, covering vast areas of Europe), and the more recent

eruption, known as the Neapolitan Yellow Tuff eruption, which occurred about 14,000 years ago.

This event, considered the second most violent episode recorded in the Phlegraean Fields, caused the circular collapse of the surface crust, leading to the formation of a smaller caldera compared to the one that originated 34,000 years ago [7]. The last significant eruption occurred in 1538, with the formation of Monte Nuovo, which emerged within a week, demonstrating how recent eruptions have been preceded by seismic and bradyseismic crises [8].

Although there is currently no eruptive activity, the Campi Flegrei continue to experience ongoing volcanic activity, with frequent minor earthquakes caused by ground deformation. The area, inhabited by almost 600.000 people, is carefully monitored by the Vesuvius Observatory of the National Institute of Geophysics and Volcanology (INGV-OV) [9], which daily analyzes every little piece of data detected to address the various risks present in the area.

To support the population in anticipation of potential high-hazard scenarios, there is an evacuation plan defined by Civil Protection [10], which divides the Phlegraean Fields into two risk zones: red and yellow. The red zone is most at risk of being affected by pyroclastic flows, which are streams of magma and gas at extremely high temperatures, while the yellow zone would be exposed to significant volcanic ash fallout in the event of an eruption.

The plan also identifies waiting areas from which, in the event of a declared "alert," buses from the Campania Region depart to transport citizens to meeting points outside the red zone. From these points, citizens who opt for assisted transportation are taken to designated destinations for evacuation.

Today, the caldera, shaped by these explosive events, hosts a variety of natural environments ranging from volcanic lakes such as Lake Avernus and Lake Lucrino, Lake Miseno, and Lake Fusaro, to craters with protected areas like the Astroni crater (a WWF oasis), and fumaroles emitting steam and gases like the "Solfatara", located less than 3 km from the center of Pozzuoli. **[fig. 2]**

This landscape presents a fascinating natural spectacle but also poses significant challenges in managing a fragile territory subject to bradyseismic phenomena.

The bradyseism phenomenon, consists of alternating phases of slow subsidence and more rapid uplift. The rapid uplift phases are associated with numerous seismic swarms—earthquakes that, though not very strong, are shallow enough to be easily felt and potentially damaging.

7 Claudia Troise, Giuseppe De Natale, Rossella Schiavone, Roberto Somma, and Roberto Moretti, "The Campi Flegrei Caldera Unrest: Discriminating Magma Intrusions from Hydrothermal Effects and Implications for Possible Evolution," *Earth-Science Reviews* 188 (2019): 108–122, https://doi.org/10.1016/j.earscirev.2018.11.007.

8 Antonio Marturano, Roberto Isaia, Giulio Aiello, and Domenico Barra, "Complex Dome Growth at Campi Flegrei Caldera (Italy) in the Last 15 ka," *Journal of Geophysical Research: Solid Earth* 123 (2018): 8180–8197, https://doi.org/10.1029/2018JB015672.

9 Istituto Nazionale di Geofisica e Vulcanologia, Napoli Section – Osservatorio Vesuviano, *Campi Flegrei*, accessed August 24, 2024, https://www.ov.ingv.it/index.php/monitoraggio-sismico-e-vulcanico/campi-flegrei/obiettivo-campi-flegrei.

10 National Emergency Planning Map for the Campi Flegrei Area, *National Plan Campi Flegrei*, accessed August 24, 2024, https://mappe.protezionecivile.gov.it/it/mappe-e-dashboards-rischi/piano-nazionale-campi-flegrei/.

Fig. 2

Since 2005, the Campi Flegrei caldera has been experiencing a new period of ground uplift, with a rise of over a meter since 2006. A yellow alert level has been in place for this volcano since 2012. In 2023, there was also a noticeable increase in the frequency of earthquakes.

In the last ten years, the ground under Pozzuoli has risen by about 10 cm per year, with a peak of 8.5 cm reached at the end of June 2024 in the Rione Terra, the point of maximum deformation of the caldera. This neighborhood, evacuated in the 1970s due to a major earthquake, remains uninhabited, with the population relocated to the Rione Toiano, built in the outskirts of Pozzuoli to accommodate the emergency. **[fig. 3]**

Over the years, the area has undergone disorderly settlement growth without adequate planning, with illegal construction exacerbating volcanic, bradyseismic, and seismic risks.

About 20% of houses in the red zone are illegal, often built with substandard materials and inadequate techniques, making evacuation difficult in case of an emergency.

Figure 2
The Solfatara Volcano with sulfur dioxide fumarole activity.

Fig. 3

The roads are also insufficient to support potential evacuations, further complicating efforts to ensure the population's safety. This chaotic development has increased the risk in already hazardous areas, such as the crater slopes or close to active fumaroles, now "plugged" by buildings, shopping centers and infrastructure, leaving the population exposed to possible future catastrophic events. [fig. 4]

The fragility of the landscape, as well as the communities living in this territory, demands integrated and holistic approaches that combine scientific knowledge, local experiences, and new governance models, capable of enhancing collective resilience in the face of risk.

One of the significant challenges for effective risk governance is promoting policies and measures that can reconcile environmental safety with the economic development needs of local communities. Risk management and landscape enhancement are not mutually exclusive.

On the contrary, they can and must coexist in an approach that recognizes the unique value of places and the role that local communities play in preserving these territories.

Figure 3
The promontory of "Rione Terra" in Pozzuoli.

Figure 4
Top view of the relationship between the craters and the settlement-infrastructure system.

Investing in infrastructure and urban redevelopment interventions that increase territorial safety, and promoting alternative development models such as sustainable tourism and organic farming, can represent significant opportunities for this area.

Furthermore, it is essential to support the development of public awareness and knowledge, empowering communities to actively participate in decision-making processes regarding risk management and landscape protection.

Achieving such engagement requires innovative educational and awareness-raising programs that make citizens aware of the risks they face, and the importance of preserving their landscapes, and provide them with the tools to become active agents in these processes.

In conclusion, the Phlegraean Fields represent an emblematic case of how the environmental crisis, territorial fragility, and the challenges of sustainable development intersect. This complex and vulnerable landscape requires an integrated approach that recognizes the importance of landscape and social sustainability, while also acknowledging the challenges posed by volcanic risks.

Only through a combined effort involving scientific research, effective governance, and active community participation can we ensure a future that respects the unique values of these territories and the well-being of the communities that inhabit them[11].

11 Lega Ambiente, "Volcanic Risk and Bradyseism in the Campi Flegrei: Safety, Innovation, and Participation for the Sustainable Future of the Territory," accessed August 24, 2024, https://legambiente.campania.it/2024/07/13/legambiente-presenta-dossier-rischio-vulcanico-e-bradisismo-nei-campi-flegrei/.

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Fig. 4

PART B

The Anatomy of a Disaster: Understanding the 2023 Thessalian Floods

The catastrophic floods that swept through Thessaly in September 2023 served as a wake-up call for the Department of Architecture, University of Thessaly, highlighting the urgent need to rethink the balance between the natural and built environment. These events underscored the growing challenges posed by extreme weather phenomena and the necessity for more resilient urban planning strategies. The following chapter delves into the underlying natural processes behind such disasters while also shedding light on the structural and systemic weaknesses of Greek cities in managing these escalating risks.

The recent experience of floods in Greece

Nikos Belavilas
National Technical University of Athens

Athens is located in the Mediterranean, a relatively arid region. In the south, there are no large rivers or significant lakes, only streams and torrents. Like the rest of southern Europe, it experiences desertification, with half the rainfall of the northern parts of the continent. The central group of islands in the Aegean, known as the Cyclades, as well as a large part of Crete, have been stripped of forests and high vegetation due to prolonged periods of drought.

Attica, with Athens at the center of its natural basin, is traversed by an extensive hydrographic network of streams and torrents spanning several hundred kilometers. These waterways are almost entirely dry in the summer, contain little water in the winter, and are prone to seasonal floods that transform the southern plain of Athens and the coast of the Saronic Gulf, known as Faliro, into large marshes throughout the winters.

Despite the near-permanent aridity, flooding is not an unfamiliar phenomenon in central and southern Greece. In other parts of the country, large marshlands in Macedonia, central Greece, and the Peloponnese surround rivers that flow from the mountains into the plains. One such example is Thessaly and its river, the Pinios. Until the period following World War II, permanent marshy areas occupied large portions of the Thessalian plain.

To understand the current flooding situation in the country, it is useful to review the recent history of hydraulic works in Greece. Since the late 19th century, there has been a systematic policy with two main objectives: draining marshes in the countryside and converting them into agricultural land, while managing or covering streams in cities to create new urban spaces.

It's important to consider that malaria was an endemic disease and a significant issue for both rural and urban populations in Greece during this time. Therefore, the extensive drainage of marshy soils, riverside areas, and lakes, as well as the covering of streams in the cities, was driven by functionality, agricultural and social policies, and hygiene concerns. No one could have suspected a century and a half ago that this large-scale alteration

Nikos Belavilas

Fig. 1

Fig. 2

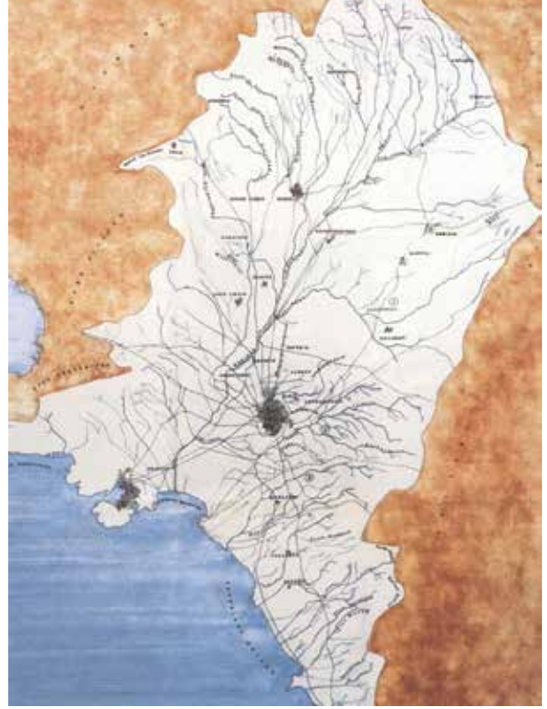

Fig. 3

of the natural landscape in rural and urban areas would lead to climate and ecological balance issues for future generations.

In the urban environment, with Athens and Piraeus serving as prime examples, the areas covered by urban development in the 1880s and 1890s accounted for only 3% of the surface area of the Attica basin. Today, they occupy more than 75%. Vast regions of the ancient plain are now built over with cement and asphalt. The rivers and streams—Kifissos, Ilisos, Pikrodafni, Podonifti, and Iridanos—once flowed freely to the sea, with a total length of 850 km.[1] The mouths of the two main rivers that brought water to the Saronic Gulf had an opening of nearly three kilometers, emptying into the sea through a large marshy delta. Today, the water exits to the sea through two narrowing points: 35 meters wide at the Kifissos and 30 meters wide at the Ilisos. The seafront was patched up from end to end during the time of the 1967 military dictatorship, and today, all the districts that had access to the sea are blocked by a wall and an elevated highway.

1 National Technical University of Athens. Alternative Practices of Intervention in Streams. Research Program "Alternative Approaches to Water Management." Athens, 1995.

Figure 1
Map of the hydrographic network of the Athens basin in 1988. Source: National Technical University of Athens. "Alternative Practices of Intervention in Streams." Research Program "Alternative Approaches to Water Management," Athens, 1995.

In the rural area, Thessaly is particularly notable. This region in central Greece has the most concentrated lowland and fertile areas in the country. Half a million hectares, or 37% of the area, are flat, with half of Thessaly being arable land.

It is a unique catchment area, with large mountains in the west and the Pinios River, which serves as the backbone of the plain with its many tributaries. This region was the ideal place to implement the agrarian reform strategy that had been discussed for a century since the creation of the state and the reign of the Bavarian King Otto. Furthermore, it was the precursor to the successful example of the southernmost plain in Boeotia, Kopaïs, which was successfully expropriated at the end of the 19th century.

However, in Thessaly, the life-giving river Pinios simultaneously posed a significant problem for the plain. Its annual floods left parts of the entire plain permanently or periodically underwater for months, while most fields remained dry and had low agricultural yields.

Figure 2
Map of the hydrographic network of the Athens basin in 1951. Source: National Technical University of Athens. "Alternative Practices of Intervention in Streams." Research Program "Alternative Approaches to Water Management," Athens, 1995.

Figure 3
Map of the hydrographic network of the Athens basin in 1893. Through successive mapping, it is possible to observe the construction that expanded at the expense of rivers and streams during the 20th century. From an initial 850 km of rivers and streams, today only ¼ of the water network remains open. Source: National Technical University of Athens. "Alternative Practices of Intervention in Streams." Research Program "Alternative Approaches to Water Management," Athens, 1995.

The triple plan for drainage, flood protection, and extensive irrigation aimed to secure agricultural land and transform dry cultivation into irrigated agriculture with higher yields. This plan was finally launched in the 1920s, and by the 1960s, it had radically changed the Thessalian landscape. At the beginning of the 20th century, only 2.7 million acres were under cultivation in Thessaly, with the rest being meadows, marshes, and forests. By 1961, this number had risen to 4.8 million acres.

In summary, this transformation resulted from a technological leap in land reclamation and the return of land to farmers, leading to the doubling of farmland and more than doubling of production. However, the Pinios and its large hydrographic network, seasonal natural flood basins, and lake zones were significantly altered. Rivers were regulated, marshes were drained, and Lake Karla, a natural lake that received surplus water from the Pinios during heavy rains, was drained and converted for agricultural use.

Awareness of the problems arising from changes in the Greek landscape emerged in the early 21st century. From the beginning, two key areas have highlighted these challenges: Attica, with the covering of the Kifissos River, and Thessaly, with the drainage of the plain.

The Kifissos River last flooded in 2002 while the project to fully enclose the southern part of the river downstream was still underway. Since then, the riverbed, confined in a box canal designed to handle a T50 flood (a flood with a 50-year recurrence interval), has nearly overflowed during heavy rains. Similarly, the Ilissos River rises to dangerous levels whenever it rains. Aged and poorly maintained pipelines in both rivers are at risk of blockage due to debris and rubbish, and there have been incidents of bank collapses in both the underground sections of the Kifissos and the Ilissos.[2]

2 Ministry of Environment and Energy. Flood Management Plan for the Basins of Attica. Athens, 2017.

Flooding incidents continue to occur in many districts of Athens and Piraeus during moderate to severe storms. Concerns about the future of Attica's rivers and streams within the urban landscape have existed for two decades, voiced by scientists and environmental activists, but have largely gone unheeded. Proposals for alternative waterway management strategies have also been ignored until recently.

In 2019, following the collapse of part of the Ilissos River's slopes, the state organization "Athens Anaplasis" proposed reopening and restoring the ancient riverbed from the Olympion and Panathenaic Stadium, through the city's archaeological center, to the Museum of Contemporary Art—a stretch of about one kilometer. Although the proposal was initially met with

Fig. 4

Fig. 5

Fig. 6

enthusiasm, it was abandoned a few months later following a change in government after the elections. In the same period 2017-2019, the Region of Attica launched the creation of a coastal flood control channel at the mouth of Kifissos, combined with an urban green park. And this project, after the change of government, was frozen.

At the same time, an extreme incident sounded the alarm and brought the issue of the climate crisis to the forefront. On November 15, 2017, a sudden and intense rainstorm struck the small town of Mandra, near Athens, with rainfall exceeding 200 mm in the neighboring mountains and 170 mm in the town within a few hours—twice the annual average for the region. This catastrophic flood claimed the lives of 24 people. Massive

Figure 4
River Kifissos during a major downpour in 2021. The water reached the limits of the technical containment. The river can be seen where it transitions into an underground pipeline, with the motorway running above it. Source: NTUA Urban Environment Laboratory Archive.

Figure 5
The Kifissos River, completely covered by the motorway, approximately halfway along its course. Source: NTUA Urban Environment Laboratory Archive.

Figure 6
The underground riverbed of the Kifissos River, with piles of accumulated rubble and garbage. Source: George Lialios and the newspaper *Kathimerini*, 2024.

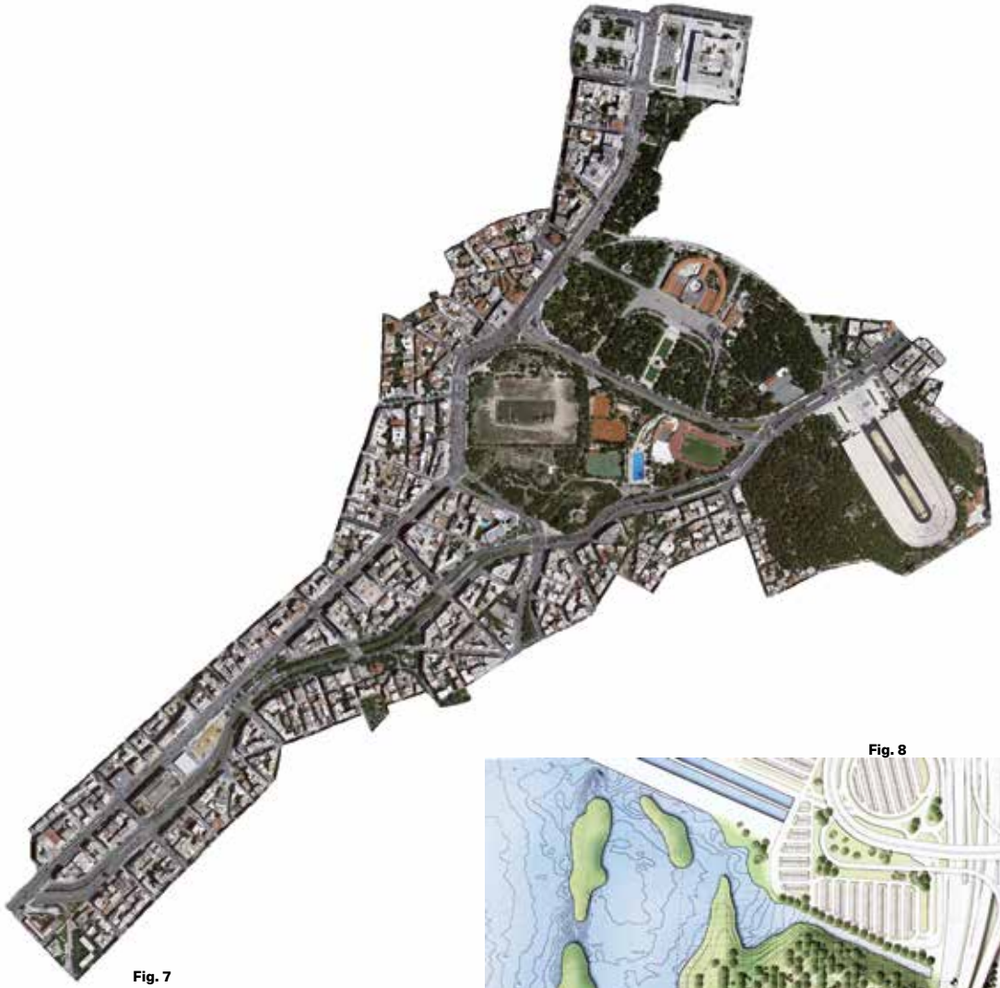

Fig. 7

Fig. 8

Figure 7
Draft general plan for freeing the riverbed of the Ilisos River in the area of the archaeological sites of Athens. Source: Athens Anaplasis S.A., 2019.

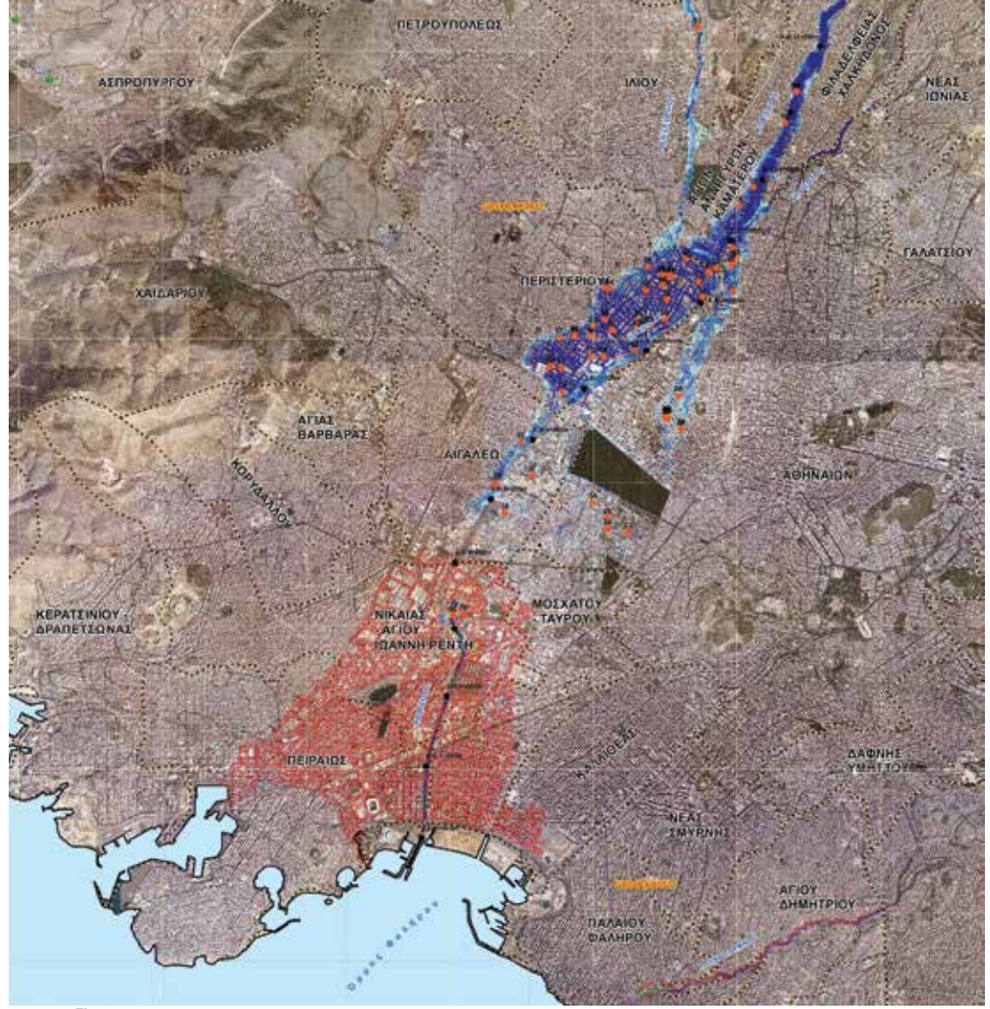

Fig. 9

Figure 8
Proposal for a park with a flood control channel at the mouths of the Kifissos and Ilissos rivers, on the coast of Falirikos Ormos. Source: Renzo Piano, 2011.

