Chapter 1

Sustainable Strategy and Cultural Heritage

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Sustainable Strategy and Cultural Heritage

Climate emergence has become a major concern in urban, landscape, and architectural heritage policies. It is a fact that Earth's climate has changed throughout history. NASA explains that just in the last 800,000 years, there have been eight cycles of ice ages and warmer periods, being the last ice period ended about 11,700 years ago, a date that coincides with both modern climate era and of human civilization (NASA, n.d.). The same variability happens with sea level, which presents itself highly fluctuating and varying usually according to sea levels, higher during warm periods and lower during cold periods. In fact, sea levels about 18,000 years ago were as much as 120 meters below present. Recent measurements show that this "recent" rise in global sea level began with the Industrial Revolution and has the most expression starting in the beginning of the 20th century. Since 1900 up to 2017, the global average sea level has increased between 16 and 21 cm and some more accurate data collected from recent satellite radar measurements reveal an accelerated increase of 7.5 cm in the period between 1993 to 2017, which means a trend of around 30 cm per century. Scientific studies relate this acceleration to climate change, which is causing the thermal expansion of sea water and the melting of terrestrial ice layers and glaciers. Despite the differences in the interpretation of this phenomena, the reality already shows some of its effects with the ocean acidity and coastal flooding in several different ports on the planet.

Meanwhile, as architects and participating together with the scientific community, stakeholders, and as individuals with extended responsibility with the built and natural environment, we should look up to coastal territory with double care: by thinking what and how to build or unbuild in a way to improve the performance of the place in the face of the recognized changing of the climate and of the rise in water levels; and also in a way to reinstall the functional life and the memory of the sites that we are going to lose. Despite the big level of positivity that we, as architects, usually see in the future scenarios, the "Inconvenient Truth" is that a large portion of land, architecture, communities and cultural life (material and immaterial) is going to be lost, literally taken with the waves. Many policy efforts, at an international level, have already been taken, by UNESCO, ICOMOS, ICOFORT among others, to address numerous major problems we are currently facing. We underline recent UNESCO "Convention Concerning the Protection of the World Cultural and Natural Environment" that establishes a "Policy Framework" and an "Implementation Policy Document" that opens a new perspective for heritage regarding an adaptation to the

climate impacts and on “climate mitigation”, as point 59 describes, by creating “value and inspirational power of World Heritage properties to showcase ‘win-win’ mitigation practices that both reduce greenhouse gases and safeguard Outstanding Universal Value” (UNESCO, 2021). Despite the optimism and commitment of many authorities and also of many engaged people, there is no universal solution to the question of cultural heritage facing a continuous changing of the planet Earth, regarding its physicality and materiality, but also regarding its memory value or immateriality. The research field deals with some difficulties, linked to the complex positioning of people regarding climate emergencies (Latour, 2018, p. 15), still “scattering in all directions”(Latour, 2021). Additionally, the idea of the global approach is to address the main lines, and local entities have a role to play, by identifying their own specificity, and this is what we are trying to do through integrated research. So this topic also has no universal answer or either no universal formula.

One of the challenges of the current situation lies in anticipation of the rise of the sea water level, trying to understand behaviors and forecast dangers relating to areas expected to be damaged. During this research, we were gradually realizing that these areas between water and land should be seen as ‘places-in-transition’ that need to be studied, registered and addressed in terms of strategies to avoid anticipated damage, improve what exists and is maintained and think about improvements for a better future.

This chapter rests exactly in the memory of these ‘places-in-transition’ considering the amplitude of heritage conditions at the present state and sets the stage for presenting some testimonies of the challenging balancing between a ‘Sustainable Strategy’ for a future regarding our ‘Cultural Heritage’. Among an interesting sample of testimony applications in current cultural heritage research issues, we open an overview of the six articles that contribute to the theme within the research agenda of the SOS Climate Waterfront project.

The Law of Conservation of Mass dates back from 1789 with Antoine Lavoisier’s statement: “In nature, nothing is created, nothing is lost, everything is transformed”. Despite the beauty of the idea of circularity of the material world, we understood along these five years of research of SOS Climate Waterfront the predominance of highly open ecosystems (where inputs and outputs can far exceed internal cycling). For example, with the enormous increase of population, there is also an increase in construction and many of the materials and natural resources (e.g., water, stone, iron) become increasingly limiting over the next century (due to

subtracted geologic deposits). We are now facing the challenge of increasing the efficiency of these systems. So, just as mass balance constraints provide a useful tool for ecologists in studying natural ecosystems, it can also ensure that the increase in human population and material consumption that has characterized the past two hundred years, cannot continue indefinitely. We are beginning to understand now that we are prisoners of a "disposable society" (Desilvey, 2017). "Reduce, Reuse, Recycle" (Petzet, 2012) seems to be the only way to achieve ecosystem cycles.