Figure 9
Flood risk map (T=50) of the Athens Basin. This map shows that large parts of the city are at high risk of flooding (marked in red and blue) in the event of heavy rainfall. Source: Ministry of Environment and Energy, "Flood Management Plan for the Bassins of Attica," Athens, 2017.

volumes of water rushed down the cemented roads, overwhelmed the drains of former streams, swept away buildings constructed on the riverbed, and tragically killed those in the water's path. The primary cause was the covering of the streambeds with structures. The Mandra flood was estimated to be a 150-year flood.

During this period, repeated severe weather events, such as the Medicanes Zorbas (September 2018), Nestor (October 2019), Ianos (September 2020), and finally Daniel (September 2023), have highlighted the scale and acceleration of climate change in the Eastern Mediterranean region,[3] particularly in Greece. Ianos and Daniel, in particular, caused significant disasters, culminating in major flooding in Thessaly and the unexpected re-flooding of Lake Karla, which had been drained since 1962.

It should be noted that since the 2000s, an ambitious project for the partial regeneration of the lake was launched, driven by visible phenomena such as desertification, depletion of water resources, and collapse of biodiversity. This project was completed in 2018 and successfully recreated only a small portion of the original lake. The event caused by Daniel led to the natural re-flooding of the entire area that had been drained sixty years ago.

The re-flooding of Lake Karla in 2018 could perhaps be considered the first project aimed at shifting the long-standing political tradition regarding the water environment. It was a recovery project rather than a containment project, as had been the case up until then. Nevertheless, the new lake was not enough. Storm Daniel in 2023 created a body of water dozens of times larger than the new artificial Lake Karla, inundating all the areas that had been dedicated to agriculture from the 1960s to the present. But that was not the end of the damage. The flood that followed the rainfall covered an area of 700,000 hectares, including farmland, settlements, districts of the city of Larissa, roads, and railways. Similarly, in the eastern part of the region, on Mount Pelion and in the city of Volos, the situation mirrored what had happened in Mandra, Attica, five years earlier. Streams that were either closed or confined swept away buildings and roads in residential areas. In the city of Volos, the Krafsidonas River overflowed its banks, particularly where its bridges narrowed the cross-section, spreading its raging waters over the campus of the University of Thessaly, the Tsalapata Museum courtyard and buildings, and other areas. Although the city of Volos has a vast seafront, as do many of the villages of Pelion that were damaged, the waters could not escape to the sea due to the dense, compact urban development.

3 Yann Tramblay, Patrick Arnaud, Guillaume Artigue, Michel Lang, Eric Paquet, Ludovic Neppel, and Eric Sauquet. "Changes in Mediterranean Flood Processes and Seasonality." Hydrology and Earth System Sciences 27 (2023): 2973–87. https://doi.org/10.5194/hess-27-2973-2023 and Laura Botija and María del Carmen. Floods Evolution in the Mediterranean Region in a Context of Climate and Environmental Change. Universidad de La Rioja, May 17, 2021. http://hdl.handle.net/2445/194366 and World Weather Attribution. "Interplay of Climate Change-Exacerbated Rainfall, Exposure and Vulnerability Led to Widespread Impacts in the Mediterranean Region." September 19, 2023. https://www.worldweatherattribution.org/interplay-of-climate-change-exacerbated-rainfall-exposure-and-vulnerability-led-to-widespread-impacts-in-the-mediterranean-region/.

Fig. 10

Fig. 11

Figure 10
Flood map of Thessaly on September 7, 2023, after Medicane Daniel. Source: Copernicus and Meteo.gr

Figure 11
Flood risk map (T=50) of Volos. The flooding caused by Medicane Daniel in September 2023 largely affected the areas shown in red and blue on the map in the western part of the city. Source: Ministry of Environment and Energy, "Flood Management Plan for River Basins of Thessaly," Athens, 2017.

Fig. 12

The only consolation from the Thessalian disaster of 2023 was the relatively effective flood protection of the city of Larissa. As early as the 1980s, a decision was made to leave an arc around the city—covering an area of about five thousand acres—undeveloped and free from construction, so it could accommodate surplus water from the Pinios River in the event of flooding. This strategy proved effective. Although the level of the Pinios River rose by more than 7 meters, the flood control basin functioned well. By filling with water, it delayed the flooding and prevented the destruction of riverside districts. However, where this protective measure was breached—in the districts of Giannouli and St. Thomas—the river flooded the streets and buildings.

Both the Athenian and Thessalian experiences lead to the same conclusion: the previous century's planning of water management and the response to severe meteorological phenomena is no longer sufficient. The climate crisis, the frequency and intensity of extreme climatic events, clearly shows that a change of strategy is urgently needed. The inadequacy of the hydraulic projects of previous generations is already being discussed at an international level, as is their scientific methodology—the attempt to transform rivers into artificial conduits, and to reduce or even eliminate lakes.

The natural disasters in Thessaly proved that in only two cases did things work well. The first was a clever human choice: the flood basin of Larissa in the 1980s, which received large quantities of water and slowed down the velocities and the rise in levels. The second was a salutary natural development: the regeneration of Lake Karla, sixty years after it was drained,

Figure 12
The flooded settlement of Vlochos in Thessaly, after Medicane Daniel, September 2023. Source: https://www.imerodromos.gr/

Fig. 13

which, by taking millions of cubic meters of water from the Pinios, prevented the flood from spreading to other areas of Thessaly.

Throughout the rest of the management of Medicane Daniel, the mechanisms for prevention and intervention at the time of the disaster proved to be particularly inadequate. And yet, the striking fact is that as early as 2017, there were already serious studies on the potential impacts and risks of flooding in all Greek regions. The corresponding study for Thessaly was prophetic, accurately predicting, through mathematical models and geographical systems, what would happen.[4] The study for Attica is nightmarish as it predicts that in the event of a Mandra (2018) or Daniel (2023) type flooding event, many districts of Athens and Piraeus will be submerged under the waters of the Kifissos River.

The need to revise the model of interventions in the hydrographic network and the realization that in the coming years we will live with extreme phenomena such as floods, heat waves, and storms forces us to search for new techniques. The restoration of natural and urban land in riverbeds, lake basins, and river estuaries to the sea is a necessary measure in this review.

4 Ministry of Environment and Energy. Flood Management Plan for River Basins of Thessaly. Athens, 2017.

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Figure 13
The Pinios River overflowed its banks, covering farmland and settlements. Source: NTUA Urban Environment Laboratory Archive.

Floods in Thessaly, Greece: causes, impacts, and protection measures

Aikaterini Lyra
Nikitas Mylopoulos
Lampros Vasiliades
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This study examines the causes, impacts, and protection measures related to flooding in Thessaly, Greece, a region characterized by diverse landscapes and significant agricultural output. The area's vulnerability to floods is influenced by its flat plains, surrounded by mountains, and a complex river system, including the Pineios River and its tributaries. Floods in Thessaly are exacerbated by both natural factors, such as heavy rainfall and climate change, and human-induced factors, including deforestation, urbanization, and inadequate infrastructure. Recent severe floods, notably those from Storm Daniel in 2023, have caused extensive damage to infrastructure, agriculture, and livelihoods. In response, the implementation of a comprehensive flood protection plan combining structural and non-structural measures, integrating nature-based solutions, community participation, and continuous monitoring is critical to manage water flow, mitigate flood risks, and enhance the region's resilience against future flood events.

Introduction

Floods are a natural disaster that can have devastating consequences on human life, infrastructure, and the environment [1]. This paper aims to explore the causes of floods in Thessaly, their impact on the region, and the measures taken to protect the local population from these natural disasters. Thessaly is a significant geographical and historical region located in central Greece. It is known for its diverse landscapes, which include fertile plains, rugged mountains, and important river systems. Thessaly's lowland area is primarily agricultural, producing a significant portion of Greece's wheat, cotton, and other crops. The most important river in Thessaly is the Pineios (also spelled Peneus), which flows through the Thessalian Plain and drains much of the region. It originates in the Pindus mountains and empties into the Aegean Sea. Several smaller rivers and tributaries, such as the Titarisios, Enipeas, and Sofaditis, contribute to the region's hydrology and are important for agriculture and ecosystem health. There are also a few but notable lakes, particularly artificial ones, integral to Thessaly's water management, irrigation, and tourism, contributing to the region's economy and environmental health. Lake Karla, near the cities of Larissa and Volos, was drained in the 1960s for agricultural purposes, but in recent decades, part of the lake has been restored to mitigate flood risks and preserve wildlife [2]. The Lake Plastiras (Tavropos Reservoir) is an artificial reservoir created in 1959 by damming the Tavropos River, and Lake Smokovo, near the town of Karditsa, an artificial lake created by the construction of a dam on the Smokovo River, both multipurpose reservoirs for irrigation, electricity and flood protection.

Thessaly has a predominantly Mediterranean climate, with hot, dry summers and mild, wet winters. However, due to its varied topography, microclimates are common, with the mountainous areas surrounding the plain, receiving substantial precipitation, which flows into the Pineios River and its tributaries. Sudden downpours can overwhelm the river systems, leading to overflow and flooding in the low-lying plains. Key urban centers in Thessaly are Larissa, Volos, Trikala and Karditsa. Due to its flat terrain and the presence of large rivers, Thessaly is prone to flooding, especially during periods of heavy rainfall.

Causes of Flooding in Thessaly

Floods in Thessaly are primarily caused by a combination of natural and human-induced factors. The region's topography, characterized by a flat plain surrounded by mountains, creates a natural basin that is prone to flooding during extreme precipitation events, which have become more frequent due to climate change[3]. Extreme precipitation and severe fluvial floods have taken place the last years due to meteorological and hydroclimatological extremes of climate change[4]. Historical human interventions, such as extensive drainage and land reclamation projects initiated in the mid-20th century, have disrupted natural flood regulation, leading to increased vulnerability [5]. Human activities like deforestation and urbanization intensified flood proneness[6]. Inadequate infrastructure, including insufficient discharge capacity in river channels and poorly designed hydrotechnical projects, exacerbated flooding risks[7].

1 Loukas Vasiliades, Hydrological Hazards (The 4Ms: Modelling, Monitoring, Management and Mitigation), in *Elgar Encyclopedia of Water Policy, Economics and Management* (Edward Elgar Publishing, 2024).

2 Panagiotis Sidiropoulos, Nikolaos Mylopoulos, Anastasia Lyra, Georgios A. Tziatzios, and Athanasios Loukas, "Risk Analysis Framework for the Optimum Remediation of a Contaminated Aquifer under Uncertainty: Application in Lake Karla Aquifer, Thessaly, Greece," *Stochastic Environmental Research and Risk Assessment* 37 (2023): 1281–1302.

3 Jurík J. et al., "Addressing Riverine Flooding with Nature-Based Solutions in the Thessaly Region, Greece," (2022); George Papaioannou, Loukas Vasiliades, and Athanasios Loukas, "A Flood Inundation Modeling Approach for Urban and Rural Areas in Lake and Large-Scale River Basins," *Water* 13 (2021): 1264; Vasiliades, Hydrological Hazards (The 4Ms).

4 Vasiliades, Papaioannou, and Loukas, "A Unified Hydrologic Framework for Flood Design Estimation in Ungauged Basins," Environmental *Science Proceedings* 25 (2023): 40; Haris Vangelis et al., "Relationship of Rainfall and Flood Return Periods through Hydrologic and Hydraulic Modeling," *Water* 14 (2022): 3618; Papaioannou, Loukas, and Vasiliades, "Flood Risk Management Methodology for Lakes and Adjacent Areas: The Lake Pamvotida Paradigm," 7 (2019): 21.

5 Evangelos Dimitriou et al., "Post-Analysis of Daniel Extreme Flood Event in Thessaly, Central Greece: Practical Lessons and the Value of State-of-the-Art Water-Monitoring Networks," *Water* 16 (2024): 980.

6 Papaioannou, Vasiliades, and Loukas, "A Flood Inundation Modeling Approach for Urban and Rural Areas."

7 Papaioannou, Vasiliades, and Loukas, "A Flood Inundation Modeling Approach for Urban and Rural Areas"; Angelakis et al., "History of Floods in Greece: Causes and Measures for Protection," *Natural Hazards* 101 (2020): 833–52.

Impact of Floods

Floods in Thessaly, Greece, have significant and multifaceted impacts, including loss of life, extensive damage to infrastructure, agriculture, economic devastation, and long-term environmental consequences[8]. The impact on the local community has been devastating, with many residents losing their homes and livelihoods. The region, known as Greece's agricultural breadbasket, faces severe disruptions to crop production and soil fertility due to flooding, which can lead to long-term agricultural decline[9] . In the region happened three distinct and extreme flooding phenomena, Ianos Medicane in September 2020[10], and the Storms Daniel and Elias in September 2023, all with catastrophic effects. Figure 1 illustrates the extensive flooding caused by Ianos Medicane, highlighting a maximum flooded area of 352 km^2, demonstrating the severe impact of the storm on Thessaly's landscape and infrastructure. [Fig. 1]

The recent Storm Daniel resulted in 17 fatalities and caused billions of euros in damages to infrastructure, livestock, and properties, with entire villages submerged for extended periods[11]. The restored Lake Karla, during floods, during extreme events like those caused by Storm Daniel in 2023, has acted as a natural reservoir, helping to absorb excess floodwaters and reduce the impact on nearby agricultural lands and settlements. However, the lake's capacity to manage such large volumes of water is still limited, and the adjacent areas remained flooded for months. Figure 2 shows the catastrophic impact of Storm Daniel, with a maximum flooded area of 1,476 km^2, significantly surpassing previous flood events and underscoring the storm's unprecedented scale and severity in Thessaly. [Fig. 2]

Protection Measures

In Thessaly, Greece, various flood protection measures have been implemented to mitigate the impact of frequent flooding, however, recent initiatives also focus on modernizing and rehabilitating sewerage and drainage networks to enhance flood prevention capabilities. The integration of nature-based solutions is being explored to complement traditional infrastructure, aiming for a more sustainable approach to flood management[12].

Flood protection is based on managing flood routes. This involves managing water flow from the mountains to the estuaries, ensuring that during extreme events, projects work together to divert parts of the flood volume to designated waterproof areas. Flood risk management plans adopt an inte-

8 Papaioannou, Vasiliades, and Loukas, "A Flood Inundation Modeling Approach for Urban and Rural Areas"; Vasiliades, Papaioannou, and Loukas, "A Unified Hydrologic Framework for Flood Design Estimation."

9 Dimitriou et al., "Post-Analysis of Daniel Extreme Flood Event"; Jurík J. et al., "Addressing Riverine Flooding with Nature-Based Solutions."

10 Klearchos Lagouvardos et al., "Ianos—A Hurricane in the Mediterranean," *Bulletin of the American Meteorological Society* 103 (2022): E1621–E1636.

11 Dimitriou et al., "Post-Analysis of Daniel Extreme Flood Event."

12 Jurík J. et al., "Addressing Riverine Flooding with Nature-Based Solutions."

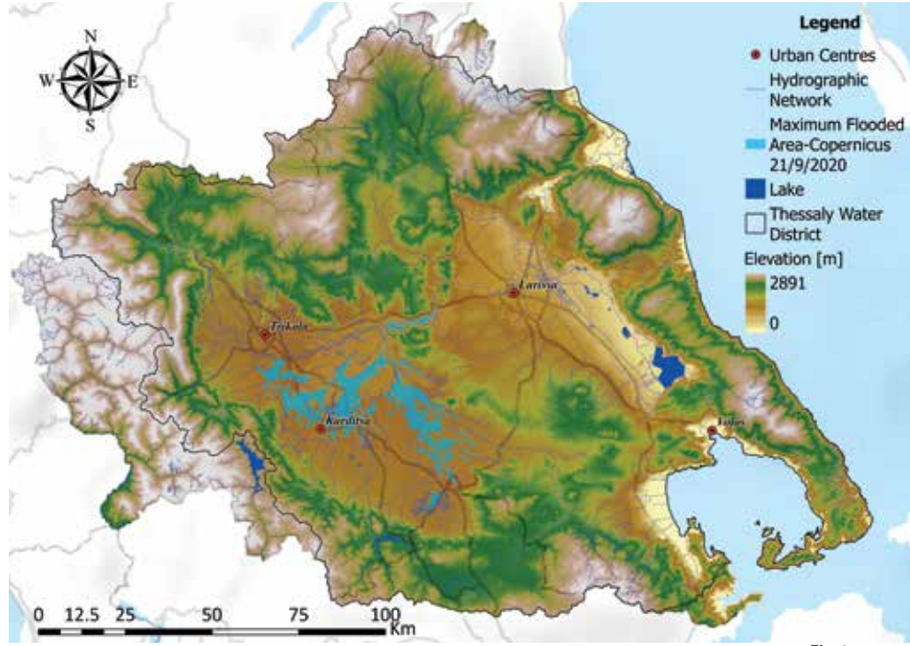

Fig. 1

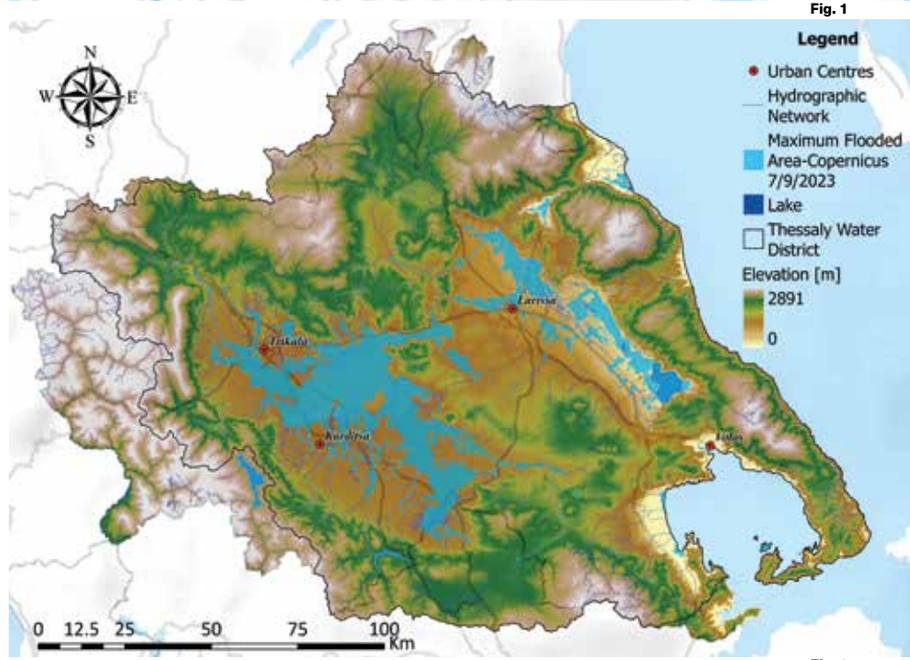

Fig. 2

Figure 1
A detailed map of Thessaly showing the elevation, the hydrographic network, the urban centers, and the flooded extent during the "Ianos" Medicane in September 2020. Source: Laboratory of Hydrology and Aquatic Systems Analysis, Department of Civil Engineering, University of Thessaly.

Figure 2
A detailed map of Thessaly showing the elevation, the hydrographic network, the urban centers, and the flooded extent during the "Daniel" Storm in September 2023. Source: Laboratory of Hydrology and Aquatic Systems Analysis, Department of Civil Engineering, University of Thessaly.

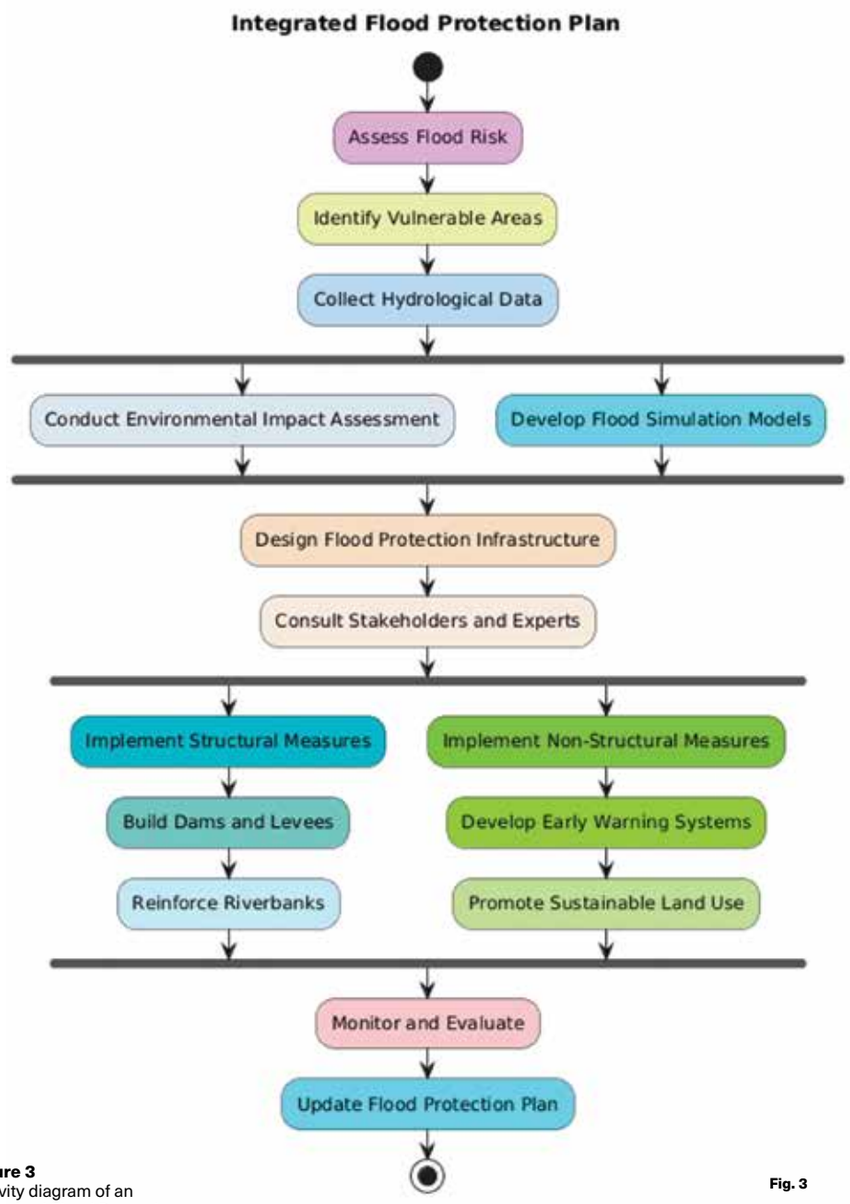

Figure 3
Activity diagram of an Integrated Flood Protection Plan. Source: Laboratory of Hydrology and Aquatic Systems Analysis, Department of Civil Engineering, University of Thessaly.

Fig. 3

grated and holistic approach, focusing not only on individual measures like dams or levees but considering a combination of strategies that work together harmoniously[13]. An Integrated Flood Protection Plan is a comprehensive design to mitigate flood risks in vulnerable areas. Figure 3 shows the activities required for the implementation of an Integrated Flood Protection Plan. It begins with assessing flood risk through the collection of hydrological data and conducting detailed flood modeling to identify areas at risk. Then, structural measures are outlined, such as constructing levees, dams, and drainage systems, as well as installing early warning systems. Non-structural measures include improving land use planning, enhancing river basin management, and promoting reforestation to increase natural absorption of floodwaters[14]. Community participation is emphasized through training and drills. The plan also includes ongoing monitoring, maintenance of infrastructure, and regular reviews to adapt to changing conditions. These combined efforts are crucial for improving the region's resilience against future flood events. **[Fig. 3]**

13 Wolfgang Kron and Oliver Müller, "Efficiency of Flood Protection Measures: Selected Examples," *Water Policy* 21 (2019): 449–67.

14 Eugen Gavrilescu and George D. Buzatu, "Structural and Hydro Technical Schemes for Flood Defenses," *Advanced Engineering Forum* 13 (2015): 200–205.

Conclusion

Thessaly's susceptibility to floods is a complex issue shaped by its unique geography, climate, and human activities. The region's flat plains, surrounded by mountains, and its extensive river systems make it particularly vulnerable to flooding, especially during extreme weather events exacerbated by climate change. The impacts of recent floods have been severe, affecting lives, infrastructure, agriculture, and the environment. Addressing these challenges requires a multifaceted approach that combines traditional infrastructure with innovative, nature-based solutions. The implementation of an Integrated Flood Protection Plan, which includes structural and non-structural measures, community engagement, and ongoing monitoring, is crucial for reducing flood risks and safeguarding Thessaly's future. By enhancing resilience and adapting to changing conditions, Thessaly can better protect the natural environment and preserve its vital agricultural and economic activities.

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PART C

Witnessing the Aftermath: Fostering empathy, redefining strategies

As part of the workshop, field visits were carried out in three areas severely affected by the devastating floods of September 2023: the workers' housing in Giannouli, Larissa, Lake Karla, and the settlement of Mikro in Pelion. These visits were aimed not only to raise awareness among participants but also to provide a deeper, more holistic understanding of the disaster. Beyond analyzing the technical, economic, and geographical dimensions of the floods, the focus was on witnessing firsthand the human toll of the catastrophe, the disruption of lives, the loss of homes, and the broader social and environmental consequences. By immersing themselves in these realities, participants were encouraged to reflect on the urgent need for innovative strategies and resilient urban planning solutions that could mitigate or even prevent the devastating effects of future flooding events.

Fig. 1

Fig. 2

Figure 1
Larisa during the 1883 floods. The event was captured in 16 photographs by the photographer Ioannis Leontaridis. Two of these photographs were turned into engravings and published in the Leipzig edition of Esperos, issue 64, on December 15/27, 1883. Source: Larisa Photographic Archive.

Figure 2
The flooded Pinios River on September 10, 2023. Larisa is located to the south and Giannouli to the north of the river. The flooded housing estate is marked with a pink circle. The pink dotted line indicates the location of the dyke that protects the housing area. The arrows point to the sections of the dyke that allowed water to enter the housing estate. Source: background Copernicus aerial photo, edited by N. Kanellos.

City in water

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The continuous proximity of the river and the city has resulted in severe floods over time. Recorded incidents date back to the Ottoman period, with the first recorded flood in 1684, when heavy rains caused the Pinios River to overflow, leading to destruction in the city. Similar events occurred in 1729 and 1777. In August 1811, a 40-hour downpour flooded the southern neighborhoods of Larissa. Following these disasters, the first simple flood control measures were implemented, such as ditches to channel rainwater into the river.

New floods struck the city again in 1826 and early 1882, causing destruction. A year later, in 1883, a torrential 48-hour rainstorm killed 20 people and destroyed around 300 buildings. This particular flood is well known as it was photographed by Ioannis Leontaridis. **[Fig. 1]** Floods and damage were also recorded in November 1901, September 1908, 1909, and 1931. Until 2010, historical records suggested that the Pinios River caused medium-scale floods every 25 years and large-scale floods every 50 years. However, after the flooding events caused by Storm Ianos in 2020 and Storms Daniel and Elias in 2023, this assumption has been revised.

An overflow of Pinios is considered officially a flood when water levels at the Giannouli bridge gauge reach 6 meters. Between 6 and 7 meters, the surrounding agricultural areas are submerged. From 7 to 8 meters, the Agios Thomas district floods. Exceeding 8 meters endangers large parts of the city[1].

Between September 5-7, 2023, two consecutive days of torrential rain in Thessaly caused the Pinios River and its tributaries to overflow. The water level reached 10 meters, breaking flood barriers and dykes and submerging several villages, including Palamas, Vlochos, Metamorfosi, Koskinas, and Marathea. The overflow at Larissa flooded the Giannouli workers' housing estate, parts of the Agios Thomas neighborhood, Filippoupoli, and Nea Smyrni districts, causing extensive destruction. **[Fig. 2]**

Flood protection efforts in the Thessalian plain

After the annexation of Thessaly to the Greek State in 1882, the government realized that there were more areas under water that areas cultivated. Sivignon[2] calculates that 30.000 hectares were under water

1 Kypraiou, Charikleia. "Flood Phenomena and Risk Management: Application Field Pinios River and Larissa Plain." Master's Thesis, National and Kapodistrian University of Athens and Technological Educational Institute of Serres, 2011 (in Greek).

2 Sivignon, Michel. Thessaly: Geographical analysis of a Greek region. Educational Institute of Agricultural Bank of Greece, Athens, 1992 (in Greek).

during the whole year while 200.000 hectares were suffering from seasonal floods. The first coordinated flood protection efforts date back to 1887 with the employment of the French technical company Gottelland. The Italian engineer Nobile completed another study for the drainage of the marches of the Thessalian plain from 1911 to 1913. In 1921 the English engineer Jackson continued Nobile's proposals and advised for the construction of dykes to prevent occasional floodings. Finally in 1931the British company Henry Boot and Sons Ltd prepared a study on the prevention of floods and on the drainage of marshes of the plain. Works started in 1936 and continued until 1961 with the drainage of Karla lake. Projects implemented included the construction of dykes, river diversions, stream channeling, water dams and an extended canal network in order to drain the fields. [Fig. 3] The drainage of the marshes, lakes and other areas was associated with a state organized land redistribution to landless farmers. During this process they sought to create uniform, easily irrigated plots by rerouting streams, filling small watercourses, and flattening land. This process destroyed river meanders, which naturally slow water flow and act as water storage areas. Instead, embankments became the primary flood protection method.

In the city of Larisa embankments were built by the Boot company to protect the riverside neighborhoods. In the 1930s, the river was diverted north into an artificial channel, and its original natural bed was abandoned. However, in the 1950s, after continued protests from the local people, a controlled water flow was reintroduced into the old riverbed. This branch of the river runs through a central area of the city, and it has become an important feature of the city's identity.

In 1986, the General Urban Plan designated areas for flood protection zones, mainly along the northern branch of the river. These areas are normally used for agriculture, while some sections have been developed into recreational and green spaces (parks, open athletic courts, playgrounds). A 2009 amendment to the plan expanded the protection zone from 100 to 200 meters from the riverbed, allowing only outdoor landscaping and green spaces within this buffer zone[3].

The flooded housing estate

The workers' housing in Giannouli consists of two residential complexes built in different periods: The «Melina Mercouri» settlement was constructed between 1993 and 1998 by the Workers Housing Organization (WHO)[4]. The

3 "The First General Urban Plan (GUP) of Larissa was approved in 1986 by Ministerial Decision No. 63819/2836/23-9-1986 (Government Gazette 1042D/31.10.1986). Later, in 2009, the GUP was revised and expanded by Decision No. 5625/59708/28-9-2009 of the General Secretary of the Region of Thessaly (Government Gazette 523AAP/09.10.2009) (in Greek).

Figure 3
Network of canals in the Sofades area. Source: Sivignon, 1992.

Fig. 3

Fig. 4

Fig.5

Figure 4
The Melina Merkouri housing estate (Photo: S. Grafakou).

Figure 5
The Melina Merkouri housing estate as of September 13, 2023 (Photo: K. Tsakalidis SOOC).

Fig. 6

Fig. 7

Figure 6
Some residents remained in their homes for ten days until the water finally receded (Photo: V. Antonopoulos TVXS).

Figure 7
As of July 2024, the damage remains evident (Photo: S. Grafakou).

4 The Workers' Housing Association, established in 1954, was abolished in 2012 due to austerity measures imposed by the EU. It was the only state entity providing social housing in Greece.

apartments were handed over to beneficiaries between 1998 and 2000. It consists of rows of three-storey apartment buildings elevated approximately 1.5 meters above the ground, with underground utility spaces. [Fig. 4] Very close by are the «New Workers' Housing», located next to the Harokopou Konaki.

During the September 2023 floods, all basements in the Giannouli workers' housing complex were flooded, and in some areas, even the raised ground floors were affected. The area remained submerged for about 10 days without electricity. [Fig. 5] Most residents were evacuated by firemen and the army using boats. However, many stayed behind to protect their homes from looting or because they did not want to relocate to gyms and hotels provided by the Municipality of Larissa. [Fig. 6]

In the flooded raised ground floors, household furnishings, door and window frames were destroyed, and significant damage occurred to walls, floors, and electrical installations. The time required to pump water from the basements worsened the initial damage. The prolonged delay in granting compensation (which, when given, were significantly lower than repair costs) led to ongoing deterioration of the buildings. [Fig. 7] As a result, many owners abandoned their homes and sought alternative housing.

Visit to the area and issues explored

On July 2, 2024, thirty five Greek and international students of architecture and landscape architecture, along with 10 faculty members participating in the Blended Intensive Program "Hybrid Urbanscapes", visited the workers' housing in Giannouli. They spoke with residents and gained a deep understanding of the scale of the problem. [Fig. 8] Despite almost a year having passed since the 2023 flood, the signs of destruction remained evident – outdoor spaces in poor condition, buildings marked by water level stains, many apartments closed and uninhabited, common buildings barely functioning, and residents in despair.

Reports from both residents and newspapers of the time suggest that two parallel events led to the flooding in the area. First, the stormwater drainage system failed to handle the excessive rainfall, causing drains to overflow. Second, the collapse of one of the dykes west of the settlement allowed the overflowing Pinios River to flood the workers' housing zone.

The students' visit had two main objectives. The first was to understand the problem in a technical context and with technical tools: hydrology, hydraulics, mapping. The second, and equally important, goal was to develop empathy, to physically witness the flood's impact, and to comprehend the events from anthropological and social perspectives. FIG8

The experience of the visit brought several themes to the fore and provided the necessary material for discussing future strategies. It became evident –from the visit, the understanding of local history, and discussions with the regional government[5]– that the logic defining the relationship between the city and water throughout the 20th century is one of opposition, a logic of subjugating nature to technical culture. Water is confined to canals and geometric channels, perceived mainly as an irrigation mechanism, and is limited and directed from the sources to the mouths of rivers and streams. Human presence continuously appropriates riverside zones for residential or agricultural use. The river functions as a tamed animal: it is enchanting when it has a controlled flow –thus safe and appealing for strolling and recreation– but as an uncontrolled element, it induces fear and leads to safety strategies. Higher dykes, longer distances from the river beds, more dams, more mechanical pumps. Ultimately, the issue of mutual concessions between man and nature formed the framework within which strategies for creating hybrid land formations which will allow coexistence.

5 During the site visit we discussed with Mr Labrinidis, vice regional governor responsible for the environment issues, the strategies of the Regional Government with regard to future floods.

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Fig. 8

Figure 8
Vagellis Voulgarakis stayed in his home throughout the flood. He recounts his family's experience and the challenges they faced both during and after the disaster (Photo: S. Grafakou).

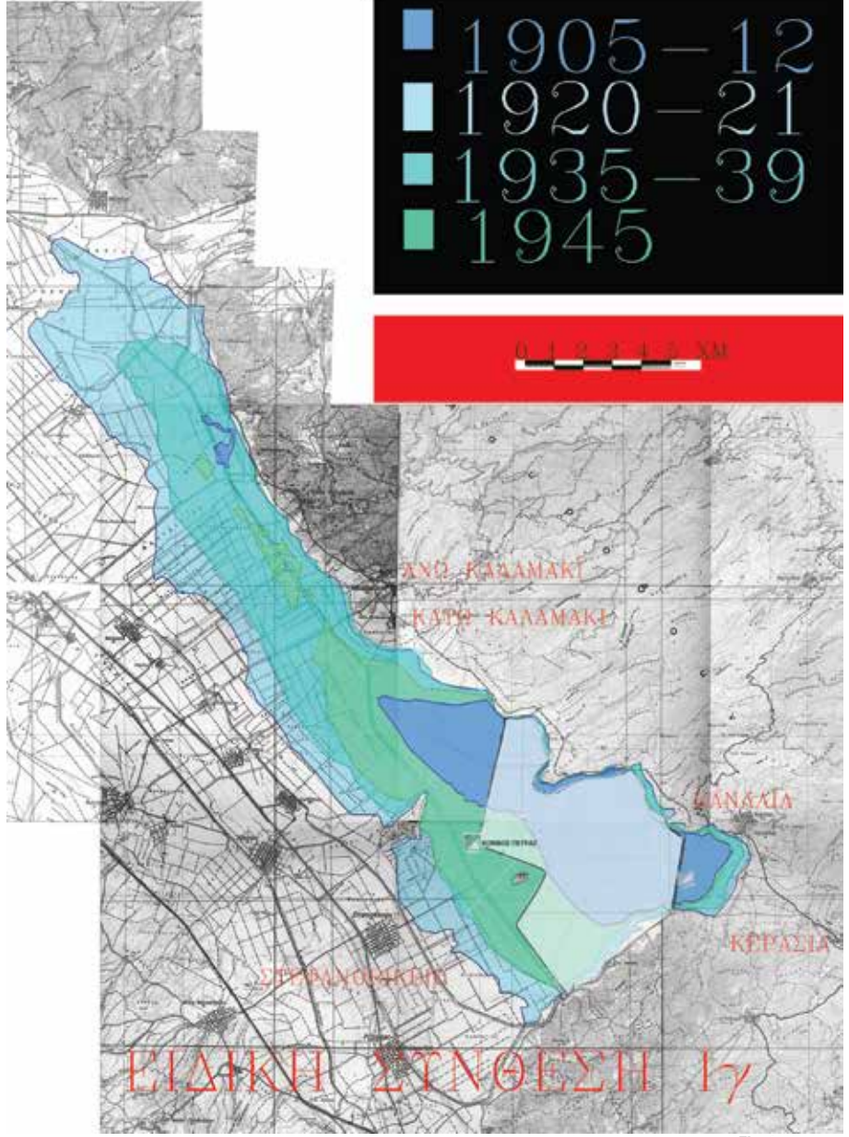

Fig. 1

Figure 1
Comparison of Lake Karla's contours on a common map, created by the author for the course Special Design Course taught at UTH between 2007- 2012. Background: 1:50,000 Army Geographical Survey maps and aerial photo synthesis. Source: Author(s).

The 'inside' and the 'outside' of Lake Karla: the aquatic and the arid

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Karla's Review: lake, non-lake, reservoir or flooded area?

Looking at the Thessalian plain from afar, and seeking a reference to the case of Lake Karla, in a simplified and brief - we would say telegraphic - way, the chronicle could be condensed into the phrase: "The Lake which became a Plane which became a Lake". If we take a closer and more detailed look at the events and the landscape, we will see important details of the landscape that are lost in the general, distanced map: the response of life through its different forms, but also various anthropic[1] efforts that have come to fruition or remained fruitless so far, which better delineate the watery veil of the Karla together with the modes of inhabiting it.

Throughout the historical years, and up to the middle of the 20th century, the nature of Lake Karla was that of a constantly and incessantly changing lake, whose area changed noticeably and chaotically from year to year, sometimes shrinking and sometimes growing. The reason was that it was connected to a multitude of torrents flowing from Mavrovouni and NW Pelion, but also to the overflow of the river Pinios, through the flow of the seasonal brook-stream 'Asmaki': thus the same amount of water did not reach Karla every year. The order of magnitude of the variation ranged, if we rely on 20th century aerial photographs, from a maximum recorded length of about 25km (in the years 1920-21) to a minimum of 10km (in the years 1905-1912). **[fig. 1]**

This change has not prevented the lake from being inhabited over time by plants, animals and human communities. The uninterrupted coherence of the riparian communities is visible from the sequence of Neolithic, Hellenistic, Roman and Byzantine archaeological sites along the banks of the lake, but also on the peninsulas and islands of Karla. The symbiosis with the lake bore particular fruit, as it was expressed through autochthonous sustainable fishing and ephemeral habitation practices, which were practiced and perfomed[2] until before the drying up after the mid-20th century. These

1 The expression anthropic includes both autonomous human actions and those of communities or institutions. It was introduced by the Swiss geologist E. Renevier in the late 19th century as période anthropique, referring to our modern geological era.

2 A. Nikolopoulos and E. Dimitrakopoulou, "Semiotic Approaches of the Landscape of Lake Karla," in *Άυλη Κληρονομιά και Συγκροτήσεις των Απτών Πραγμάτων*, ed. K. Moraitis and A. Kouzoupi (forthcoming).

Fig. 2

practices have been documented photographically by the photographers D. Letsios and T. Tloupas, but are also described in older akidographs in the church of Agios Nikolaos Kanalia.

After the period of free and harmonious variability, the condition that characterizes the next period, the recent 80 years in the landscape of Lake Karla, was the extreme, subversive, changes. This new chapter in the history of the lake was triggered by a purely anthropogenic intervention, the technical works of draining the lake. Following the study plans, carried out in the 1950s, Karla was drained in the early 1960s, through a sluice gate and a tunnel [built between 1959 and 1962] that channelled the lake’s waters into the Xiria torrent and through it into the Pagasitikos gulf. The sluice gate remains functional to this day, as does a network of channels leading to it, in order that the area of the plain that emerged ‘should not be flooded again’. This sluice gate which is still in use today as we shall see below, has been associated with much pain: during the initial drainage, but also very recently. [fig. 2]

From the second half of the 1960s until the end of the 20th century the area became progressively arid, with an extreme drop in the aquifer level due to overpumping as the agricultural character of the riparian soils was maintained and new agricultural lands were added for irrigation after drainage. The lives of the inhabitants of the riparian communities, without moving, changed dramatically; losing their lake around which they had woven myths and beliefs , while symbiotic fishing practices could not be passed on to the next generations. A traumatic condition with social, anthropological and ecological parameters, somewhat similar to the traumas experienced by climate migrants and refugees, during the recent years of the climate crisis, marked the arid period of the Karla. From this, emerged the conscious reaction of the now rural populations of the former Karla-banks region, which was mediated as a claim for the re-creation of the lake by the state, this time as a reservoir.

Almost mysteriously, during the arid period, fish, endemic-steno-endemic and indigenous species that remained alive and formed bio-communities in the constantly wet irrigation channels of the former lake area, resisted the drying process most vigorously. Also the migratory birds that continued to stop at the now-drained Karla, not taking it off the map on their intercontinental journeys, which in turn fed on the fish that resisted the ravages of drainage.

The reconstruction of the reservoir began in 1999 and was inaugurated as a complete project of the region of Thessaly in 2019, named ‘the Reconstruction of Karla’. It is not a ‘natural’ lake but a ‘heavily modified water body’ that needs constant monitoring by expert scientists who know when the balance of the ecosystem needs intervention and recommend the necessary actions. This role has been taken over by the former “Karla-Mavrovouni-Kefalovryso Velestinou-Management Body” and the current “Management Unit for Protected Areas of Thessaly” [NECCA/ Natura’ Environment and Climate Change Agency]. Subject to continuous monitoring, the Karla Reservoir restoration project is a partly curative/remediation project, which addressed several aspects of the negative consequences of drainage, such as drought, geological fracturing, waterlogging of the aquifer. But the Karla will not have recovered as long as the relationship between the communities and the lake does not touch the previous intimacy, the symbiotic relationship that existed between riparian communities and Karla lake before the drainage. The Management Unit has developed some proposals that would tend in such a direction of gradual appropriation, in terms of lifting the ban on [initially recreational] fishing by local residents. These proposals are still pending, while fortunately the ecological balance of the area , barring recent extreme conditions, is on a trajectory of gradual improvement....

Figure 2
Opening of the drainage tunnel. Distant and near view, 2007–2008.

Flood: from nadir to zenith, and nadir again

In September 2023, the second reversal occurred, with a cataclysmic outbreak of climate crisis with the prophetic name “Daniel”. Resulting in the flooding of the Thessaly Plain, and the concentration of vast amounts of water in the Karla region, the cataclysm brought about the ‘overnight’ reappearance of the maximum historically known water perimeter of the lake. This image brought the promise of the return of the Karla: people could not prevent it from reappearing in its familiar places! So is this the ‘natural’ Lake Karla, restored to its maximum historical sizes?