In Architecture Depends (Till, 2009), Jeremy Till discusses the idea of architecture as an authorial artwork, bringing out its dependence from other disciplines and specially from other humans and the ethics that this relation involves. Although architecture is not determined by its durability, its argument is directly related to its material decline and to its social survival. In this sense, the durability and ephemerality and the use and oblivion of the built world explain the proximity between the "construction and demolition (...) the more new architecture there was, the higher the mounds of waste grew" (Till, 2009, pp 69-70). Despite the effort, it is evident that we cannot save all buildings or turn everything into heritage (Desilvey, 2017, p. 15), first because we really need to evolve, and second, because it is physically impossible, by weathering, intrinsic materials degradation, new space needs, or even by the expected rise in water levels, for example. Our point here is to bring the relevance of acting with anticipation to build strategies to avoid anticipated damage, improve what exists and is maintained and think about improvements for a better future, and among these, we are here discussing the value of memory.

In his book The Art of Forgetting, Adrian Forty reminds us another book of Alexander Lúria that described a man with the capacity to remember everything, a mnemonist (Forty, 1999). According to Forty, Lúria explained that his major problem was to forget due to the congestion of remembering everything. This is also a process that we should take into consideration when dealing with our 'place-in-transition': we will need to choose what has the utility to be preserved and what is better to forget. And here we find the first problematic: one thing is the individual memory, and another completely different is the collective memory. This second problematic is stressed by Paul Connerton in his book How Societies Remember when he says that "past factors tend to influence, or distort, our experience of the present" (Connerton, 1989, p. 2). So, we may also stress that choices made today will influence or distort our collective experience in the future.

Following these two concepts related with memory, as architects and planners, we can act with anticipation when planning and designing for the future. We can even legislate this idea, by deciding what materials, technologies or what ideas to use in these 'places-in-transition'. But what about the remains of these buildings? We know that architecture is concerned about the future, but in these areas we may also have interest in having concerns about the past. In the end, reusing a construction or a landscape means that we are registering a memory by thinking about its future.

Entrenched on the SOS Climate Waterfront research experiences, present speculative text aims to raise some ideas to a debate regarding the implications of the meaning of heritage with respect to practices and their sustainability.

The chapter addresses a complexity of emergent topics with five high-quality papers that support a broad spectrum of approaches for sustainable strategies and cultural heritage as local geographic and historical resources exploring concepts and projects relating water to landscapes and cultural heritage, focusing on the impacts of the contemporary uses. Each cultural landscape and each community relates to its particularities sustains and their re-signification regarding value, functions or conservation of heritage buildings and sites is a case-study by itself.

The SOS Climate Waterfront project constituted an important opportunity for scientific reflection on the impacts caused by climate change on urbanized territories at different scales with special attention to places characterized by the presence of water, our 'place-in-transition'. Different historical and geographical contexts were compared through a methodological and design lens which allowed us to delve into topics such as resilience, protection and valorisation in the context of plan and project strategies linked to water. In this direction, it has proved essential to combine environmental, landscape and urban planning with highly technological approaches linked to hydraulic engineering under the sustainability framework.

This first chapter aims to underline the value represented by the historical-environmental and cultural pre-existences and their ability to connote as resources in the identification of resilience strategies towards climate change and sea level rise. A greater awareness of the role that cultural heritage can play in this direction is undoubtedly a possibility that still remains partially unexplored and which deserves, instead, to be explored in depth through innovative project paths capable of modifying consolidated points of view to open up to new fields of experimentation as a link between the past and the near future.

Overview of the Thematic Chapter

The contributions that follow demonstrate the desire to broaden the study experiences not only to the large international working group of the research partners (Greece, Italy, Netherlands, Portugal, Poland, Sweden and Turkey), but to extend them to the contribution of other european researchers in order to compare even broader points of view.

The first contribution, "Chasing the Nexus between Sustainable Strategies and Cultural Heritage" is the result of collective work between researchers from the Italian and Portuguese groups and is aimed at highlighting the extent of the challenges facing cultural heritage in fulfilling a contemporary role. After a brief review on the evolution of the concept of heritage in the recent past, the essay explores the expansion of design approaches from purely environmental issues to more complex and inclusive ones of the landscape. Here the project must deal with the supporting role of cultural and anthropic values and prove sensitivity to new awareness capable of applying land care practices to reduce conditions of risk and vulnerability and develop a set of sustainable strategies at different scales and levels of governance.

The second contribution is entitled "Learning by Portolans: Reading and rewriting the built coastline beyond climate change and threatening obsolescence" and is written by Stefano Antoniadis who examines the most recent transformations of coastal spaces, often due to industrialization processes, the creation of mobility infrastructures or the presence of different equipment, from port to tourist equipment. Many of these artifacts are today unused because they are obsolete and no longer meet current needs, but their presence has now generated new landscapes and new experiences from which it is impossible to independently activate environmental redevelopment strategies. The author therefore invites us to draw up a sort of new Portolano as spatialized of these heterogeneous pre-existences as an opportunity to raise new design paths of re-signification and re-use.