But climate change is not only ‘natural’ but also man-made, so how can the lake that is reappearing be considered the ‘natural Karla’? But Karla was not only ‘natural’ it has also been mythical, it was watering and nurturing a cultural rhizome, Karla was a culturally radiant place. So her return was also a legend becoming reality. In the winter and spring of 2023-2024, the winter and spring of the great flood, an abundance of fish and bird predators were recorded in the off-reservoir flooded lake. That is, for many of the fish and birds, the great Karla had indeed returned, allowing an orgasm of biodiversity to unfold in its waters: wonderful but ephemeral. And then, the Karla was persecuted a second time, her reappearance was only temporary: using the same sluice gate, a return to ‘normality’ was sought with the decision to expel her again by draining her into the Pagasitikos. The disappearence will be completed within about a year after the flood: its size is diminishing as the waters of the flooded areas outside the reservoir levee. Only those protected behind the reservoir’s arms remain. At the end of the summer, the excessive drop in water levels, due to water removal and evaporation, marked the dramatic end of this ‘natural’ or mythical or historical Karla, the Karla of climate change, with many losses, initially recorded as tons of dead fish, in the Karla region, Xiria and Pagasitikos.

We note that the gradually decreasing size of the emptying lake in the months following the 2023 flood can be associated with phases of its historical perimeter, as documented in discrete years by historical aerial photographs. For example, in October 2023 [3] its size and perimeter was similar to that of 1920-21 **[fig. 3]**, just one month later [11/19/2023, Copernicus] to that of 1939 **[fig. 4]**, and in June 2024 [01/06/2024, Copernicus] to the 1945 perimeter **[fig. 5]**. Within one year Karla showed fluctuations that historically had occurred within a twenty-year period.

3 Copernicus Data Space, accessed 10/10/23, https://browser.dataspace.copernicus.eu/

Figures 3–5
Recent variations in the size of Lake Karla, 2023–2024. Source: Copernicus.

Fig. 3-5

Desiring to control the zenith and nadir

So we saw, or it seemed to us, within one year, 2023-2024, the unexpected and sudden "Return of Karla"[4] followed by her departure again.... Did the flood bring with it all that was lost for the Karla-banks communities with the drainage? Apparently not. The waterlogging brought to the fore a very useful counter to what has been done so far in terms of one-sided man-made actions. Because apparently the co-weaving of anthropogenic actions and the other natural dynamics-processes of the lake, which had unfolded over time, was extinguished after the drainage. The area was plundered by anthropocentric decisions and actions. The historic, natural elastic oscillation of the lake's size, which did not please everyone who wanted to control it, was much more hospitable to many more life forms and in it unique symbiotic structures were balanced.

The rationale of 'Building Back Better'[5], or BBB as a way of responding to risk after disaster, is being questioned and challenged, thanks to the flood. Already this phrase was uttered as a political statement in the presentation of the rebuilding of the Karla reservoir, at the Council of Europe conference in the spring of 2022, by the then authority of the Thessaly Region[6]. The hubris to imply that the reconstructed Karla reservoir could be an optimized version of the lake, an engineering project that answers some of the issues [ecological, social, health, economic...] better than the Karla itself before it was drained, depressed by the weather effects of the climate crisis. BBB is a doctrine that forgets to ask 'better? For whom, whom, whom?". It forgets what an insurmountable trauma the draining event was. It overlooks that not all losses are translatable into economic terms [Cheek & Chmutina, 2022] . It overlooks how many and which momentous issues were left unresolved, untouched or in the process of being resolved following the rebuilding of the Karla Reservoir. All this should be taken into account when considering the effectiveness of the whole intervention including {drying + reconstitution}. It clearly demonstrates how careful and thorough any interventions in aquatic and culturally defined ecosystems, such as the former Karla was historically, should now be.

Could we continue the interweaving of our own designs with the natural dynamics of the Karla, instead of continuing to design and impose new grey infrastructures on the Thessalian plain, after the onslaught of the cataclysm? By seeking to articulate the interdisciplinary synergy between the newly established "Research Unit" of Arch-UTH called "Empirical and Longitudinal Observatory of Landscape" and the NbS, we argue that the logic of "Nature-Based Solutions", [Nature-Based Solutions[7], NbS] could be a more viable solution than the BBB strategy, also for the Karla region. Because the 'grey infrastructure' , the one-dimensional human-centred ones, constantly seek human intervention, and have proven themselves inadequate against extreme cataclysmic events. NbS allow for less human intervention from the outset, prompting and entailing the engagement of natural processes that activate and empower established ecosystems. Ecosystems act as multi-factor balancing factors during the onset of extreme weather events. As they regenerate, they deserve to be observed with more sobriety: they probably hold solutions that we did not stop to listen to before rushing to empty the Karla again. And the anthropological dimension of the Karla's landscape cannot be sidelined. It would make sense for the marginal culture, a culture of sustainability and the commons, to rediscover in the present sustainable expressions of its relationship with the waters of the lake. The anthropological dimension of the Karla landscape cannot be sidelined. It would make sense for the Karla's banks culture, a culture of sustainability and the commons, to rediscover in the present sustainable expressions of its relationship with the waters of the lake. **[fig. 6]**

Karla Bound

The flooding and the abrupt emptying of the flooded area highlighted the vulnerabilities of the logic of the engineering project implemented in the

4 Yannis Ruskas, *The Return of Karla* (Private edition, 2001).

5 Wesley Cheek and Ksenia Chmutina, "'Building Back Better' Is Neoliberal Post-Disaster Reconstruction," *Disasters* 46 (2021), https://doi.org/10.1111/disa.12502.

6 The statement 'build back better' [COE/ actes/ pp 29-30] implies an arrogant assessment of the overall institutionally driven intervention in the region as ultimately and exclusively positive. Council of Europe, National Symposium on the Implementation of the Council of Europe Convention [COE/ actes/pp 29–30], accessed 5/9/25, https://rm.coe.int/national-symposium-on-the-implementation-of-the-council-of-europe-conv/1680a69961.

7 UNA City, accessed 5/9/24, https://una.city/.

Fig. 6

Figure 6
The expression of the harmonious abundance of the past – the "Carlisle" fish. The excitement of the descendants of fishermen in 2011 at the reintroduction of their tactile connection with the fish, following the first filling of the reservoir. Today, after the "emptying" of the reappeared Karla, a dystopian expression emerges – the tragic waste of fish, treated as a disrespected common resource, as if they too were not part of the miracle of the nascent ephemeral ecosystem. (6a: Photo by Takis Tloupas, 1953, from the exhibition "Water Courses at Lake Karla" at the Tsalapatas museum, Piraeus Bank Cultural Foundation, Volos March 2017. Accessed at: https://www.ypaithros.gr/ydatines-diadromes-limni-karla-mesa-apo-ta-kare-taki-tloupa/ 6c: August 22, 2024, DEAD fish-from-Karla [EPT-National Radio & Television-Volos]. Accessed at: https://www.ertnews.gr/ert3/nekra-psaria-apo-tin-limni-karla-ksevrastikan-stin-paralia-volou/)

Fig. 7

Fig. 8

area around the Karla Reclamation Reservoir. Raising concerns for finding more symbiotic ways of coexistence of the reservoir with the still vibrant and lively landscape dynamics of the area.

And what does an empty reservoir in the plain mean, as it was in 2017? And what does a reservoir full of water mean in the flooded lands of the Karla? It means important things, despite our well-meaning criticism of it. Because as long as emptying the fields as soon as possible is a priority, as long as the weir that removes the water from the Karla area works, these levees are useful. Because the crises of climate change bring successive and alternating conditions of water scarcity and flooding. It is significant that in the last few days before the Daniel Flood, the reservoir of the restored Karla was at its lowest ecological limit. The DPI Unit was on alert, talking daily with the district to order the pumping for irrigation from the reservoir to be stopped. The extreme water scarcity was followed by the 2 floods. In September 2024, a year after the floods, Thessaly is again facing water scarcity, and the Karla Reservoir is there to hold back some of the water, and the NWRF is there to ensure the ecological limit so that the fish living sheltered inside can breathe, and in turn be food for the flying protected species of fauna that the—albeit limited—Karla attracts. Karla with a thousand faces, the jewel of Magnesia. **[fig. 7-8]**

Yiannis [Ioannis] Vergos is the deputy-head at the Management Unit of Protected Areas of Thessaly (N.E.C.C.A.) where he has been working since 2014 as a biologist involved in monitoring, conservation and management of species and habitats in 17 NATURA 2000 sites. He is a biologist [integrated master - Hydrobiology and Water Protection, Faculty of Biology, University of Sofia "St. Kliment Ohridski]. He holds a M.Sc. in Spatial Analysis and Environmental Management from the Department of Planning and Regional Development, School of Engineering, University of Thessaly, and a M.Sc. in Fishery and aquatic animal production from the School of Agricultural Sciences, University of Thessaly. Manly of his publications in scientific journals and international congresses are directly linked with lake Karla. He has been also involved in European research programs -such as Interreg MED- as a scientific associate and member of the coordination team.

Aspassia Kouzoupi is an Assistant Professor at the Department of Architecture of the University of Thessaly. She is an architect [Dipl-AUTH], holding a MAS in Landscape Architecture from ETH Zurich, and a diploma in Fine Arts from the National School of Fine Arts, Athens. During 2019-2022 she was a postdoctoral fellow at the School of Architecture, NTUA, recipient of a scholarship from IKY [State Scholarship Foundation]. Her research investigates diachronic mapping modalities, urban landscape structural features such as 'infrastructural palimpsests, and urban socio-natural ecosystems such as mediterranean torrentscapes, acknowledging the Anthropocene era. Her scientific publications feature in international scientific journals and congresses proceedings. She teaches academic courses that combine landscape theory and dynamic urban public space design. Founding member of the team "Sculpted Architectural Landscapes: Golanda + Kouzoupi", she is the author and co-author of designed and materialized projects at urban and peri-urban sites, which are featured in international publications of architecture, landscape, and art. www.sculpted-architectural-landscapes.gr

Figure 7
Karla Lake area post-drainage. The reservoir levees are constructed, but the reservoir (visible on the right) remains completely empty: "Where is Karla?" September 2007. Source: Author(s).

Figure 8
The stone peninsula with the empty reservoir in 2008–2009. The same peninsula with water in the reservoir in 2010.

The house in Mikro no longer exists

Alexandros Psychoulis
University of Thessaly

The house in Mikro was built in 1932. It was restored without any alteration of its characteristics in 1985. A small two-storey stone house with a roof of Pelion slate. The stones were gathered from the edge of the beach and the corners of the house were reinforced with chipped white marble from the nearby quarry. All the materials arrived by boat, the road to the beach at Mikro was only opened in 1987.

On September 4, 2023, it began to rain. Quietly at first, almost redemptive considering it hadn't rained for three months, and August had ended with a lasting heatwave that had yellowed the leaves of my little avocado tree.

If you had listened to the weather report in those days, you would have noticed the meteorologists' discomfort. What they saw approaching was unprecedented in forecasting models. Fearing ridicule, they softened their words, trying to present a more optimistic version of the phenomenon that was coming. Overall, they were beating around the bush.

In the afternoon the real storm began. The thunderbolts fell in bursts on houses, trees and the sea. The water started coming in through the roof. ¨It was leaking on the surrounding walls. I deployed all Tupperware and buckets in the house trying to keep the situation under control.

Houses like mine, made of stone, lime and mud, are in danger from the roof, the old builders told me. I thought I could handle it. I fought it anyway until late at night when the electricity went out. I couldn't do anything in the dark. I lay listening to the gusts of water on the roof tiles, the constant thunder that machine -gunned the night, the rhythmic symphony of water dripping into bowls. I dozed off until water began to drip onto my face; my sheets were soaked.

By dawn, it seemed it was blowing itself out. We all went outside and looked up. We knew that only the sky could take pity on us, and we looked at it in any way you can look at the sky today: through our eyes, through the forecast models on our laptops, through real time satellite graphs on our cell phones. Things looked dark from every angle.

At noon the rain started again, but it would be a misuse of the term rain to describe this downpour. It was as if buckets of water were being emptied onto the earth, and this went on for hours. I realized how useless it was to empty the bowls that were overflowing with droplets from the roof in no time. It was raining inside the house too. I fatalistically let the water form rivulets on the floorboards, drip downstairs and pool there.

I was standing at the second-floor window. The stream that ran in front of the house, the one that separated me from the sea and the dunes of the beach was rising rapidly. Where in normal rains it was no more than seven meters wide, now it was twice that and kept widening. It began to drift down the dunes along with the colonies of sand lilies I had been trying to salvage from the wheels of the beachgoers' 4x4s all summer. Slowly, carried away by the force of the water, the remnants of summer began to drift by. Beach umbrellas, sun loungers, and inflatable rings came first, followed by bulkier items—tables and sofas from the yard of the nearby canteen. Then came the canteen itself, followed by caravans, plane trees, and ancient olive trees.

On the horizon of the sea, where I usually saw boats and sailboats passing by, half-submerged cars, some with their hazards still flashing, were slowly sailing by. I saw my arbor retreat a couple of meters and I knew what was happening and what was to follow.

Many years ago, in the context of an exercise that attempted to define the concept of "habitation", I asked the students of the Department of Architecture of the University of Thessaly, "what would they take with them if their house caught fire". This question, which I then used as a working hypothesis, I had not only to answer at that moment, but also to act upon. I stood for a moment in the center of the second floor, among a multitude of objects I had accumulated over the years, all meaningful, all with a story to tell. I picked up the paintings I had painted over the summer and began to toss them into the shed of the hotel next door. Then I took my laptop and my suitcase and said goodbye to the house as if I were saying goodbye to someone departing for good to a faraway place. The paradox was that I was the one holding the suitcase.

I jumped over the wall that separated me from the newly built hotel and in ten minutes the house fell. I saw and heard it collapse with a deafening crash that briefly drowned out the roar of the torrent and downpour.

The dirt road leading to the sea, to the left of the house, had also turned into a rushing torrent that was bringing down from the mountain what

it could, and its perpendicular meeting with the gigantic stream created eddies that ate away at the soil in the eastern corner of the house. The foundations of the stone buildings of Pelion are simply the stones themselves, dug only half a meter into the soil. The water turbines were drilling holes two meters deep. Thus, the arbor gave way, followed by the corner of the house, and then the bearing walls under the weight of the roof.

Before the final collapse I saw the house bleed. One might say that my strong emotional charge created hallucinations. The truth is that I was too attached to that house. I often talked to it, but mostly I listened to it. I listened to its breaths, the expansions and contractions of its materials; it was a living house. But what I perceived as a domestic hemorrhage is a fact. Just before the end a deep red liquid poured out from under the front door into the yard. It was a lyrical coincidence, and it took me about a minute to give a rational explanation. Sheltered in the hotel shed I could only see both sides of the house and had no line of sight to where the two torrents were impacting the walls. I could not see that on the other side some stones had begun to give way and that the alleyway bringing red soil down from the mountain had already flooded the ground floor.

Sometime later, having calmed down, I tried to find the reasons why a house collapses just before it becomes a hundred years old. Could it not have faced weather of similar magnitude during that time? Papadiamantis' writings describe similar floods hitting Skiathos in the first half of the 20th century, and Skiathos is only 6 miles from Mikro.

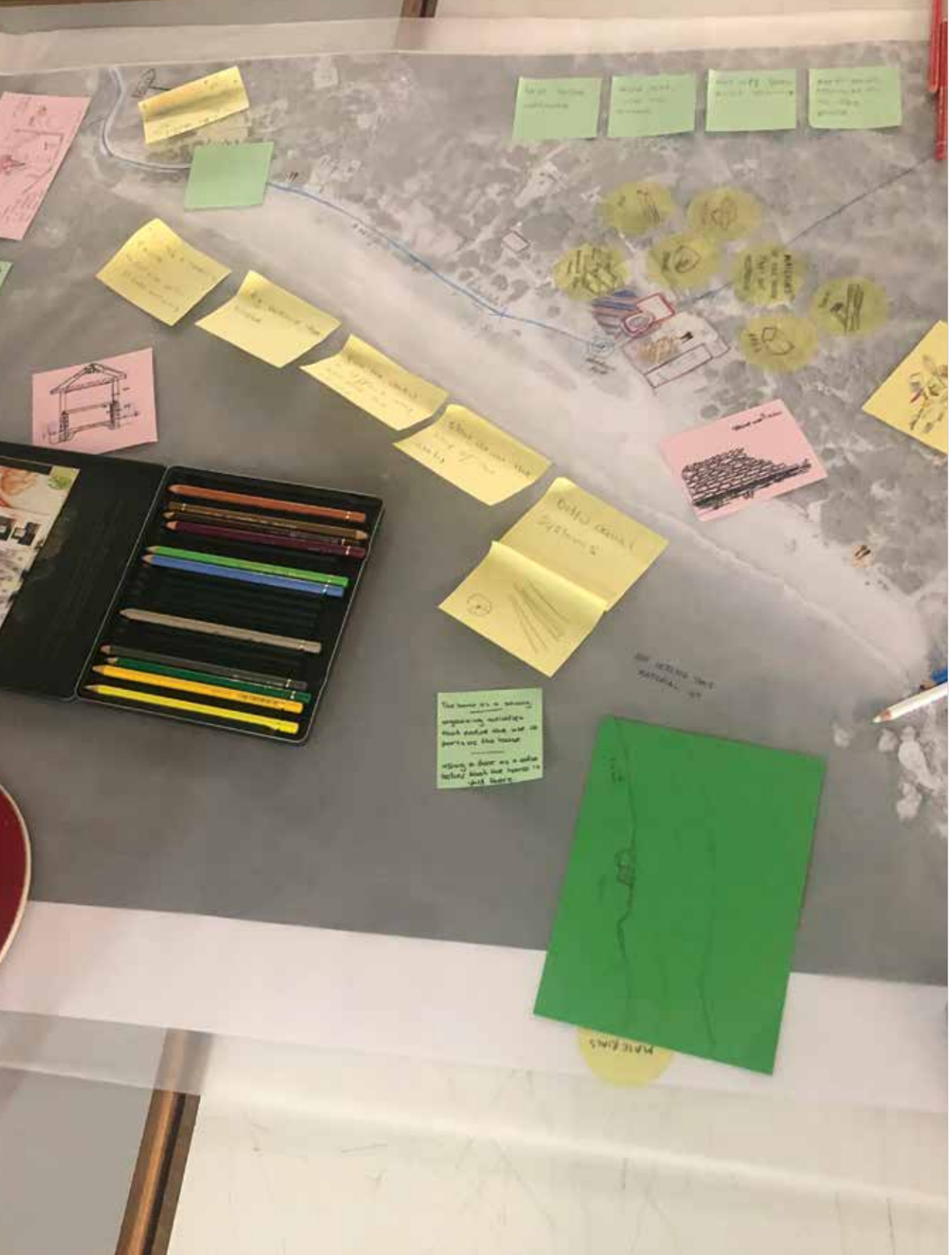
In the first years I lived in this house, around the end of the 1980s, there was nothing built next to it. The rainwater that came down from the mountain flowed freely through the olive groves on either side and ended up in the sea. Studying a recent satellite photo of the site on Google Maps – in which the house remained standing and thriving for another 11 months despite its fall – suggests something that may have been the cause of the disaster. Two hotel units built parallel to the sea, right behind the house, created two powerful barriers that prohibit the water from diffusing and instead funnel it into the alleyway that is next to the house and that at the peak of medicane Daniel turned into a torrent of destructive power.

In July 2024, within the framework of the "Hybrid Urbanscapes" workshop, 35 architecture students from all corners of the world, wearing protective helmets and gloves, to experience the destruction caused by

floods on individual dwellings, began a day-long excavation in the ruins of the fallen house. Creating human chains, they stacked stones and slabs in the garden. Unlike houses built with reinforced concrete, whose demolition materials must by law be taken to special landfills, the materials of the stone house are fully recyclable. Because the binding material was mud, i.e. soil, rather than cement, the stones and slabs appear intact and ready to be reused, like loose Lego blocks potentially ready to be part of any new structure. The mounds of material that the students formed in the ruin garden may have been identical to those from which the workers of the 1930s took the stones to interlock and build the house.

The repetition of the process may seem a natural, clearly arduous but promising way of doing things. Of course, in completely new terms, not because climate instability demands it, but because both the given concrete building stock and anarchic construction work like a time bomb, with consequences that nobody could or wanted to foresee until now.

Alexandros Psychoulis was born in Volos in 1966 and has studied painting at the Athens School of Fine Arts. His first works are interactive installations, which are activated by the spectator and explore his subconscious, by decodifying his fears, desires or memories in images and sounds. The exploration of the virtual reality's territory has been up until now the central drift of his work, which is consisted by installations, animation and painting. In 1997, he has been awarded the Benesse Prize for his work "Black Box", with which he participated in the 47th Venice Biennial. He has presented many solo exhibitions such us: *The room*, a.antonopoulou.art, Athens (2009), *Mammals*, Zina Athanassiadou, Thessaloniki (2005), *Body Milk*, a.antonopoulou.art, Athens (2003), *Speak about your life in materials with no memory*, Lionheart, Boston (1999), *There's no place far enough for you to escape from images and the pain they caused you*, Deitch Projects, New York (1998).



PART D

Rethinking Design Education: Building Resilient Futures

New ideas for fostering a balanced relationship between nature and the built environment must begin with education. It is through education that the next generation of engineers, design thinkers, and decision-makers will be shaped—individuals who will eventually hold key positions of responsibility and influence critical policies in urban and architectural design. The devastating floods that struck Thessalian cities in 2023 served as a wake-up call, prompting a re-evaluation of design priorities. In response, the Department of Architecture at University of Thessaly introduced a series of courses aimed at exploring new strategies for resilience and sustainability across multiple scales—ranging from urban and landscape planning to architectural structures and object design. This chapter delves into the objectives, methodologies, and outcomes of four courses conducted during the 2023-2024 academic year. It highlights how these academic initiatives not only encouraged critical reflection on current design approaches but also laid the groundwork for innovative solutions that address the challenges of an increasingly unpredictable natural environment.