The third contribution is written by Dimitra Babalis with the title "Heritage Waterfronts and Well-being Strategy for a Dynamic Urban Transformation and Place Value" and introduces the notion of health and well-being as an additional component in the urban transformations of sensitive contexts such as those linked to the presence of water. It takes inspiration particularly from the specific conditions of a qualified context such as the Arno riverfront in Florence and proposes some design hypotheses that give value to the presence of open spaces as

a component for an environmental redevelopment that is also attentive to the well-being needs of citizens.

The fourth contribution is entitled “Life Between the Cliff and the Sea. Post-Industrial Waterfront Heritage as a natural system: a comparative approach between heavy industry and local ecological, cultural and leisure systems in Fiume (Rijeka)” written by Spela Hudnik. Also in this case, the attention is focused on the continuous natural and anthropomorphic transformations that determine contemporary structures in continuous evolution and in continuous oscillation between past and future, between commodification and patrimonial value, between environmental needs and needs of use. From this perspective, the various possibilities for the regeneration of territories require renewed attention to the needs of the contexts, as they have transformed over time, to the heritage values and to the new conditions dictated by the changed climatic conditions.

The fifth contribution is written by Hugo Nazareth and is entitled “The Consecration of Water through Architecture in the Eternal City Contributions to the Art of Memory in the Anthropocene”. The author focuses on the profound link between water and architecture and on the role played by memory as a lever to give value and support to cultural proposals capable of representing a sustainable strategy for the regeneration of water landscapes in urban contexts with a strong historical identity.

The chapter concludes with two meta-design experiments developed during the research as exemplifications of contexts and recurring problems in european territories from the Baltic to the Mediterranean where the challenges of climate change must necessarily deal with the historical sedimentation of urban structures and the diversity of geographical conditions.

Notes

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Chasing the Nexus between Sustainable Strategies and Cultural Heritage

1. The sense of heritage from 'historic centre' to 'historic city'

"Cultural heritage is, in its broadest sense, both a product and a process, which provides societies with a wealth of resources that are inherited from the past, created in the present and bestowed for the benefit of future generations. Most importantly, it includes not only tangible, but also natural and intangible heritage [...] however, these resources are a 'fragile wealth', and as such they require policies and development models that preserve and respect its diversity and uniqueness since, once lost, they are non-renewable" (UNESCO, 2014).

It is useful to start these short reflections from the above-mentioned definition in order to argue about the paradigm shift which occurred in time in the perceiving evolution of the built territorial and urban domain from general interpretations of basic terms as 'heritage', 'monument', 'artifact' to complex items (and issues) as 'historic centre' and 'historic city'.

1.1 The ontology of Heritage

The term heritage has been inherited from the past in the most diverse fields: both natural (in terms of flora, fauna, landscape and natural resources which are recognized as having a high scientific value in terms of physical, biological, geological characteristics, or risk of extinction, etc.), and cultural (in terms of tangible and intangible artifacts, from food to traditions, from arts to crafts, which are recognized as having a high historical, aesthetic, archaeological, scientific, ethnological or anthropological value).

Heritage, with the exception of the immaterial one, is something physically present, that represents the legacy of history but is at the same time, undeniably, part of our present. Inside the heritage concept it is possible to distinguish a material reality (landscapes, cities, buildings, monuments, works of art, etc.) and an immaterial dimension (the historical, artistic, cultural value that these material entities express and represent). UNESCO classifies as World Heritage Sites places (such as, for example forests, mountains, deserts, etc.) or artificial complexes (such as, for example, buildings or urban ensembles) of natural or cultural significance such as to make them an integral part of the common heritage of all humanity.

In Architecture and Urban Planning, heritage mainly designates the built historical legacy, both at the scale of the single building and at the entire urban scale. From an evolutionary point of view, it is a relatively recent conception, which spread following the rapid changes caused by the industrial revolution, from the last part of the 18th century onwards, and strongly developed starting from

the end of the Second World War following the architectural and urban destruction in Europe. Even more recent is the idea that the value should not be referred only to the single monument or building but, for the most part, to the context as a whole.

1.2 From 'historic centre' to 'historic city'

The modern concept of 'historic centre' was born at the beginning of the 19th century, in the midst of the industrial revolution when, in opposition to the idea of urban modernity, the urban fabric of the historic city collided with the new organizational needs dictated by urban growth. Despite the attempts to give the definition of 'historic centre' an absolute value, the impossibility of extending its meaning to a universal level was soon clear. Easily identifiable for european cities, more generally it remains difficult to recognize it in the vertiginous expansions of new metropolises with recent stratification where — between dispersion and super--concentration — development seems in many cases to herald the recession of the historic notion of city itself. Within the 20th century, therefore, attempts were made to avoid the use of the 'historic centre' concept beginning to introduce 'historic city' as a topographically non-limiting term, precisely to escape the problem of fixing the edge between historical and non-historical areas. The progressive evolution of the concept of 'historic centre', therefore, arises from the impossibility of distinguishing, in analytical and planimetric terms, the city centre from its urban and territorial surroundings to which it is linked by mutual and deep relationships; hence the development of the concept of 'historic centre' and related definitions of 'historicity' and 'recovery' to be extended up to include an extremely broad cultural value which is not always confined to precise portions of the urban domain.

Regarding the evolutionary definition of historic centre, within the last two centuries the cultural paradigm has shifted starting from a limited and traditional dimension towards new inclusive, comprehensive, dialectic perspectives.

The traditional view had proposed a 'monumentalist' approach to the historic centre as the unique identity of urban cultural heritage. Consequently, the historic centre was reduced to its excellent buildings and the preservation of a special symbolism emerging from some major structures. This ideological perspective was grassrooted on the thesis that the past can only be constructed through 'monuments'. In this sense, the historic centre was merely treated as a museum and defined by its market value (Carríon & Guardia, 2011). The opposite emerging perspective treats the

historic centre as a public sphere with multiple dimensions. Monuments are one asset of many, but the centre as a place of social relations, cultural production and a space where society is constantly re-constituted is the most crucial dimension. The value of the centre as a whole in this case is thus estimated by highly taking into account its performative part (Merlin, Choay, 2000).

After the first structured reflections of international masters about the heritage issue (Sitte, Ruskin, Morris, etc.), since the first decades of the 20th century, Italy became the core of innovation ideas on the values and relationship between monuments and historic fabrics. Within this perspective the prophetic vision by Gustavo Giovannoni, in the first decades of the 20th century in Italy, has been the first to clearly interpret the historic centre as an urban heritage comprehensive repository. He outlined and spread out a more extensive idea of 'monument' which, in addition to the emerging episodes, should also include "the set of things of 'important interest' that have a collective value" (Giovannoni 1913, 1931). By addressing the difficult relationship between old historic buildings and new developments, he aimed to satisfy the needs of contemporary times (the beginning of the 20th century) through adjustments that would not damage the identity features of the historic heritage. He pursued the idea that "every city has its own artistic atmosphere ... a stylistic sense ... which should not be ignored, guiding the lines for new works, even in the newest and most audacious inspirations".

After the Second World War, the 'Gubbio Charter' (1960), signed by eminent scholars with the support of several Italian municipalities, represents a fundamental milestone treating the entire set of elements that made up the historic centre as a 'monument' itself and established the principle of integral safeguarding of the historical centre, thus giving way to a long line of international reflections on the problem of their conservation. The outstanding Assisi plan (1958) by Giovanni Astengo represented an ideal embodiment of the principles pursued by the 'Gubbio Charter'.

The definition of historic centre has been discussed *ex post* by another *maitre a penser* like Pierluigi Cervellati: "It was a mistake to define the historic centre as the city of the past. [...] The consideration of the historic city as the equivalent of a centre has contributed to distorting the very meaning of the city itself. The centre, however historic, is not equivalent to a city. The periphery has never been qualified as such. There was therefore a transition from city centre to historic centre. It is now a matter of designing/planning a reconversion: from urban centre to historic city" (Cervellati, 2006).

Jumping to the end of the 20th century, the necessary transition from the concept of historic centre to the broader one of historic city has taken place within the evolutionary road map for the adoption of the Rome General Master Plan (2003-08). It does not represent a mere exercise of temporal or spatial extension, for instance moving forward the date within which to place the historical values, or enlarging a perimeter. Recognition of the historic city calls for an interpretative need, an ability to read wider and more diffused urban parts in the traditionally 'peripheral' territory and to select, even within more recent urbanization processes, those urban fabrics and single materials that express historical values and therefore require different attention mainly aimed at recovery and valorisation. The transition from 'historic centre' to 'historic city', therefore, does not mean homogenising and flattening everything inside and treating differently what is outside its perimeter, but it means recognising urban diversities by learning how to describe and preserve them, and at the same time suggesting, where necessary, modifications consistent with those differences. It means seeking new strategic relationships between the parts both within the historic city and between it and the city of transformation (Gasparrini, 2001).