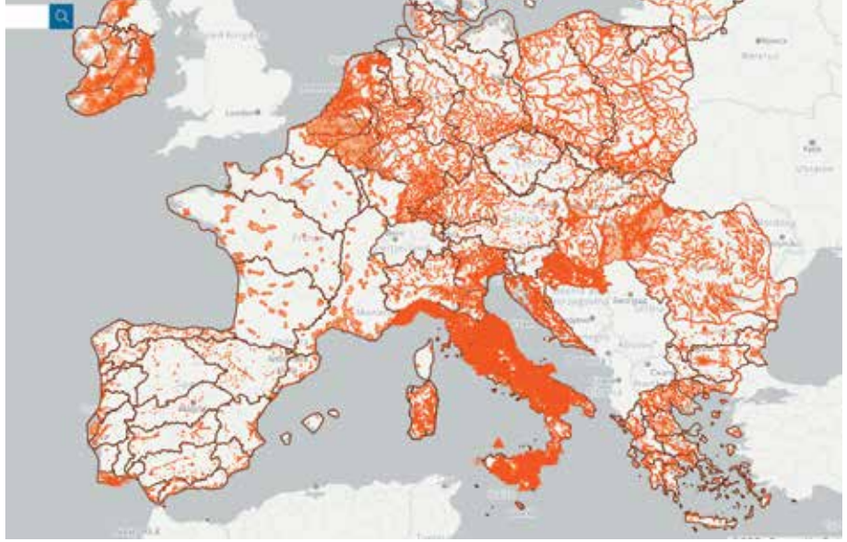


Fig. 1

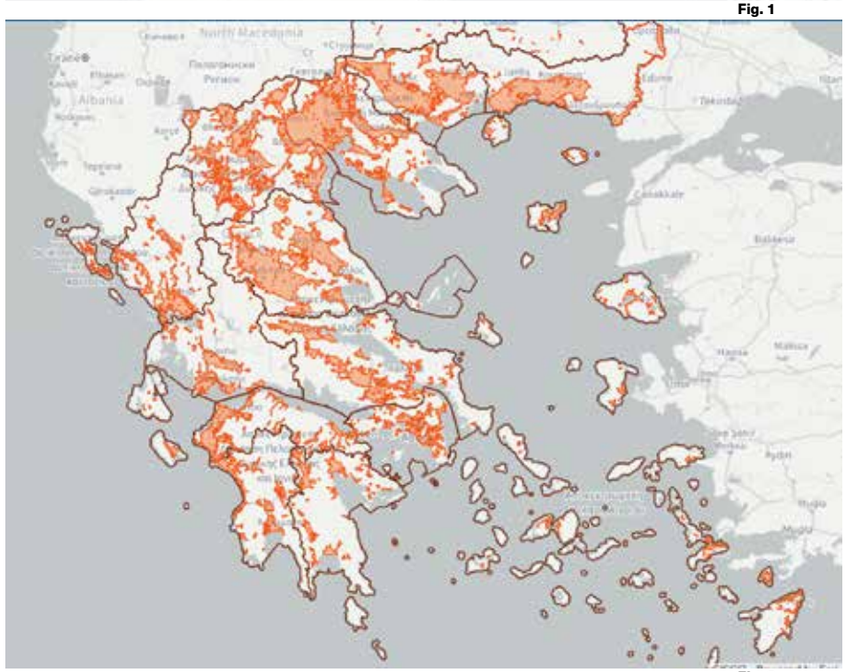


Fig. 2

Figure1
Flood risk areas in Europe 2023
Source: https://discomap.eea.europa.eu/floodsviewer/

Figure 2
Flood risk areas in Greece 2023
Source: https://discomap.eea.europa.eu/floodsviewer/

Rethinking urban design: the dynamics of floods

Vaso Trova
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Climate change is expected to lead to an increase of precipitation in many areas. Increased rainfall over extended periods will mainly lead to fluvial (river) flooding, while short, intense cloudbursts can cause pluvial floods, where extreme rainfall causes flooding without any body of water overflowing.
River flooding is a common natural disaster in Europe, which has, along with storms, resulted in fatalities, affected millions of people and incurred massive economic losses in the last three decades. Climate change is likely to increase the frequency of flooding across Europe in the coming years.
Heavy rainstorms are projected to become more common and more intense due to higher temperatures, with flash floods expected to become more frequent across Europe.
In some regions, certain risks such as early spring floods could decrease in the short term with less winter snowfall, but the increased risk of flash flooding in mountain areas overloading the river system may offset those effects in the medium term[1].

Such warnings as that of the European Commission seem rather theoretical until recent years in Greece. The issue of flooding seemed to concern other European cities with large rivers (such as the Rhine) or areas near estuaries. But 2023 was a defining year as in September 2023 two torrents hit the cities of Thessaly in Greece with devastating results for the economy and people's lives. In 2023 after the devasting floods in Slovenia and Greece, the European Commission published a viewer [2] which presents for the first time in one map the areas in the European Union which, according to the national authorities, carry a potentially significant flood risk (coastal, river and pluvial floods). It included more than 14,000 areas in the EU which are at significant risk of flooding. This is part of an effort to effectively mitigate the climate risks that European cities are facing and to provide reliable information which will enable decision-makers and professionals to factor in the risk of floods in their decisions. At the same time, it will help people realize that the risks of floods are present throughout Europe. **[Fig 1]**

1 European Commission, "Consequences of Climate Change", accessed September 1, 2024, https://climate.ec.europa.eu/climate-change/consequences-climate-change_en.

2 European Environment Agency, *Floods Viewer*, accessed September 1, 2025, https://discomap.eea.europa.eu/floodsviewer/.

Floods and the vulnerability of the Greek city

The floods in Thessaly in September 2023 brought to the fore the effects of climate change on Greek cities and especially the vulnerability of the city to extreme rainfall and flooding. [Fig 2] Cities are particularly vulnerable to severe weather events, increased rainfall and sudden fluctuations in the level of rivers and streams that cross them. The design of urban infrastructure is based on the idea of a stable 'nature' or 'nature stabilization' and on a reliance on technology that tames its extremes. Barriers, Dams and Levees are designed to protect urban areas that are close to rivers. Streams are generally treated as rainwater runoff channels. From the 1990s onwards, legislation began to delineate the zones and rivers but already, particularly in city centers, the riparian zones were already built up.

Urban areas near rivers or streams do not differ in terms of design regarding flood risk. Buildings, building blocks, public spaces are designed in the same way and with the same regulations as the rest of the city. The prevailing view is that water must be removed (by mechanical means, with larger drainage pipes, etc.) or prevented (with protective dikes and flood protection basins), but at the same time water is essential for human survival. Climate change has already led to major changes in water availability across Europe, due to less predictable rainfall patterns and more intense storms. We confront increased water scarcity, especially in southern and south-eastern Europe. Therefore, we must promote SuDS[3] rainwater harvesting and management, to collect water during rainfalls and to reuse it at least for irrigation during dry periods.

At the same time, water is one of the most charming elements of the city. It creates green corridors, helping significantly to cool the city and biodiversity, while at the same time it can be an important element for the creation of outdoor recreational areas. So, removing the urban fabric from rivers and streams (with flood basins and embankments, may be a safety solution but it takes away an important element of urban life. Is it possible for planning to propose models of symbiosis between water and the city in the context of the increasingly frequent occurrence of these extreme phenomena?

The case study of Agios Thomas neighborhood in Larisa

The case study of research and design is the district of Agios Thomas in Larissa, which was flooded during the heavy rains of September 2023. [Fig. 3] The district was not flooded by the adjacent Pineios river, as the protective dikes did not break, but by the inability of the drainage network to drain the huge amounts of rainwater. The pumps of the drainage system could not operate effectively as the power supply was cut off. In some areas the water reached up to 2 meters from the ground, [fig. 4] destroying homes, mobile equipment and infrastructure in buildings. As part of the course, we studied the zone between Ioannina Street and the ring road which is located at the top of the dike that protects the city from the risk of overflow of the Pineios river. The intervention area is located on the edge of the urban fabric of the city. Typical buildings are detached houses or small apartment buildings with two and three-stores. Commercial activities of local scale can be found along the main road (the regional road connecting the city of Larissa with the city of Ioannina).

3 Sustainable drainage systems (SuDS) are a set of measures that use natural features and processes to slow down and reduce the volume of surface water runoff to manage downstream flood risk and reduce the risk of runoff-caused pollution. Therefore, SuDS generally contribute simultaneously to tackling surface flooding and water quality issues and can also enhance water availability by capturing and storing rainwater. Susannah Woods Ballard et al., *The SuDS Manual* (London: CIRIA, 2015).

Fig. 3

Figure 3
Agios Thomas neighborhood, Larisa on 8/9/23. Source: www.onlarissa.gr

Fig. 4

Figure 4
Traces of the flood water on the exterior wall. March 2024. Source: the author

The design studio

The design studio took place in the spring of 2024 with students of the 4th year of the Department of Architecture of the University of Thessaly. New ways of urban design were explored within the context of the climate change adaptation with regard to rainwater management. The overall objective was for the students to understand how new climate conditions affect cities and to explore urban design strategies to achieve a symbiosis between water and the city. [fig. 5]

Students had to consider the idea of the flexible city, the city of climate adaptation. To understand the city as a part of a process of continuous transition where urban developments do not lead to a fixed-end position but emerge from future oriented dynamic starting positions[4].

Typical questions asked were: What kind of a city can leave room for a possible water overflow within it? How can the different dynamics of the city and nature formulate hybrid spaces in a balanced and flexible system? How is such a symbiotic concept expressed in the Building Code or in building typologies? How could the neighborhood be redesigned in a context where the management of rainwater or river overflow becomes the leading principle of urban design?

4 Tom Bergevoet and Maarten van Tuijl, *The Flexible City: Solutions for a Circular and Climate Adaptive Europe* (Netherlands: nai010 Publishers, 2023).

Several design strategies were developed within the design studio

Climate resilience and seasonal flexibility

Embracing uncertainties is a strategy to deal with the inherent unpredictability of climate change and deal with extreme weather conditions which may range from draughts to heavy rainfalls and floods. Becoming climate resilient means incorporating measures that can counteract the negative consequences. Low tech solutions such as stepped recess parks and squares

Fig. 5

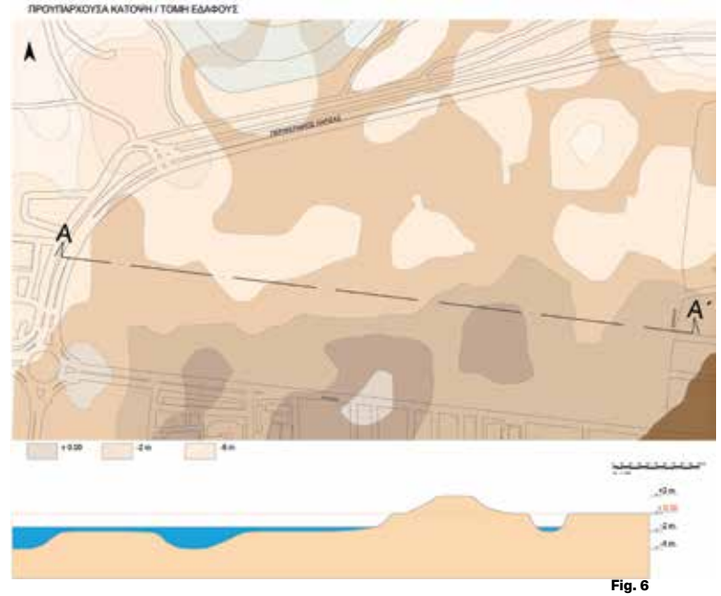


Fig. 6

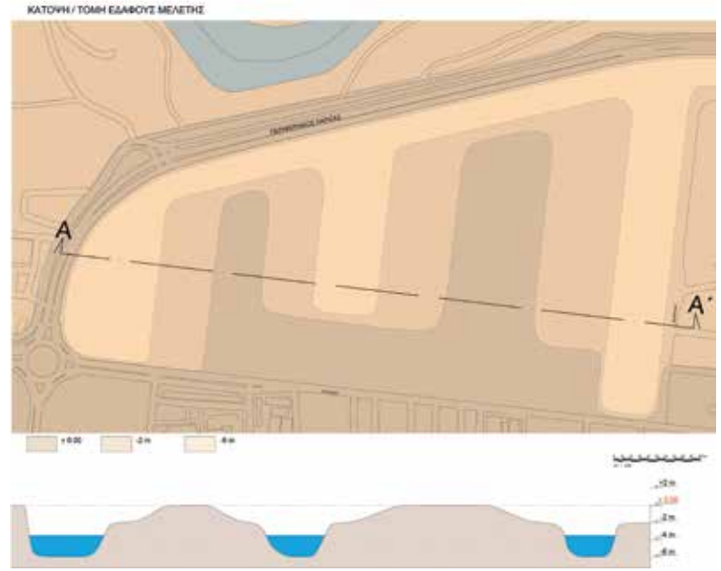


Fig. 7

Figure 5
Agios Thomas neighborhood. Forecast of T 50, T100, T1000 years flood (left). Mapping of the flooded areas during September 2023 (right). Maps by student S. Kechri.

Figure 6
Understanding the ground microscale. Analysis by students A. Chronaki, N. Tsioupi.

Figure 7
Re adjustment of the ground levels. Prposal by students A. Chronaki, N. Tsioupi.

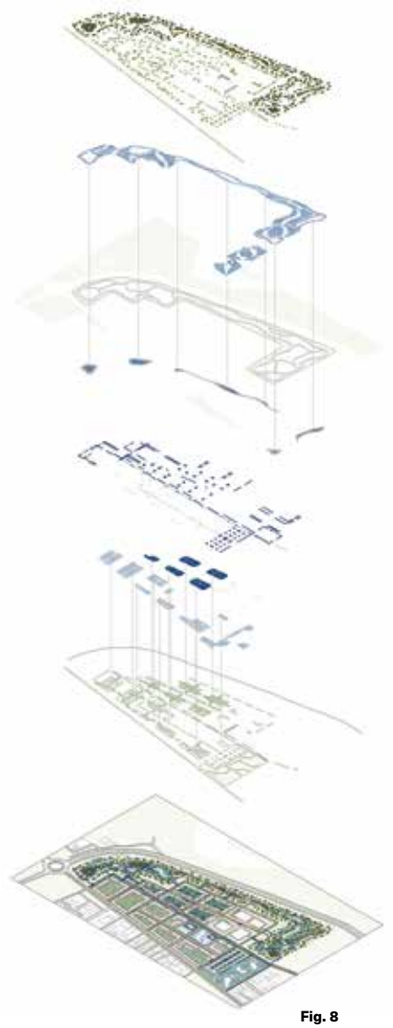


Fig. 8

can have different functions over the year depending on the weather conditions.

The ground rearrangement strategy

The ground is analyzed in its microscale, [Fig. 6] the different levels are identified and the relationships with the flood zones are researched. In the redevelopment proposals the ground is rearranged into higher and lower levels that will receive water in the event of flooding. [Fig. 7] Thus, the areas that will flood in the event of a similar intense event will be controllable. The lower elevation zones are being landscaped into green spaces.

The multilayered city

The design of the city is layered, and each layer works with the others. It is not the sole responsibility of different disciplines, each of which maximizes its requirements and specifications. It requires a synergy of methods and techniques, but above all it requires a paradigm shift and an acceptance of the power of nature. The design of symbiotic environments that can accommodate different states of water and different states of human activity, in a game where partners advance or retreat as appropriate. [Fig. 8]

The strategy of comprehensive stormwater management.

The sponge city

Stormwater management is carried out as an element of urban design rather than as a matter of hydraulics. The aim is not to remove the water as quickly as possible with large-diameter underground drainage pipes but to introduce a system of different tactics for managing rainwater. These include maximizing water absorption through permeable surfaces, underground collection of water to be reused for irrigation, organized

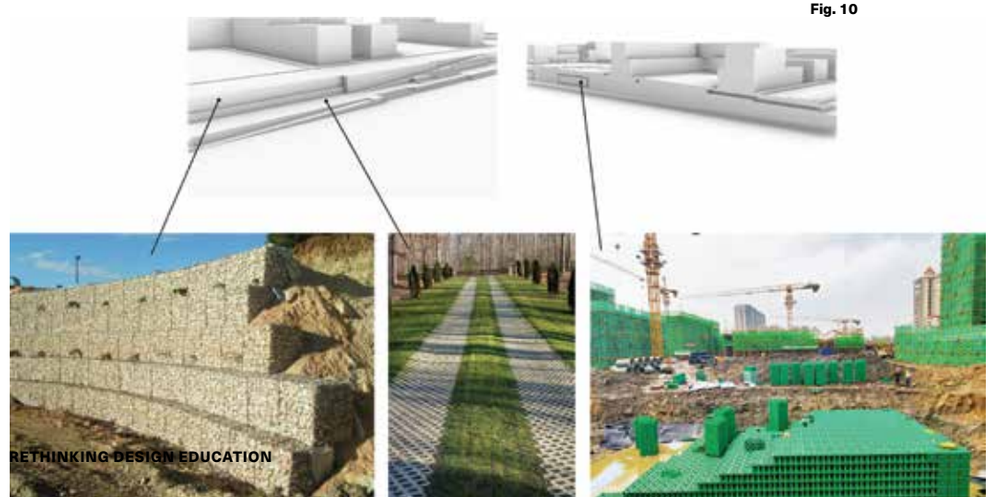
Figure 8
Understanding the multilayered city. A proposal for integrated urban design by student S. Kechri.

Figure 9
An integrated system of rainwater management. Proposal by students A. Chronaki, N. Tsioupi.

Figure10
Water permeability of materials and water collection infrastructure to be used in public spaces. Proposal by students A. Chronaki, N. Tsioupi.

Fig. 9

Fig. 10



removal of excess water through open planted channels on the sides of streets and collection to retention ponds and detention basins at the lower ground level. [Fig. 9] If there is still excess water it will be driven to the drainage pipes. Stormwater management configurations are elements of the site's open space design. Permeable materials are proposed in every location where they can be used. [Fig. 10]

The revision of the building code and the new building typologies

The survey of the area showed that the most damaged buildings were those constructed at lower ground levels, with basements and ground floor use. [Fig. 11] Based on these findings the students explored new building typologies for this area, without basements, elevated ground floors or buildings on stilts (pilotis).

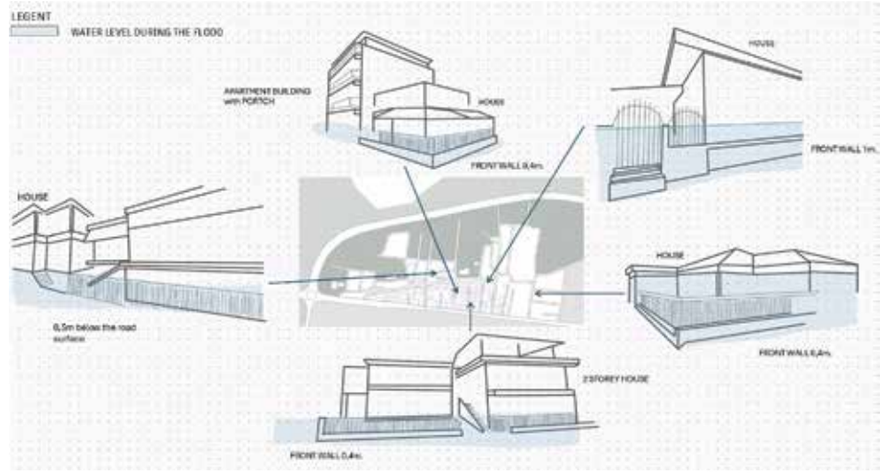


Fig. 11

Fig. 12

Figure11
Building typologies and damages due to flood water. Sketch by student S. Kechri.

Figure 12
Flexible urban design. Retention basins are designed and used as multi-level open green spaces. Proposal by students A. Chronaki, N. Tsioupi.

Fig. 13

The design moved from the typical building block of the Greek city, where the building of each plot dominates, to a different type of building block which provides for large public open spaces inside and the densification of the building volume on the perimeter of the block. [Fig. 12] These open spaces have provision for the collection and absorption of rainwater.

Cross check

Finally, students had to cross check their proposal in the context of flood risk prediction. How will the rainwater be distributed within the framework of 50- and 100-year flood forecast data? To which extent the re-organization of the ground, the management of the water retention system and the new typologies of buildings will be able to minimize the impact in case of a recurrence of a phenomenon such as the September 2023 cloudburst. [Fig .13]

Outcomes

The results showed that adaptation to climate change and protection from heavy rainfall can be realized with low-cost urban planning strategies. Strategies that leave room for, cooperate and symbiotic with water dynamics. Cities need permeable biophilic skin that acts as a water filter, maximizing soil permeability, infiltration and rainwater retention especially in public spaces. The local and regional policies should start to move away from large-scale flood control engineering projects that attempt to prevent water from entering or quickly channeling it away from cities. Cooperation between hydraulics, urban planning, hydrology and bioengineering is essential to create urban typologies adapted to climate change.

Let's hope that the 2023 cloudburst will help the regional government and the municipal authorities to change the approach to rainwater management in cities, following the well-known example of Copenhagen[5] after the 2011 heavy floods.

5 State of Green, "The Cloudburst That Changed Copenhagen and Urban Water Management", accessed August 10, 2024, https://stateofgreen.com/en/news/the-cloudburst-that-changed-copenhagen-and-urban-water-management/.

Vaso Trova born in Samos (1961). Architect eng NTUA (1986), MSc Bartlett School of Architecture and Planning UCL (1989). She teaches at the UTH since 1999. Head of the Dept. of Architecture UTH 2016-2020. Director of the Urban Design Lab. She has been a visiting teacher at the AA London (2002), a visiting prof. at London South Bank University (2008), Politecnico di MIlano (2004-2013), Universidade Lusofona Lisbon (2006-2013). A practicing architect, she has designed and implemented various projects in Greece, she has won prizes in architectural competitions and has participated in exhibitions in Greece and abroad. Her research focuses on urban design issues in reference to contemporary urban phenomena, sustainability and urban adaptation, mobility and temporary inhabitation, urban landscapes, urban networks and their relation to the designed space.

Figure 13
Masterplan cross checked. Retention basins and lowered ground can hold 380.000 tn of rainwater. Proposal by students A. Chronaki, N. Tsioupi.

Designing emergency: post-disaster relocation of human settlements in the Thessalian Plain

Fabiano Micocci
University of Thessaly

Climate change has brought to the fore how the balance between natural and built environment is fragile and constantly under risk. In September 2023, the Thessalian Plain saw an unprecedented flooding that provoked major damages to settlements, agricultural lands, and infrastructures with a consequent humanitarian, economic and health crisis[1]. The inefficiency to adequately face the disaster can be found at three levels. At first, it was a matter of management of risk, as many anti-flooding works had not been implemented although they were programmed and financed since years[2]. A more structural problem can be found in the long-term over-exploitation of the land for agricultural production, provoking a higher instability of the ground in an already fragile ecosystem[3]. Linked to that, since the 20th century, a sparse network of small-size grid villages connected by roads, rivers, and water canals covered all the available land was built following the model of the "diffuse city"[4]. Therefore, the Thessalian Plain presents today a fully urbanized landscape that try to coexist with the unpredictable Mediterranean natural environmental made of mountains, rivers and valleys[5].