Why should we save the city of the past? To this question, the first possible answer is looking at the history of values recognition. It is precisely this process which has led to the recognition of what the value of the inherited city is: at the beginning, an aesthetic, artistic, architectural value of some of its components; then, a historical and documentary value of increasingly large portions; afterwards a 'civilizational' value, focused on the notion of 'cultural asset' (Bonfantini, 2020). It is the line followed by UNESCO action when assets and sites are inscripted in its lists. For the urban planning project, this meant first taking care of individual monuments; then, of the 'environments' in which they are immersed and of which they are part; then of 'minor' environments even devoid of any excellence peak, but equally worthy of attention; afterwards, of the 'historic centre' to be understood as a 'unitary monument' itself; finally, of the 'historic city', with an expression that dialogues with the 'historic urban landscape', highlighted and recognised at comprehensive level (UNESCO, 2011). However, precisely this further passage — that from historic city to historic urban landscape — brings us to a second interpretive answer to the question of saving the city of the past. An answer that is now nourished not by a contemplative value principle, but by a performative one of practical utility. The historic city is, probably, a factor of habitability. Its

materials have a potential to improve the performance of contemporary living space. The historic city helps us to live better and nourishes the urbanity of the contemporary city.

2. The value of the unbuilt space from 'environment' to 'landscape'

Heritage however, from an urban and landscape planning perspective, is not limited to the built elements of the territory. As the reconstruction of the gradual transition from 'historic centre' to 'historic city' has demonstrated, the definition of what is to be considered heritage and therefore protected has changed over time. The recognition of the unbuilt space as heritage, and of its value as equal to the built space for the purposes of preservation and transmission, starts from a concern for nature and gradually evolves to conceptualise landscape as heritage.

Natural heritage preservation in the european tradition, unlike the United States', originates from a scientific, ecosystemic concern, more than an identity building process (Battilani, 2017). It was the result of a need to maintain the ecological balance that sustains life — an attitude which, from its origin in the 19th century until today, has never lost its relevance to the management of nature and later of landscape.

The natural environment in the international context is object of preservation but in its 'integrity', which is an equivocal concept, especially for the european context. Moreover, 'nature' and 'culture', at least until the introduction of landscape as a concept, are generally considered as separate realms.

The UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO, 1972) defines natural heritage as:

- "Natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;
- Geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation;
- Natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty" (Article 2).

The UNESCO Convention therefore preserves natural elements, not landscapes. For a broader definition of landscape and its

components, and an acknowledgement of the interplay and synergy between anthropic and natural elements, we should refer to the European Landscape Convention (**ELC**) of the Council of Europe. Opened for signature in Florence on 20 October 2000, the **ELC** has been ratified by 40 European Council Member States, of which 24 are part of the European Union.

The **ELC** brings together morphological and cultural aspects in the representation of the identity of places when it defines landscape as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" (Article 1 — Definitions). Such a definition emphasises the intangible features linked to people's perception — as sight is central to the identification of landscape (Venturi Ferriolo, 2009) — and on material features emerging from natural and human agency.

Spatially, landscape is not defined by physical borders but by perceptive aspects, deriving from the environment but also from the individuals' social context and their history, as it is considered "an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity" (Article 5 — General measures).

The Convention is not only an international legal instrument "to promote landscape protection, management and planning, and to organise co-operation between the Parties" (Article 3 — Aims), but, above all, it is expression of a wider cultural and political project aiming to influence policy and stress the importance of the society-territory relationship, including everyday places, industrial sites, and degraded areas.

Landscape speaks a muted language, that of nature and the things humans have added in time, season after season, solely to satisfy their needs (Turri, 2005). Cultural and natural heritage building up landscape are a muted expression of the territory as a palimpsest[3], as they represent the continuous writing and rewriting of places, defining an ever-changing landscape, a narrative of its layering, a record of the many ways societies establishes relationships with the territory they belong to, dwell in, and transform.

The drawback of the emphasis on the immediateness of perception in the definition of landscape is that the notions of history and historicity are notably absent in the **ELC**, victim of a 'presentist' attitude in the contemporary society, which tends to cut its ties to the past in favour of a rush to development (Tosco, 2021). Landscape however, as we have seen, is imbued with the past, despite being subject to change. Its specific kind of temporality accommodates past actions and transforms them into a material form to be

perceived and handled in the present, so that the perception of the landscape also implies an engagement with its history.

Landscape as perception and heritage as historical testimony have long been considered as distant if not opposing concepts. Nevertheless, the spatial extension of the concept of heritage from isolated structures to their context and entire parts of the territory on one side, and the evolution of the notion and practice of landscape itself on the other, have resulted in a convergence of the two concepts (Fairclough, 2016). Common ground between heritage and landscape is being developed as they are increasingly understood as negotiated and processual entities, with representative purposes and identity values, worthy of preservation through actions of conservation, valorisation, and — this is the most recent add — management of change. Allowing change while acknowledging and preserving the inheritance of the past is therefore one of the most challenging tasks we are confronted with when designing for the future-proofing of our landscapes, currently under discussion in policy frameworks such as UNESCO's Historic Urban Landscape approach (UNESCO, 2011).

In this respect, the ELC provides fundamental guidance in stressing that landscape, being common good of the people, is the ground for dialogue and collective decision-making. On a political level, it becomes the privileged field to address the contemporary socio-environmental challenges and collaboratively shape the sustainable future of our territories. On a scientific and technical level, landscape emerges as an integrative field of practice where different disciplines can cooperate to elaborate visions and design solutions which can aspire to a more holistic, less sectoral approach.

3. Identifying the risks to reduce exposure and vulnerability

In recent years climate change effects have occurred most evidently as extreme floods and droughts. The intensification of these extreme events has highlighted the importance of managing natural resources through a multisectoral and multiscale approach and the need of reshaping the relationship between public space and the built environment. In the field of water management, for instance, several cities throughout the world have begun a trend of initiatives to become water-sensitive cities, promoting community education and government policies on water conservation, management, and reuse. According to UNESCO recommendations, present and future challenges require the definition and implementation of a new generation of public policies identifying and protecting the historic layering and balance of cultural and

natural values in urban environments (UNESCO, 2011). In this regard, the relationships between cultural heritage and the surrounding physical environment must be adequately addressed. The UNESCO historic urban landscape approach supports communities in their search for development and adaptation while retaining the features and values linked to their history and collective memory as well as to the environment, eventually providing assistance in managing and mitigating such impacts (UNESCO, 2011).

According to the major international institutions, climate adaptation planning and policies are hindered especially by insufficient data and lack of knowledge on feasible adaptation measures (JPI Cultural Heritage & JPI Climate, 2022). For this reason, further research on adaptation strategies, knowledge generation and exchange, and stakeholder engagement all play a crucial role in managing the impact of natural and anthropic geo-hazards affecting cultural heritage and its surroundings (JPI Cultural Heritage & JPI Climate, 2022). The current trend, as requested by JPI Urban Europe's Strategic Research and Innovation Agenda 2.0, is to prepare cities for unexpected, non-linear events, while still ensuring maximum liveability for its inhabitants (JPI Urban Europe, 2019). To this end, the classification of risks is crucial since they occur in a variety of forms and with different degrees of severity. Approaches and methods used to assess vulnerability and risk range from global and national quantitative assessments to local-scale qualitative participatory approaches. A common base is the IPCC Sixth Assessment core definition of risk as the potential for adverse effects to human or ecological systems. A significant evolution and clarification compared with earlier assessments, is that risk applies to both impacts of, and responses to, climate change. Since the term risk refers only to negative ('adverse') consequences, to allow a broader and more value-neutral characterisation of climatic changes without prejudging whether specific climatic changes lead to adverse, neutral, or beneficial consequences, a more general concept of 'climatic impact driver' has been developed. The expression refers to "natural or human-induced climate events or trends that may have an impact (detrimental or beneficial) on an element of society or ecosystems". Risks can range from rare and catastrophic events to daily clearly observable, yet minor, threats (ICCROM, 2016). Risk classification is thus necessary to identify and optimise adaptation measures, prioritise preventive conservation strategies, and rehabilitate affected territories. In recent years, there has been a growing attention for integrating climate change adaptation and resiliency into policies, strategies and decision-making processes

(van Veelen P.C., 2017) in which resilience results from cross-scale and cross-sectoral interacting processes of resistance, adaptation and transformation on various system levels (van Veelen, P.C., 2016). Overall, adaptation responses related to risk-based classification involve: reduce hazard probability, reduce exposure and reduce sensitivity.

Vulnerability and exposure of communities, societies, or social-ecological systems are dynamic across temporal and spatial scales, and depend on economic, social, geographic, demographic, cultural, institutional, governance, and environmental factors. As highlighted by Cross-Chapter Paper 2 of the AR6 IPCC Report (IPCC, 2022), waterfront areas, for instance, face a much greater risk than comparable inland settlements because the concentration of people, economic and cultural activity, cultural heritage and infrastructure combine dynamically with coast-specific hazards. The IPCC's Climate Change 2014 report suggests two closely related categories for classifying risks that rest on waterfronts: climate-driven risks and anthropic-driven risks. Climate-driven risks for waterfronts include (IPCC, 2014):

- Sea level rise;
- Storm surge and extreme weather events (increase in frequency and intensity of extreme weather events);
- Erosion and coastal degradation (loss of beaches, dunes and protective coastal ecosystems and natural barriers, infrastructure damage) that can also result in reduced resilience to future climate impacts;
- Hydrogeological instability;
- Salinisation of freshwater resources: as sea levels rise, saltwater intrusion may become a concern for urban areas that rely on freshwater sources near the coast. Salinisation of freshwater resources can impact the availability and quality of drinking water, agricultural activities, and ecological systems;
- Heatwaves and urban heat island effect, as urban waterfronts are often highly urbanised and the significant presence of concrete and asphalt absorbs and retains the heat.

Indirect related risks include: disruption to infrastructure and services (floods, storms, and other climate-related events can damage transportation networks, power grids, sewage systems, and water treatment facilities; ecological impacts such as habitat loss, reduced biodiversity and ecological imbalance); existing community abandonment and retreat; cultural heritage damage.