The after-disaster is a moment to re-think the spatial organization of the human settlements of the region envisioning new flexible, scalable, holistic and inclusive strategies to revitalized traumatized communities and create alternative socio-economic models. The case-study of Metamorphosis Palamas, a village in Central Thessaly that completely flooded in September 2023, offers the opportunity to think about sustainable solutions for the management of future disasters re-negotiating the relationship between people and their environment.

The village of Metamorphosis Palamas is in an area of high risk of flooding because of the topographical depression and the closeness to water canals and rivers and had been inhabited by around 120 families[6]. During the 2023 storms, the whole village was completely flooded because rivers and canals overflew, with almost all the houses and public buildings damaged. Unfortunately, this was not un unprecedent event, because the village disastrously flooded two other times –in 1953 and 1994– and this cyclical repetition gives an impressive data: each generation of people has witnessed a catastrophe with their own eyes. Due to these facts, in November 2023, the 90% of the population of Metamorphosi informally voted for the relocation of the village, a proposal that was approved by the National Government and then a safe area close to Palamas has been chosen for the new settlement.

The story of Metamorphosis is crucial to understand the problematic relationship between Man and the Nature. In antiquity, the village was settled at the foot of a hill to be protected from flooding. During Ottoman time, it was relocated in the plain but on a slightly elevated position, recognizable by the irregular street network. With the implementation of liberal agrarian policies at the beginning of 20th century, it was finally extended on reclaimed land using a grid system. Few decades later, during the period of the European economic expansion of the 1950s-60s[7], the agricultural area had increased exponentially accompanied with the construction of large-scale infrastructures for irrigation and movement. The consequence of those technocratic interventions has been the impoverishment of the land and water resources with the definitive alteration of the regional ecosystem[8]. But if we consider the raise of turbulences provoked by climate change during the recent decades[9], it is easy to state that the region has reached a no-way out.

Beside the macro-phenomena that have altered Thessaly's environmental balance, there are the micro-stories of its inhabitants. The urban structure of the Metamorphosi –like most of all the other villages in the Plain– is organized along a grid with large plots and a very low density: each plot hosts a single-family house, gardens and areas for activities linked to agricultural production. [fig. 1] The core of the village is identified in a shallow

1 After the Storm on 13-15 September, UNICEF made an on-site assessment with local authorities identifying various criticalities like the damage of infrastructures, the impossibility to use educational infrastructure for the start of the school year, a large epidemiological crisis with the spread on infections among animals and humans, and the damages on the agricultural sectors with an impact at the regional and national scale.

2 European Commission, "Press release, Water: Commission Decides to Refer Greece to the Court of Justice of the European Union for Failing to Provide Updated Flood Risk and Flood Hazard Maps," Brussels, 16 November 2023.

3 Dimitris Panagiotopoulos, *The Farmers in Greek History* (Athens: Pataki, 2021) [in Greek].

4 Bernardo Secchi, "The Emergence of the Diffuse City," *Diagonal* no. 156 (2002): 10-12; F. Indovina, ed., La Città Diffusa (DAEST-IUAV, Venice, 1990).

5 Fernand Braudel, *Il Mediterraneo. Lo spazio, la storia, gli uomini, le tradizioni* (Milan: Bompiani, 2017), 11-30; H. Peregrine and N. Purcell, *The Corrupting Sea: A Study on Mediterranean History* (London: Blackwell Publishing, 2020), 297-341.

6 Ministry of Environment and Energy, Flood Risk Management Plans (accessed September 7, 2024, https://floods.ypeka.gr/).

7 In this period, also the lake Karla was completely drained to obtain agricultural land.

8 Panagiotopoulos, *The Farmers in Greek History*.

9 Climate Change Impacts Study Committee, *The Environmental, Economic and Social Impacts of Climate Change in Greece* (Athens: Bank of Greece, 2011).

Fig. 1

Figure 1
The view of Metamorphosi from the roof of the Museum of History and Folklore

Fig. 2

urban center composed with a very large square for collective events, a *cafenio* that hosts also various community's meetings, [fig. 2] and a two-floor building that had hosted the doctor's office at the ground floor and the local Museum of History and Folklore at the upper floor. [fig. 3] During the flooding, all the houses were submerged until the roofs, while a brave group of 80 citizens that were heroically staying there to fight for their houses against the water, found a safe place at the first floor of the Museum, using boats to rescue the last survivors that were not able to escape from the roofs of their houses.

Two are the main consequences of the disaster that dramatically affected every citizen. The flooding provoked an unprecedented housing crisis because every house needs to be repaired except for 2 that look safe and 10 that must be demolished. Displaced people moved where they could wait for recovery plans by local and national administrations – some has rented houses in the surrounding villages, other were hosted by relatives and friends, while the less fortunate were moved to the refugees' camp of Koutsochero or illegally came back to their inhabitable house facing very poor health condition. At the same time, the flooding has made uncultivable the surrounding lands due to pollution, has provoked damages to the irrigation system, trucks and machinery, while the livestock farming depleted because an enormous number of animal husbandry died. Dramatically and unexpectantly, the inhabitants found themselves to be in the condition of refugees in their own country, without a house and a job.

The flooding –like other disasters– is a crucial historical event that creates new opportunities to rethink the balance between preservation and

Figure 2
The *cafenio*, where we had a meeting with the local community and the cultural Association of Mertamorfosi on May 27th, 2024.

Fig. 3

innovation with the objective to turn disaster into experiment[10]. According to Sultan Barakat, an international expert in studying war-torn societies and their recovery, three are the questions to face in case of relocating a community: where to relocate, how to rebuild and how to design[11]. The issue therefore cannot be limited only to select a safe area, but it requires to look for new sustainable urban models that will be resilient in case of future disaster with the support of community's participation.

The course "Designing emergency. Post-disaster relocation of human settlements in the Thessalian Plain" run at the Dept. of Architecture of the University of Thessaly during Spring 2024 and asked to the students to inquire the issue of re-locating Metamorphosi. At first, students conducted a territorial analysis working on multi-layered maps merging various data (street network, map of risk, topography, settlements, water infrastructure, plots and fields network, etc.) to investigate possible alternatives for where to relocate. [fig. 4] On a second phase, we made a trip to Metamorphosi where

10 Alais Lucia, "Disaster as Experiment: Superstudio's Radical Preservation," *Log* no. 22 (Spring/Summer 2011): 125-129.

11 Sultan Barakat, "Housing Reconstruction After Conflict and Disaster," *Humanitarian Practice Network*, no. 43 (December 2003).

Figure 3
The two-storey Museum of History and Folklore of Metamorphosi

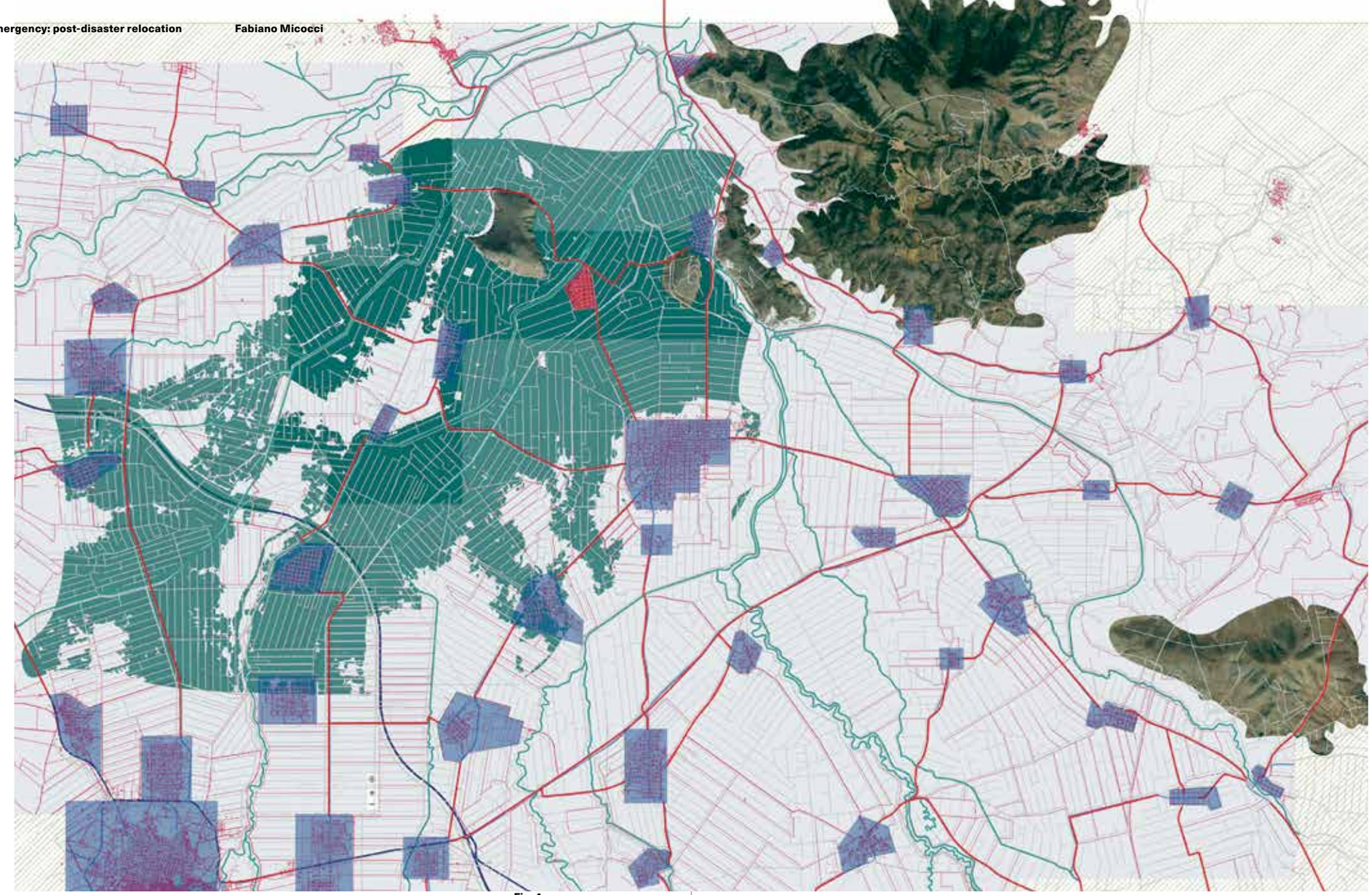


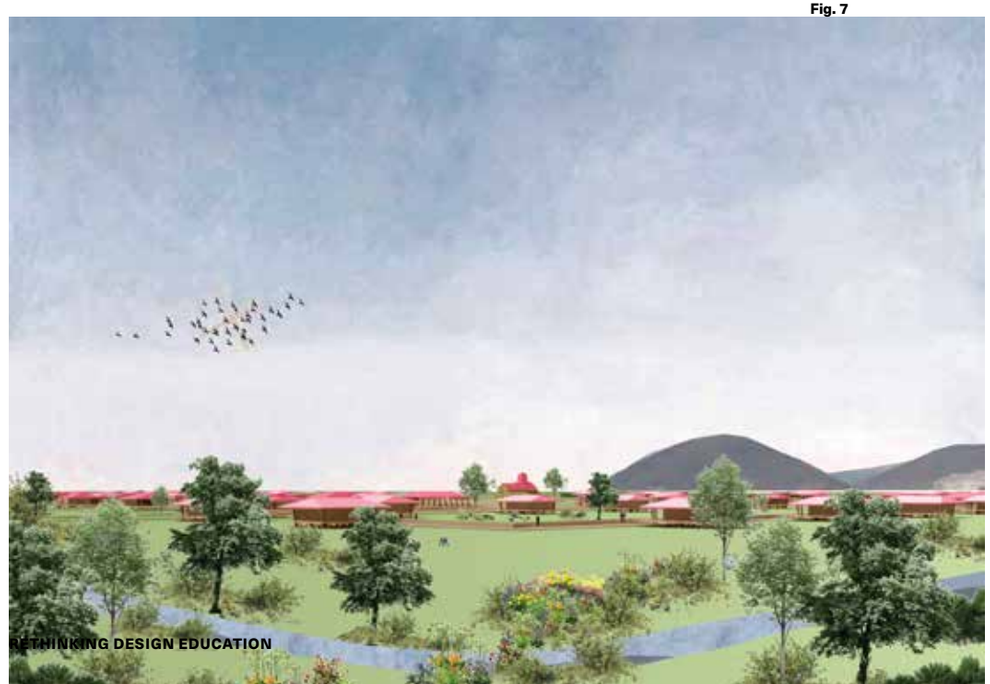
Fig. 4

Figure 4
Multi-layered map of the area with the networks of villages, houses, canals, fields and the map of risk. By students Ana Belén García Figueroa, Pedro Miguel Machado Vicente and Sofia Pedrosa Caetano.

Fig. 5

Fig. 6

Fig. 7



we discussed with the local community about the days of the tragedy and their expectations/problems. This phase had helped to shift the point of view from a planning perspective established from above to the everyday life of common people. [fig. 2] Lastly, keeping in mind the trauma that a relocation may provoke, students made proposals for new settlements integrating new dwelling models, flood mitigation measures, alternative forms of agricultural production, and new ways of sharing and commoning. Some students selected very pragmatical options choosing a safe location placed on a slightly higher altitude but also envisioning mitigation solution and emergency plans in case of unpredicted future floodings. [fig. 5, 6, 7] Other students choose to

Figure 5
Anti-Flood Communities: Elevated housing, flexible grid systems, and public spaces for sustainable community development in risk of floodings by students Alicia Marín González and Claire Thong Soum.

Figure 6
Fusion of the villages: Relocation of Metamorfosi by combining it with Kalivakia by students Weronika Bartoszuk and Noé Gonzalvo.

Figure 7
The hive of Metamorfosi: Relocation of the village Metamorfosi by students Magalie Greff and Lauriane Mychno.

Fig. 8

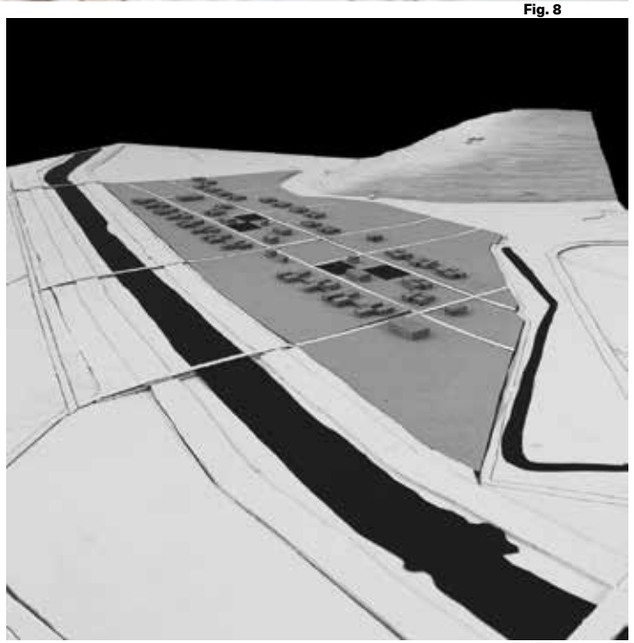


Fig. 9

Figure 8
The Metamorphosis into An Off - Grid Island: An Amphibious, Autonomous Settlement by students Thanos Karanikas and Lucia Sofia Paulo Salvador.

Figure 9
Relocation without distortion. Relocation of the village Metamorfosi through adaptation to flood mitigation strategies and keeping of the traditional lifestyles of the inhabitants by students Elisa Olivi and Letizia Tincani.

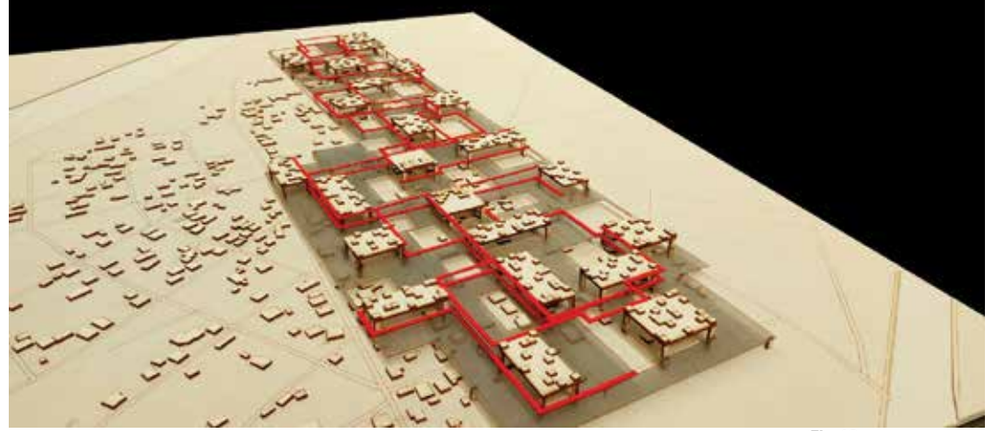


Fig. 10

relocate at the foot of the surrounding hills, where villages in Ancient Thessaly were settled suggesting a pre-modern relationship between settlements and cultivated area[12]. **[fig. 8]** Finally, some students investigated 70s-like superstructures using a multi-layer elevated system built over the abandoned village to host vertical farming, dwelling, communal living, free-time, and wild nature[13]. **[fig. 10]**

To conclude, our experience during the course helped to focus on the intricate relationship between three interlaced factors: the impact of policies of economic growth that have compromised the natural environment and the way humans live; the struggle of local communities to survive in a period of crucial climate changes; the fragility of natural ecosystems both in urban and rural areas.

12 Robin Rönnlund, *The Cities of the Plain: Urbanism in Ancient Western Thessaly* (Oxford, UK: Oxbow Books, 2021).

13 Similar to Yona Friedman's *Villa Spatiale* (1958), the plan for Frankfurt by Candilis-Jozic-Woods (1964), and Kisho Kurokawa's *Agricultural Village* (1966), a project proposed to rebuild towns in the Aichi region in Japan after the Ise Bay Typhoon in 1959.

Fabiano Micocci (Rome, 1976) graduated from University of Roma Tre in 2002 where he also specialized in History of the Design Process (2003). He obtained his PhD in Architecture and Urban Design from the University of Florence (2010) with the dissertation 'Mediterranean Topographies: Michelucci, Távora, Pikionis and the image of the Mediterranean'.
He taught at the University of Florence, at the Lebanese American University of Beirut and in many international workshops. He is assistant professor at the University of Thessaly in Volos, where he also teaches at the Master of Reuse of Building and Complexes.
He is a co-founding member of NEAR Architecture, a design and research practice based in Athens and Rome, that received the NIB prize –section landscape– in Italy in 2013. In 2015 he worked on an urban strategy for the post-conflict are of Tripoli, in Lebanon.

Figure 10
Sky City by students Ana Belén García Figueroa, Pedro Miguel Machado Vicente and Sofia Pedrosa Caetano.

Dealing with a Mediterranean torrentscape: design studio on the banks of torrent Krafsidonas

Aspassia Kouzoupi
University of Thessaly

The understanding of the nature of a Mediterranean torrent as a constantly active element of the landscape, can be considered the starting point for the design studio course that I have been teaching since 2017-2018 at the Department of Architecture of the University of Thessaly. Entitled "Architectural Composition – Reconstructions of the Soil", it addresses mainly to 3rd and 4th year students. The course attempts to introduce students to architectural design manipulations of public open spaces, which take under account the factor of time: both as a time-vector [irreversible changes, climate change, etc.] and as a pseudo-cyclical time [i.e. seasons of the year]. The course focuses on the design of dynamic landscapes, to be designed as hybrid/amphibious landscapes, sometimes drier and sometimes wetter, which should certainly function under normal conditions as accessible public spaces. At the same time, the planning must pre-suppose that these spaces can be 'animated' unexpectedly by extreme climatic events: influenced by the impact of possible climate change crises. Urban landscapes that require that mode of planning are found at the city of Volos, along the banks of the Krafsidonas torrent, whose estuary is at a very close distance from the Department of Architecture of the University of Thessaly.

The watershed area of the Krafsidonas torrent is the reference landscape for discussing a broader water flow management strategy. Following the principles of the *Integrated Catchment Management Plans (ICMPs)*[1], the scale of the watershed/catchment is identified as the interrelation of the units that make up the catchment: upper catchment – the Pelion, mountainous and slopy terrain with ravines and gullies, mid catchment – where the city frontier meets rural landscapes, and lower catchment – where the stream runs through denser urban fabric to its confined estuary within the commercial harbor of Volos city. As we have been working exclusively at the studio with the lower catchment since 2021-2022, we are exploring ways of redesigning a large section of the Krafsidonas banks, within the city.

Unfortunately, the Krafsidonas as of our days, was not treated by the state or the municipality in a sufficiently inclusive way towards the water flow, the potential riparian and river-bed ecosystems, but also the human society of Volos. Although a bridge of the Krafsidonas is crossed by most students every day, to reach the Faculty of Engineering coming from the center of Volos, the scarce water that flows most of the time in the confined and cemented current bed, made the students not understand from the beginning the potential of this neighboring torrent. Over the years as I taught this studio, I have observed that usually the stream was at first initially set aside in the background of the students' impressions: it was a landscape treated as 'trivial' and thus almost 'invisible'. Many times, up to the academic year 2022-2023, the students had the impression that the confined cement bed was already disproportionally wide. It took time to convince them, and for them to understand what a potential 'Mediterranean Torrent' means, to refer back to historical floods of the Krafsidonas, such as the deadly floods that had taken place in Volos in October 1955, counting 36 deaths[2].

By discussing international examples of landscape architecture, embedding climate change mitigation solutions, the students began to be initiated to understand how in reality the severity of climate change worldwide requires addressing the design of urban space and especially urban landscapes as landscapes in readiness: hybrid and amphibious landscapes, able to co-exist with extreme weather phenomena, able to function by mitigating their effects. Also the landscape approach methodology[3], grounded in a series of field experiential mapping of the stream landscape, often led them to design interesting and innovative amphibious landscapes. Through their proposals involving the re-design of the stream banks, scenarios of managing conditions characterized by extreme water abundance or extreme water scarcity, extreme temperatures, and the aim of augmenting urban biodiversity, quality of life on the banks, and handle/reduce vulnerability against flooding of riparian communities, unfolded through the student's design proposals.

Then climate change made a show of force in Thessaly, Magnesia and Volos, under the names "Daniel" [5/9/2023] and "Elias" [28&29/9/2023]. Krafsidonas was treated by most of the media as an overly powerful, potentially destructive torrent that 'broke' its boundaries. It 'broke' the strict limits imposed by its artificial diversion[4] bed. The torrent waters claimed the entire

1 Integrated Catchment Management Plans (ICMPs), accessed during summer 2024, https://www.catchments.ie/icm-epa-role-introduction/.

2 "Heavy rainfall caused the overflow of the city's torrents, which broke their embankments and flooded large parts of the city, mainly in its peripheral districts." Βίλμα Χαστάογλου, Βόλος: *Πορτραίτο της πόλης τον 19ο και 20ό αιώνα.* (Βόλος: Δημοτικό Κέντρο Ιστορίας και Τεκμηρίωσης Βόλου, 2007), 114.

3 The landscape approach methodology I engage is strongly influenced by the "Landing-Grounding-Finding-Founding" concepts developed by Christophe Girot, Professor Emeritus, Chair of Landscape Architecture, ETH Zurich.

4 In the town plan of Volos of 1904, the current course of the diverted torrent bed of the Krafsidonas can be observed west of the hill of the Castle of Paleon. In contrast, the 1882 urban plan of Volos by Vlachopoulos shows the Krafsidonas still in its older, historically recorded, natural bed east of the hill and Paleon Castle. Χαστάογλου, Βόλος: *Πορτραίτο της πόλης τον 19ο και 20ό αιώνα*, 2007.

cross-section of the riverbed, occupied it, and even overflowed it at the point of the historic *railway bridge*[5], severely flooding the area around the Castle of Old Volos. The area to be planned is located in this neighborhood, which is dominated by historic structures such as the Palea walling structures together with the archaeological findings within and around their perimeter, and the Tsalapata Brick-factory[6]. What became apparent following the flood, thanks to the thorough in situ mapping by student groups, is that this area precisely includes many old buildings from the early to mid-20th century which, along with their courtyards and gardens, are located at a level lower [about 0,5m to 1,5m lower] than the actual functional surface of the city. Thus, the waters of the two floods were trapped for weeks, causing even greater damage, and making the daily life of the residents, who were enclosed in the area, even more difficult. Knowing how the floods affected this neighborhood, the student groups' proposals were asked to answer multiple questions: how to create space for flood, to increase the capacity of the torrent-bed, and how an intermediate 'floodplain' could receive the water that flooded the area as soon as possible, to relieve it? At the same time, an urban design issue arose: the design of a public space that is inclusive of the community, resilient towards the water, and friendly towards the riparian ecosystem is equally the objective of this course. **[Fig. 1]**

Designing After the Flood

The walk along –and wherever we could, within– the torrent-bed of the Krafsidonas, during the 'landing 'mapping process[7] was a tangible experience within a crucial zone of the landscape. Strong sensations, smell, humidity, many obstacles hindered the kinesthetic experience, the traces of destruction, were there. But the walk also included a wondrous diversity of peculiar findings. The great volume of the debris of the flood, the deep mud of the Krafsidonas had receded, and now we found a sculptural ground [above the buried concrete], completely covered by small dunes and islands of river sand, which was twisting, in various formations. A student worked on the topology of the islands: the relationship of 'across', the juxtaposition of islands in a collage-patchwork, the network or grid of islets forming a dashed barrier. **[fig. 2]**

At places within the torrent-bed we found trees in the trunks of which Krafsidonas had woven incredible assemblages of fibres, with yarns and plant stems. We found such weaves growing on other obstacles as

5 It is the bridge of 1889 whose foundation was designed by Quellenec, a member of the French Public Works Mission. Today this bridge is one of the most problematic points as it is too low, leaving as a passage for the torrent water the smallest cross-section in the whole urban length of Krafsidonas torrent.

6 A historical industrial building, surrounded by open-air industrial infrastructure and in operation for over fifty years (1926-1978), was restored between 2004 and 2006 to become a museum and multi-purpose exhibition space. During the period of severe flooding, it housed, among other functions, the Research Committee of the University of Thessaly.

7 Christophe Girot, "Four Trace Concepts in Landscape Architecture," in *Recovering Landscapes: Essays in Contemporary Landscape Architecture*, ed. James Corner (New York: Princeton Architectural Press, 1999), 58-67.

Figure 1
Aerial view of the study area.

Figure 2
From the 'recording-presetting' phase of student Dimitra Zachou.

Fig. 1

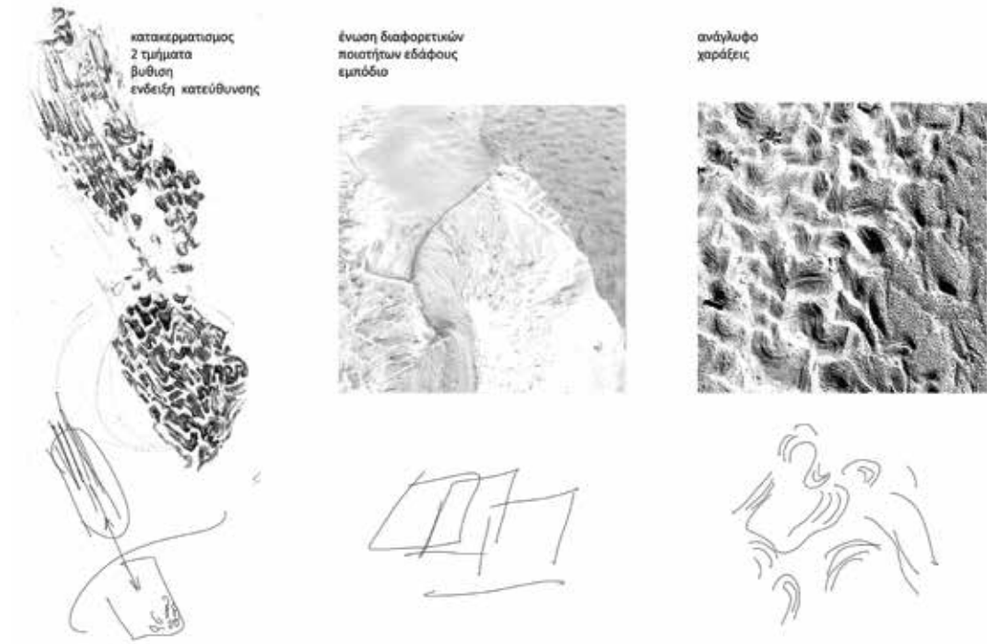


Fig. 2

Fig. 3a-3b

well. With a group of students, we thus discussed, that it is the action of Krafsidonas who was weaving treads with water flow, that Krafsidonas is also a sculptor. [Fig. 3a, 3b]

The compositional process and interaction between the 3 above students, as they formed a cohesive student group, created conceptual vortices and creative ripples. They developed a compositional process that yearned to engage the Krafsidonas as an active landscape dynamic. Striving to discern and choreograph the natural, or rather, nature-cultural' ways in which the Krafsidonas weaves and entangles the materials that flow in its waters; to create islands, the team designed a terrain hospitable to water. Its inhabitants are meant to be streamwater-ecosystem living beings; humans could visit it mainly as visitors. People can navigate and enjoy the island complex, moving on a grid of bridges, but they should only respect some islands apart, which are meant only for other living beings [flora, fauna] left to the unimpeded creation and protection of urban ecosystems. [Fig. 4, 5]

The second approach among the student projects of the winter semester 2023-2024 which shall be presented here, has a different focus. [fig. 6] While the functionality of the riparian urban area is perceived through a more anthropocentric prism, the design choices nevertheless negate and deconstruct this anthropocentricity. Specifically, the team of Thanos Karanikas, Ioanna Yalessa and Nikos Martimianakis choose to keep in the program a soccer field that currently exists in the area. Regarding the wider area, the student team also pointed out the important function of the bridges, as the only points of contact today between the citizens of Volos and Krafsidonas: since by crossing the river they provide visibility within its bed. [Fig. 7] On the one hand, the team proposes that a large part of the bank and bed of the Krafsidonas should be redesigned, by forming new lower levels to allow the

Figure 3a-3b
The sculptural object [metal mesh, probably a former platform] plastically deformed by the action of Krafsidonas, with the weavings on it of various fibres and stems, brought by the flow, was initially photographed in situ within the torrent-bed and then after its removal, at Dept. Arch-UTH.

Figure 4a-4b
Material part of the end of semester presentation and sections showing how the flora adapts to the new topography by students D. Zahou, E. Thomaidou, G. Katopi.

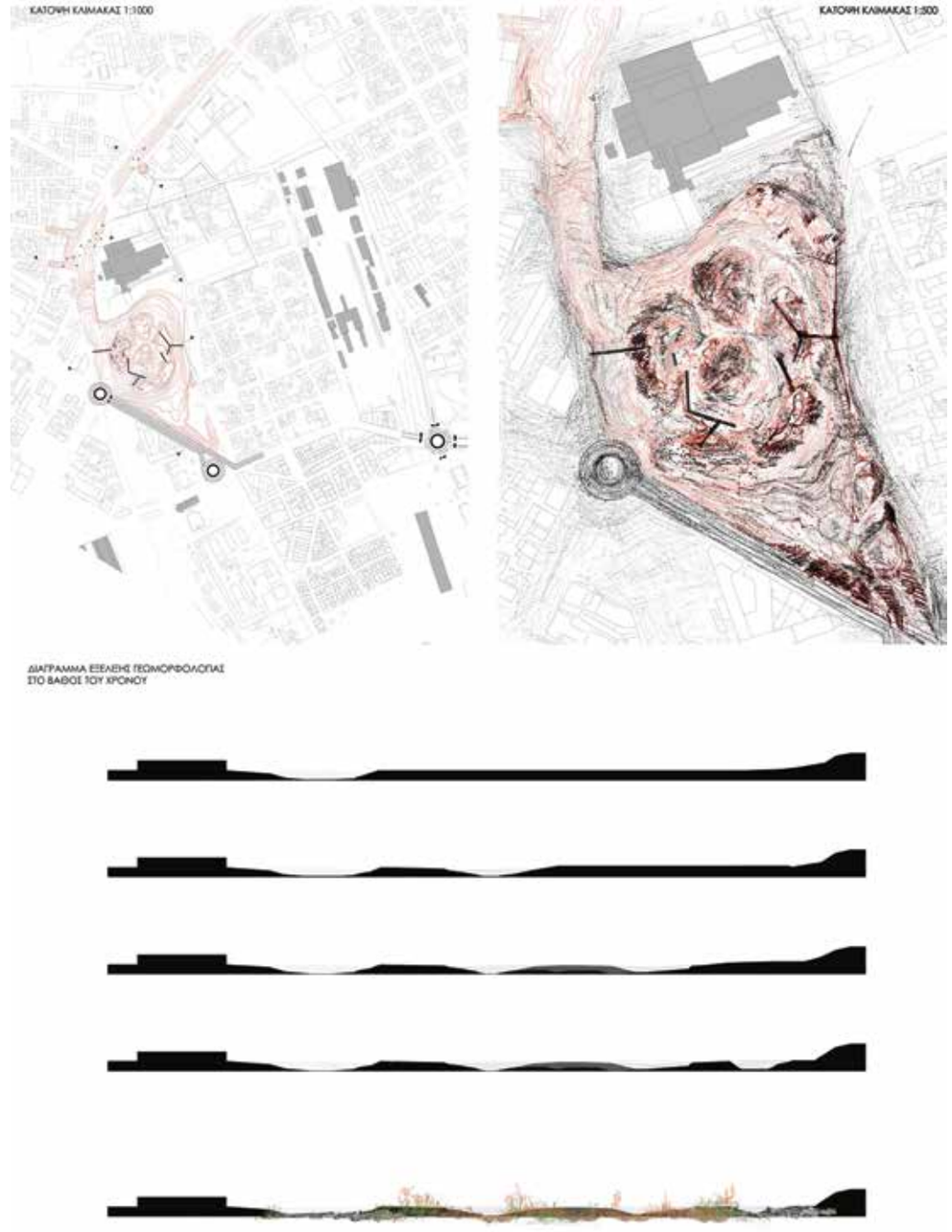


Fig. 4a-4b

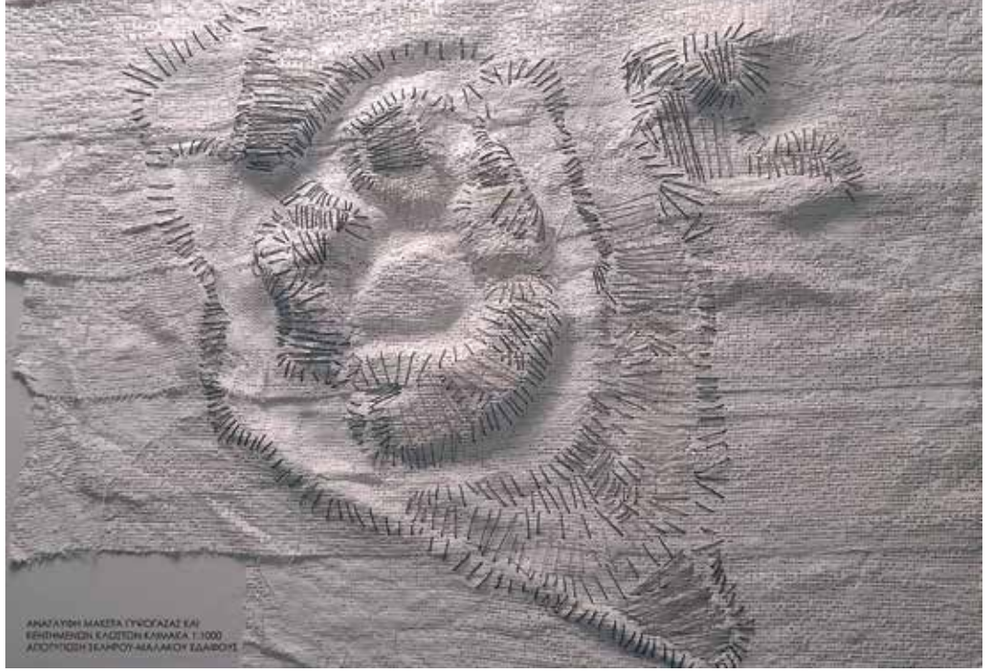


Fig. 5

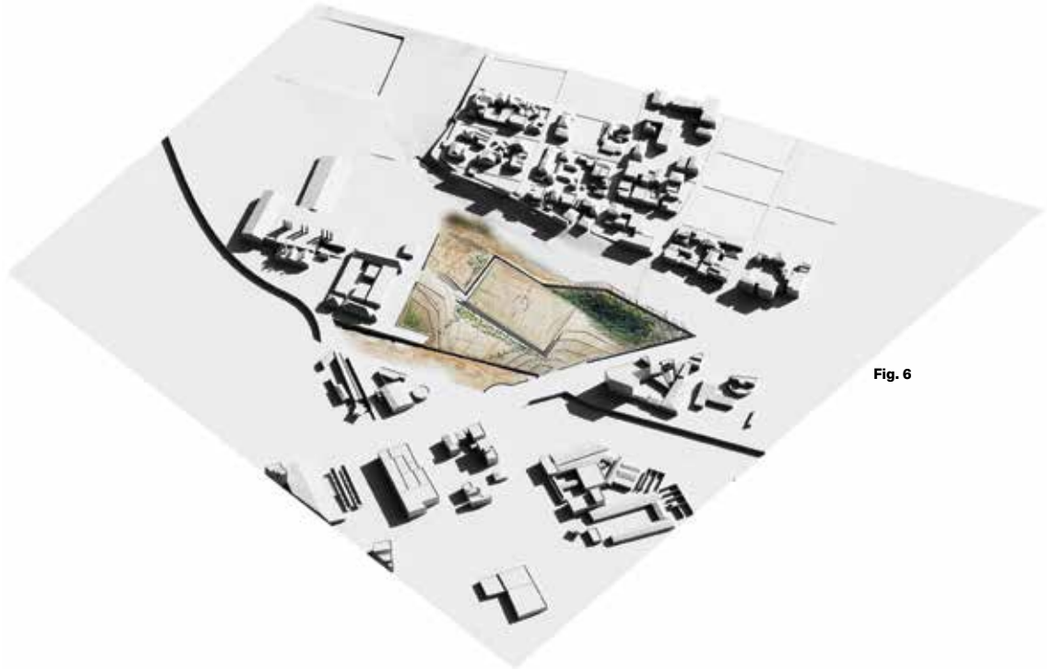


Fig. 6

area to flood when needed, creating 'flood space', and removing water from the neighborhood and the Tsalapata complex area. This decision goes hand in hand with the design of the football pitch, which not only lowers the level but also turns-pivots- the rectangular shaped field and acquires a texture that allows it to flood occasionally; the resilience of its surface shall make it functionable shortly after the removal of water. Thus, while the football pitch remains as a function, it loses the homogeneity of a 'standard' pitch, since it is not imposed on the site by its materiality and its initial orthogonal contour.

The design is complemented by a new artificial wetland that picks up and retains rainwater while the pitch is drained, as it is formed at a lower level. The student team also has set a limit, initiating a part of the wetland as a sanctuary safekept from human intervention, which is protected by its water and its plants. Finally, principles of circularity are adopted in the design, as the cement bottom of the confined Krafsidonas torrent bed, which is proposed to be broken up, is recycled into structures within the proposal. The broken concrete is cut by various means and methods [unconfined cutting, or irregular crushing] producing corresponding materials of different textures and qualities to create the new dry-stone structures in the proposal. Moreover, the student team investigated the characteristic stages corresponding to different water levels; a sketch-based visualization of the process of the retreat of the flood rainwater from the site, after the flood outbreak. **[Fig. 8, 9]**

What else did the Flood bring...

From the chronicle to which I have referred, it is perhaps not too hasty to draw a conclusion. The various manifestations of a 'nature-cultural' approach to torrents is likely to be the foundation of the way in which student work; their engagement after the outbreak of 'Daniel' and 'Elias' enabled them with a sense of ease, and a full understanding of the crucial contribution of urban riparian landscape design vis-à-vis the climate change. The advent of the climate crisis in Volos marked the passage from the theory and potentiality of emergency scenarios due to climate change crises, to face-to-face confrontation with them. The students matured and, instantly, we could say, they wished to take action, designing with courage and extreme resourcefulness the new amphibious banks, making room for the possible next floods.

In conclusion, we note that the 'new climate regime' [8] can also be illuminated as a condition in which one-dimensional anthropocentric planning is wisely, systematically criticized. But anthropocentrism is not the only

8 Bruno Latour, *Down to Earth: Politics in the New Climatic Regime* (Athens: Polis, 2019) in greek.

Figure 5
Model made from permanently bent canvas and sewn treads, depicting the soft and hardest surface of the ground. [part of the end-of-semester presentation by students D. Zachou, E. Thomaidou, E. Katopi.

Figure 6
Floor plan showing the tilted pitch, the widening of the Krafsidonas riverbed based on the wider design solutions, and the new artificial wetland to the right of the proposal [green area].

Fig. 7

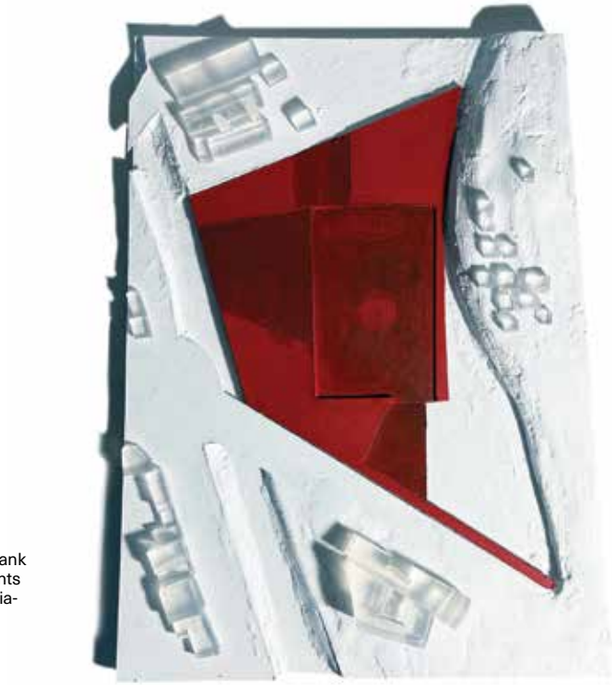


Figure 7
7a Area bridge, 7b the new location of the field on the bank of the Krafsidonas, by students Thanos Karanikas, Ioanna Gialessa, Nikos Martimianakis.

Fig. 8

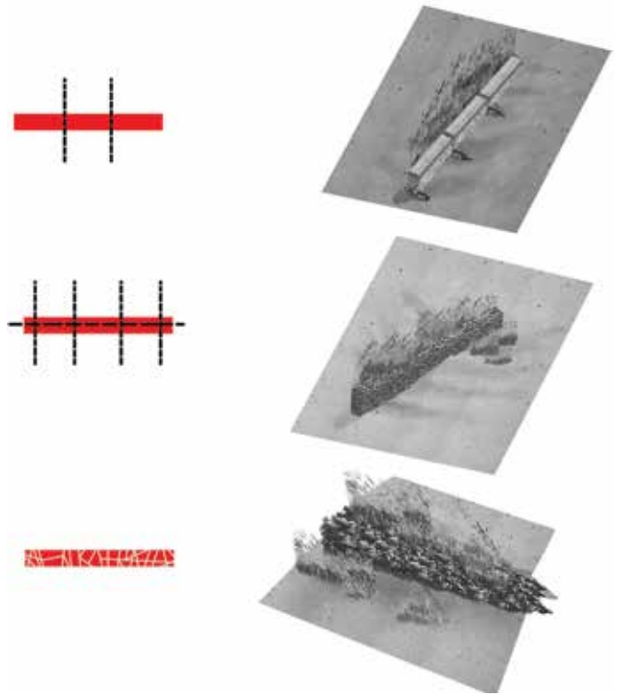


Figure 8
Circularity of the process of cutting or dissolving reinforced concrete and reassembling the resulting pieces, of more or less regular shapes, in the proposal in 3 different ways. By students Thanos Karanikas, Ioanna Gialessa, Nikos Martimianakis.