Anthropic driven risks include (IPCC, 2014):

— Soil consumption and soil sealing;
— Pollution;
— Tourism pressure (increase in users' fluxes; gentrification, etc.).

Adaptation and risk management policies and practices are expected to be more effective if they take into account the dynamic nature of vulnerability and exposure (Cardona, O.D., et al., 2012). The common decision-making process to plan for an uncertain future is based on the prediction of a future state (or multiple states) and the design of plans or projects for the conditions of that state (Hallegatte et al., 2012). In scenario-based planning approaches, scenarios are used to analyse the effect of plausible futures on short-term decision-making processes and prepare adaptation strategies for the conditions of that state (Walker et al., 2010, Hallegatte et al., 2012). Approaches that have been developed include scenario planning, exploratory scenario planning and backward planning, or back casting, in which a preferred future state is defined and used to identify operational goals backward to the present situation (Hooimeijer et al., 2001). These approaches share the assumption that the future, although uncertain, can be explored by developing potential futures based on extrapolations of past long-term trends.

To effectively incorporate resilience into urban design and planning of coastal waterfronts it is necessary to understand under what conditions the system is no longer able to recover and needs to adapt. Several researches have explored to what extent climate adaptation and resilience can be integrated into processes of urban development to enhance resilience at relatively low costs. For instance, designing for adaptation in waterfront areas requires understanding causes and character of several types of flooding in terms of probabilities, duration, depths, water quality (i.e. salinity) and velocities (Jha et al., 2012), as well as an understanding of the effectiveness of measures related to urban typologies, such as typology, size, age and construction of the building, and urban density (NYCDCP, 2013).

4. Developing sustainable strategies

The question we ask ourselves here is clear, even if it doesn't have a single answer: can we fight the anticipated consequences of climate change, with heritage protection in mind? And how?

Our framework for this question is linked to a series of strategies to be undertaken with diversified approaches at multiple

levels and simultaneously. We mention here four of them: the institutional level with guidelines and policies; the procedural level with funding and legislative provisions; the planning level with more sensitive design approaches to incorporate resilience; and finally, on a cultural level, through the diffusion among the communities of new awareness.

4.1 FIRST: Guidelines and policies at the institutional level

The framing for the question we pose here is particularly linked with the UNESCO guidelines that regulate local national policies regarding action on the heritage of cultural and architectural interest, in the current scenario of climate crisis and forecast of rising water levels.

Climate emergency has become a significant topic in urban, landscape and architectural heritage policies and many international policy efforts have already been undertaken to solve several important problems we are currently grappling with. UNESCO has been addressing the issue with a broad gaze since many years. Starting with the 1972 World Heritage Convention, UNESCO brought together, in a single document, the important concept of nature conservation and conservation of cultural heritage. The Convention recognised how people interact with nature and the fundamental need to preserve the balance between the two. Certainly, the threats of climate change in 1972 were not yet so clear and the Convention limited itself to questioning the anthropic nature of the degradation and destruction of the world heritage.

Over time, UNESCO has periodically updated its operational guidelines for the implementation of 1972 Convention, aware of the broader threats posed by global warming, driven by growing concentrations of greenhouse gases in the atmosphere and by deforestation. A first revision dates from 1977 and others have followed over the years, also implementing a useful database (State of Conservation, SOC) for monitoring the various changes in different contexts.

International organizations, on another hand, seem to have a lack of, or at least a weak, perception of how much climate change is a “threat multiplier”: initially registered as an environmental issue, it has proved to be untangled from its social consequences, such as, for example, extractive capitalism, mass consumption and governance failures, which give rise to wars and episodes of terrorism, migrations and deliberate destruction of cultural heritage.

The real change can happen when we stop considering the effects of climate change as “simply” natural and recognise that it also involves social mechanisms of impact.

4.2 SECOND: Legislative and financial drivers

Cultural heritage is a precious and irreplaceable record of human activity and provides a tangible link to the past, connecting intangible stories with people and places. Cultural heritage also provides many social benefits, environmental well-being, feelings of identity and stimulation for community engagement, learning, leisure, and recreation. These benefits represent a value that we must not only protect but also increase, with the necessary legal and funding provisions. In fact, cultural heritage is strongly linked to economic and touristic activities and its preservation also entails significant social benefits for the communities. However, while statutory provisions provide a fundamental juridical basis, they fail to ensure the physical protection to the assets. This must necessarily be supported by adequate funding and procedures to make desired interventions operational, guaranteeing their implementation, maintenance, management and monitoring over time.

The challenge we face now requires developing management strategies, actions, treatments and interventions that respond to the impacts of climate change for specific landscapes. And, for that, it is essential to adopt a new organisation attitude to ensure a territorial planning approach for the protection of cultural heritage rather than a traditional untidy conservation approach. This is possible through a more comprehensive and accurate understanding of the relationship between cultural heritages, landscape resources, and social environments.