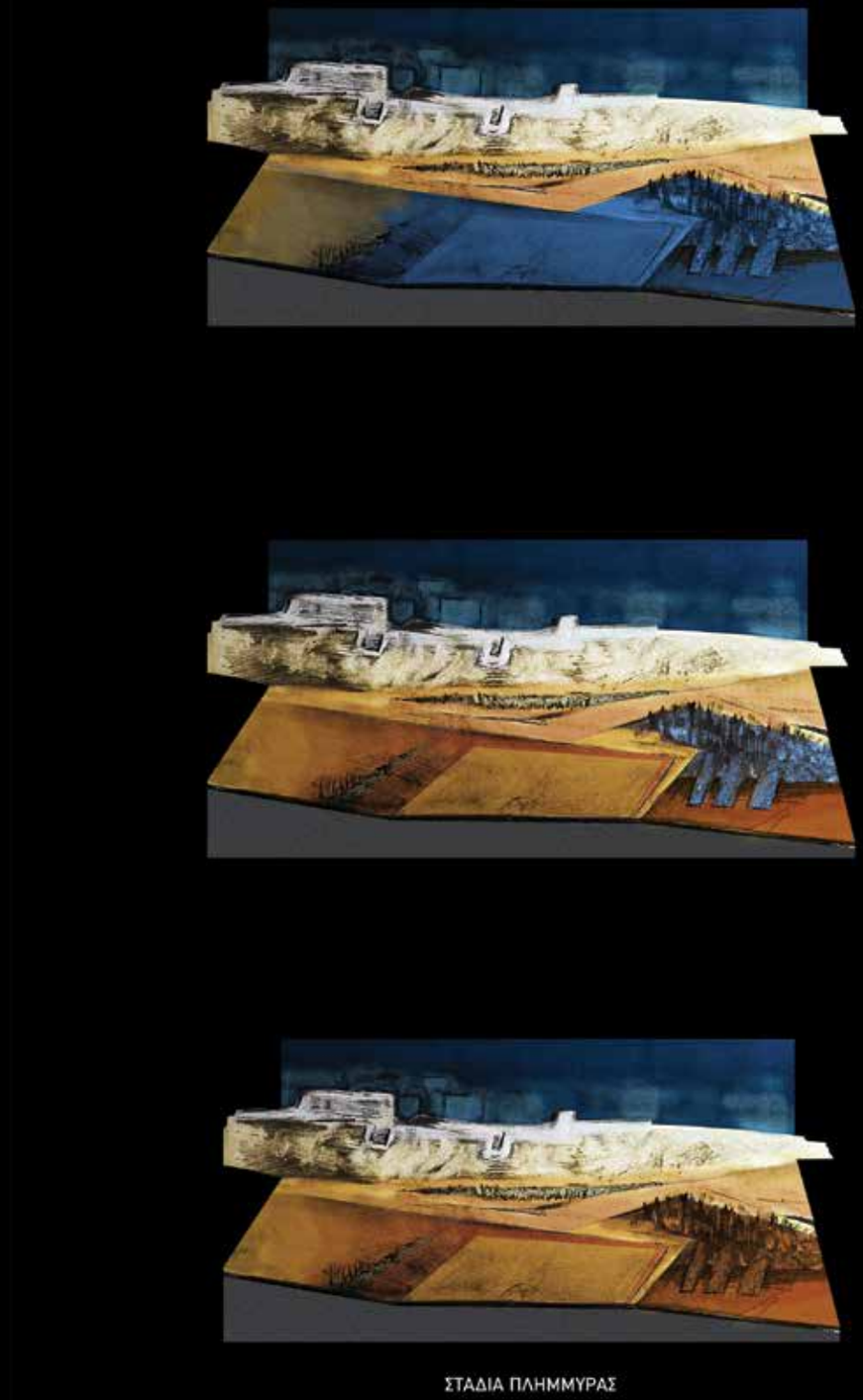


Figure 9
The gradual drainage of water after an underlying flood, remains at the artificial marsh area [image in the middle] for longer than the surrounding landscape.

way humanity has always and everywhere operated, nor is it operating. Going back among the oldest ancient Greek literature, in Homeric epic poetry, we find the emergence of the subjective dimension of a river, Skamadros/Scamander. Specifically, this important finding occurs in Rhapsody/book 21 of the Iliad, as noted by Holmes; her finding concerns evidence of a trace which eradicates the oppositional dichotomy of 'nature' with 'civilization'[9], within the epic: "The episode with Scamander muddies clean breaks between human and non-human force, nature and culture, ethics and physics, people and things, super human and subhuman. It calls into question the very purchase of these categories on our interpretive framework."[10] The way Holmes illuminates the episode with Scamander[11] is clear: the search for 'natureculture'[12] in the Iliad is a way of re-reading the Homeric epic poems in the search for understanding natural dynamics beyond the 'nature<>culture' dichotomy.

This kind of theoretical search can serve as the foundation for the promotion of a design that goes beyond the one-dimensional anthropocentric thinking, and the utilitarianism it imposes. Similarly, instead of unidirectional hydraulic infrastructure, or 'grey infrastructure', the student teams sought to give shape and place, to the coexistence of the torrent with the living inhabitants of the city; in terms of synergy, by maximizing beneficial reciprocity, they aim to create lively conviviality.

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9 I attempted a similar investigation as part of my doctoral thesis, "'Natural' Landscapes of the Homeric Odyssey: Investigating the Structures and Limits of Cultural Deposits in Odysseus' Nostos Course" (PhD diss., Aristotle University of Thessaloniki, 2017).

10 Brooke Holmes, "Situating Scamander: 'Natureculture' in the Iliad," *Ramus* 44 (2015): 29-51. https://doi.org/10.1017/rmu.2015.2.

11 «Scamander's wrath is in fact triggered by Achilles' flagrant violations of a code of honor as much as by Achilles' pollution of his waters on a more concrete level. [...] We would therefore be mistaken to characterize the river as something physical that obeys only physical laws, or raw nature acting outside and against culture, or non-human force undermining the human. [...]No doubt some scholars would question any division between these two domains.» Holmes, «Situating Scamander,» 30.

12 Donna Haraway via Brooke Holmes.

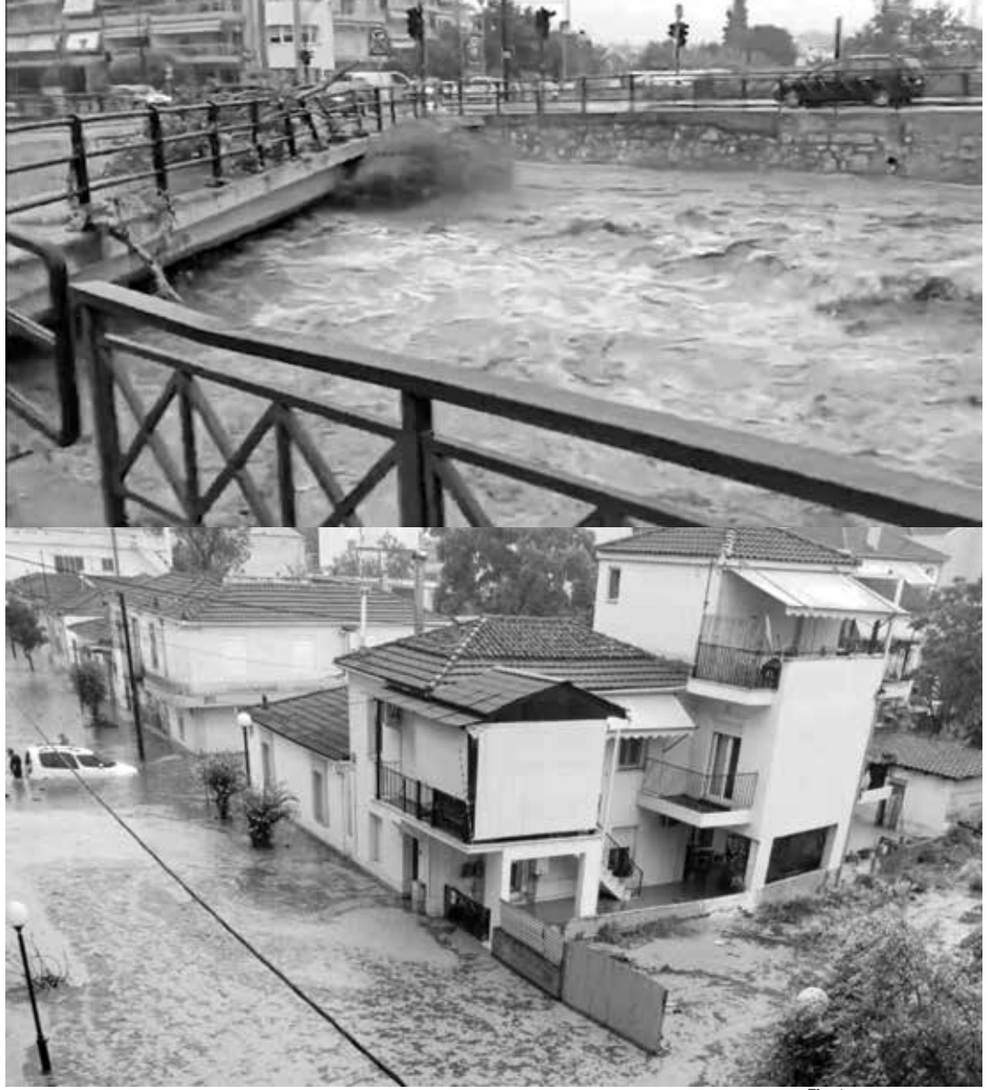

Fig. 1

Figure1
The Volos flood by “Elias” and “Daniel”, September 2023.

Broken households:[1] subjects and object assemblages in conditions of emergency

Zissis Kotionis
University of Thessaly

1 Title of the studio course entitled “Everyday Performative Thing” for the fifth and ninth semesters of study at the Department of Architecture, University of Thessaly. Collaborator: Efthymia Dimitrakopoulou, PhD candidate of the University of Thessaly.

2 After a year the effects of the disaster are still visible, perhaps more so than at its beginning. It seems that the reaction to the natural event of the flooding instead of being in the direction of an adaptation-based solution has exacerbated the problem and its impacts. The flood restored a natural lake, Karla, to its original – natural form before it was emptied and wiped out in the middle of the last century in an engineering project at the time to create new farmland. As a result water scarcity appeared from the misguided agricultural exploitation of

Nothing can be understood in the way it is when it is an experience rather than a re-description of an event from a temporal or spatial distance. The experience of the *Elias* and *Daniel* storms and the flooding in Volos in the autumn of 2023, and their effects while still in formation, brought a studio course, the students and the initial questions of the studio into the focus of the disaster. Thinking towards the subjects of the residence, who suffered the disaster in the affected city of Volos, the course acted both to document and to intervene –within the limits of the few forces of a small group of students– in the ongoing events[2]. The precariousness of the vulnerable households on the one hand and the perseverance and resilience of the inhabitants on the other became the real field for the development of a dialogue and an experiential practice of architectural education.

The weather-actor

the idea that the weather is not the background of the inhabitants’ residence but is a critical, universal actor, affecting life, everyday living and of course the intentions of architecture in the Anthropocene era came to surprise us and impose itself with the extraordinary occurrence of the natural disaster. The weather and its extreme effects not only affected life in the school, interrupted classes and affected the logistical infrastructure of our building but also put back into practice all the questions concerning architecture and its studies in the extraordinary climatic and meteorological condition that we live in our time. This is the time when the purpose of architecture as a field of knowledge and as a scientific, and professional practice is radically shifting: Its purpose is no longer to build shells to protect human life from the adverse conditions of “nature”, as the ontological foundation of architecture

in Western civilization from the time of Vitruvius to late modernity intended. We now know that nature and culture were never separate, that is why "we have never been modern" as Bruno Latour has put it. And we also came to know that the purpose of civilization must be to rescue "nature" in their hybrid coexistence, including human and non-human beings, from the intensive and destructive economic activity on the thin crust of the planet called Gaia[3]. Between the planetary scale and the climate catastrophe carried out on the one hand and the small local scale where the disaster was experienced in the households of Volos, the workshop for "Every-Thing"[4] sought the minimum possible solutions for the affected households. By investing empathy and care, the workshop moved with the least possible means to reverse a highly precarious domestic routine at the scale of the household, this vulnerable unit of production and reproduction of life. Thus, the laboratory with all its agents acted with the rich forces of the students' resourcefulness and the poor means that they may have had at their disposal, because of the scarcity and the insult to the logistical infrastructure of the university by the flood.

Household vs House

Widespread household disasters have tested everything that sustains life and human communities at the scale of the family dwelling unit, the couple, the lonely people without networking and care, the elderly and the helpless city dwellers. Within the affected or damaged households, the population sought survival solutions with improvised patents and solidarity practices in the scale of the neighborhood to continue life, maintain health, and restore basic survival conditions. We insisted on the idea of an engagement of the studio not in the unit of residence we would call "house" but the engagement being in the unattached unit of residence we call "household". The passage from the study of a building structure to the study and practical reinvention of the "household" marks the passage of architectural culture from design research on the form of architecture to research on the performativity of architecture in the space between the subjects of the dwelling and their objects, all of which together are a set of actors[5] in the performance of the domestic dwelling.

Everyday performative things

The laboratory course entitled "Everyday Performative Thing» has as its general objective the understanding of the contemporary conditions of living and the design and construction of objects and micro-installations of accommodation on a real scale (1:1). During the "Broken Households" Course it was directly adapted to the extraordinary condition of flooding and household destruction as it was happening around us and turned its questions to this very extraordinary and site-specific condition of contemporary living. As stated, a critical concept and condition of the real, within which the workshop was situated, was that of the household. The question posed from the beginning and in the wake of the disaster and its effects on the lives of the students and the lives of the city's inhabitants was: What happens to households as they are disrupted and affected, how are residents and micro-communities activated, how does the collapse of energy networks and infrastructure affect life in the home, what is the function of the inviolate of residence we call the household, how gender roles are redistributed, what are the possibilities of cooperation and symbiosis between residents, what is the role of solidarity, care, horizontal and bottom-up activation of subjective relations and the collective subject of the neighborhood.

Empathy, documentation and inventiveness

In the first phase and while people were still living in affected households without running water, without electricity and communication networks, we were concerned with identifying these affected households and their subjects. We effortlessly developed communication and solidarity especially with the affected women, key actors in the functional articulation of the households. We documented the condition in the interiors and exteriors of the houses, documented the losses, the grim experience of destruction and lack within the house and in the neighborhood. Then, we proceeded to devise ways of contributing to the restoration of the households, to replace their connection to the networks. We also proceeded with the practical investigation of the repair and replenishment practices of the affected households. To exercise new inventiveness at the scale of the construction, we recorded the residents' inventiveness[6] and "patents" in the use of water[7] and the substitution of damaged household infrastructure (water, energy, connections to materials and digital networks). Simultaneously, we moved on to the exercise of a constructive and performative resourcefulness on the part of the workshop and students, which came to complement that of the residents in the restoration of the functioning of each household.

the Thessalian plain as well. After the flood it was decided to empty the lake again into the sea, causing extensive environmental damage both to the extended new lake-land and to the Pagasitikos Gulf on the other side of the city of Volos.

3 The concept of Gaia is posited here as originally defined by James Lovelock in his book: Lovelock, James. *The Vanishing Face of Gaia: A Final Warning*. New York: Basic Books, 2009 and as developed by Bruno Latour in his later theoretical work: Latour, Bruno. *Facing Gaia: Eight Lectures on the New Climatic Regime*. Translated by Catherine Porter. Cambridge: Polity Press, 2017.

4 The title of the Workshop "Every-Thing" (Καθημερινό Επιτελεστικό Πράγμα) means: Everyday Performative Thing. The term "thing" instead of "object" encourages us to understand objects as products and agents of actions and acts, not as aesthetic forms. The dimension of everyday life also emphasizes the agency of objects within domestic life.

5 For actor-objects and their connection to actor-subjects in a network of domestic or urban performativity see also Actor Network Theory (ANT) as formulated by Bruno Latour and his research team.

6 For the concept of resourcefulness and in relation to the ancient Greek matrix: "This engineered, practical knowledge is called matrix. I argue that 'Solidarity Practices', since they do not participate in the dominant knowledge systems of the economy and state welfare, can only develop as mechanizations, in in-between spaces, with mixed media, in non-institutional temporal organizations. Certainly Michel de Certeau's research and his analysis of inventions and mechanizations in consumer practices – remain exemplary in the direction of theoretical investigation of agency. The application of the inventiveness and mechanization of subjects in relations of solidarity, hence the production and transfer of knowledge, is the basic political tool for communication and the achievement of the solidarity goal." Kotionis, Zissis. "Inventiveness and Mechanisms of Solidarity," in *Practices of Urban Solidarity*, edited by Z. Kotionis and I. Barkouta, 140. Volos: University of Thessaly Publications, 2015.

7 A typical example of the "matrix" of the residents at the neighborhood scale was - given the long days of water supply

network interruption – the collection of water from the watering troughs that for days emptied rainwater into the street. Residents collected water from the gutters with water storage vessels and in rows, sharing the time of water collection, arranging equally the right to use the communal water per resident.

Biographies of the emergency residency

In the first phase of recording the situation was done with empathy and participation in the traumatic experiences of the residents, which were also traumatic experiences of ourselves, members of the academic community who were equally affected in their daily lives. Thus, the videos featuring the household actors talking about their dystopian experience and their extraordinary activation became a kind of solidarity conversation that never appears in the journalistic coverage of the events, when the residents feel that they are once again victims not of the disaster but of its exploitation by all sorts of communication media.

In the short videos on the affected subjects and the affected households in their conditions of non-functioning, the problems and disasters were identified through the narratives of the affected people so as to then provide, dialogically, the perspective of repairing the situation and organize the anticipation of future similar exceptional situations. The recording projects presented the subjects, sharing their traumatic experience and their resilience, and ultimately created a kind of biographies of their stay in the emergency condition of flood and disaster.

From biography and documentation to inventiveness and assemblage practices

What do we do when a household has no running water for days, no electricity or even no connection and communication through telephone networks and the internet? Through dialogue and communication with the subjects of the broken households and through the biography of their experience of the rainstorm and flooding emergencies, ideas and ways to rehabilitate the households were then sought. Of course, it was something that could only affect the household life in some minimal aspects where a little intervention would add a tone of optimism to the narrative of traumatized daily life. Thus, the aim became to design and build micro-inventions either for the autonomous functioning of households when connection to the water and energy infrastructure networks was impossible for days or for the restoration of the affected structure both pragmatically and symbolically. It even encouraged the substitution of technological means of communication –the disconnected telephone and the internet– with alternative, embodied practices of physical communication at street and neighborhood level. With small patents of zero or minimal cost, in the logic of creative invention, micro-practices of assembling new constructions were developed to attach and adapt them to the environment of 'broken households'. The assembly of the new inventions or constructions was carried out with the logic of circularity of materials, using half-destroyed objects and utensils, to ensure that the life of the already destroyed utilities was preserved with new uses. To this end, the logic of assemblage in construction was developed by assembling a plethora of heterogeneous materials, available from the stock of household destruction or elsewhere, with the necessary supplements from market components.

Fig. 2

Figure 2
Videos of the affected household residents.

Fig. 3

Figure 3
Proposals for new object assemblages to contribute to the restoration of household performativity by students Vangelis Eleftheriou, Sotiria Grafakou, Dimitra Kosma, Stephanos Spanias, Eleni Fotopoulou, Elli Elpida Gkogka, Ifigenia Pediaditaki, Gabriela Kontra, Konstantina Andrianopoulou, Thisvi Argyriou, Giorgos Mpregiannis, Giapitsaki Chrysophia, Giorgos Miovolos, Giorgos Mpousis, Anastasia Karava, Dimitra Koritsi, Ioanna Patrikaki, Maria Alexandrou, Eleni Karakatsani, Myrto Ioanna Tzoka, Chrysi Katsiroumpa, Aimilia Tsepelidou, Athanasia Alexandrou, Martina Lioni, Athanasia Kitsopoulou, Dominiki Xatzinikolaou.

A reflection

The student projects within the emergency condition of traumatized infrastructure were impossible to be supported by the already poor laboratory infrastructure of the university, which had been put out of operation. Nevertheless, the crisis condition in the households that were broken and in the individual habitats of the students themselves triggered the intensification of the relationship between the affected, residents and students. Beyond the development of construction skills in the production of real objects and the development of the artistic consciousness of the students, the results of the workshop counted more in the production of embodied experience, the production of feelings and the promotion of a sense of the social scope of architecture, within the relationship between the subjects of the residence and the objects that constitute the material world of dwelling: Both the subjects who live within architecture and those who are supposedly intended to design it.

Zissis Kotionis (PhD) is an architect, writer and artist. He is a Professor in the Department of Architecture, University of Thessaly, Greece. He has published twelve books and monographs on architectural theory, urban culture and narrative poetry. His architectural and art projects have been internationally published, awarded and exhibited in Universities, Galleries and Museums. His work includes built and performative architecture, design and art projects, performances, installations and public art practices. In 2010 he has co curated and deigned the Greek National Pavilion in the 12th Biennale of Architecture, Venice (The Ark). Kotionis' research work in architecture, urban studies and artistic practices include topics on Greek/ Mediterranean landscape, phenomenology, existential topologies, cultural activism, bodily and social artistic practices, public policies, eco-poetics, social housing, sustainable design. Zissis Kotionis is involved in artistic performances, installations and in public art practices. He was founding member of the group Urban Void that introduced performative architecture in urban environments, in the late nineties, in Greece.

in loving memory
of our friend and colleague
Spiros Papadopoulos
1966-2023

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This volume brings together the knowledge and creative explorations that emerged from the Erasmus + Blended Intensive Program "Hybrid Urbanscapes" workshop. It includes a collection of lectures delivered during the workshop, as well as documentation of field visits to critical sites affected by extreme flooding in September 2023 – the Giannouli neighborhood in Larisa, Lake Karla, and the village of Mikro in Pelion. These locations, deeply impacted by climate-related disasters, served as case studies for envisioning resilient urban and territorial futures.

As we navigate the complexities of the 21st century, the question remains: Can we move beyond the traditional paradigm of human-versus-nature and instead cultivate an approach where urban design and nature work in synergy? The future of sustainable cities depends on our ability to design with nature rather than against it – adapting, learning, and fostering resilience in the face of an ever-changing world.

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