4.3 THIRD: Planning and design to address climate change

To understand climate change, it is essential to perceive it not only as a threat, but also as an opportunity to activate a closer dialogue with environment. Consequently, it is also necessary to renew our approaches in territorial, urban and landscape planning and to put into practice an evolution of cultural heritage concept. It is also important to bring the existing gaps and redefine cultural heritage from a dynamic and territorial planning point of view, not only for its protection against climate change, but also for emergency preparedness and disaster risk reduction. This means operating on a territorial scale to identify the available resources, to prepare the networks of connection among the cultural heritage, natural, environmental, and landscape resources.

We can do it through stewardship, as a set of actions from ongoing preservation and maintenance, to repair and replacement in-kind, having in mind that deteriorated resources are more

vulnerable to further degradation than those maintained in good repair with healthy growing conditions.

We can also implement adaptation and mitigation strategies. Adaptation is the process of answering the question of what is to be done about the specific situations. It requires one to identify a range of options and test them within a variety of hypothetical scenarios, from national policy to managerial on-site decision-making.

Adaptation strategies can use all the innovation potential that our cultures have implemented over time, but also draw on the traditional and holistic knowledge that local communities have sedimented. Local potential for problem-solving, which rests upon the application of methods rooted in intangible cultural heritage can support modern resource management. An example of adaptation is the Dutch "Room for River" Program aimed to improve the safety of delta areas, through hydraulic engineering and landscaping operations. As we well know, the risk of flooding in the Netherlands is steadily increasing because the floodplains of rivers are shrinking. The water level is also rising because rainfall is more frequent and more abundant.

In order to lower water levels in rivers, the Netherlands is increasing space for rivers in many different locations. For example, moving dams further inland and building high-water channels, or in other cases lowering floodplains to flood them during periods of high-water levels, thus temporarily giving the river more room and easing the pressure on the levees.

The interventions are technologically innovative and are not limited to engineering solutions, but always incorporate the creation of usable public spaces. Therefore, they also contribute to increasing the quality of people's experiences.

Mitigation too, addresses the reduction of greenhouse gas emissions and the overall environmental footprint around cultural heritage. The activity in this area has focused on the historic built environment and cultural landscapes, since historical buildings and landscape maintenance can be energy intensive, while archaeological sites are generally not. In some cases, cultural resource managers have recognized that cultural heritage can assist carbon mitigation efforts, given that historic houses and landscapes often had to incorporate passive environmental controls that managers can identify and restore.

In terms of research projects focused on climate mitigation from the point of view of cultural heritage, it is worth to mention the project Footprints of Monumental Structures, Landscapes, and Buildings (ReFoMo 2017) involving Dutch, Spanish and Italian

partners. ReFoMo investigates the carbon footprint of cultural heritage and generates strategies to reduce such footprint. ReFoMo also examines the level of demand for climate-based refurbishment of cultural heritage structures as well as the barriers to achieving reduced carbon footprints within these cultural heritage resources. The ReFoMo website contains many of the results of this ongoing project in publicly accessible form.

Another solution for mitigation can be offered by the creation of a green and blue infrastructure network. These have the objective of restoring and enhancing natural ecological networks in order to satisfy many functions that go beyond environmental issues as a tool for sustainable territorial development, providing ecosystem services to communities.

Blue and green infrastructures are defined as a network made up of networks: the ecological and water networks, the network of peri-urban and extra-urban rural spaces, the network of cultural heritage and leisure services and, finally, the slow mobility network that integrates pedestrian, cycle paths, and dedicated lanes for public transportations. In this way, green and blue infrastructures not only constitute a network of connections capable of recomposing fragments of the contemporary metropolitan areas together, but also determine a network of permeable and semi-permeable spaces. Their main characteristics can be recognized in their multifunctionality, their connectivity and their multi-scalar approach. Added to these are those of contrasting the waterproofing of the soil by facilitating the penetration of water and thus contributing to the defence against hydraulic risks.

Green and blue infrastructure design integrates with other closely related approaches in the field of green design at different scales, such as nature-based solutions and ecosystem services. These approaches share a theoretical and operational background consistent with the conditions required by climate change and can contribute to defining a methodology to support territorial, landscape and urban planning and design. They require nature-based solutions considered as design approaches that are inspired by nature and derive their own operational support from nature: their usefulness is the ability to provide both environmental and socio-economic benefits, helping to build resilience.

4.4 FOURTH: Spreading new awareness and involving communities

Making adaptation and mitigation measures possible requires an intricate combination of policies, guidelines and approaches to planning and decision-making, but real communication work is also needed. Communication incorporates efforts to share information in a meaningful and useful way, both among asset managers and with the public.

Understanding how stakeholders value cultural heritage will be a key factor in designing climate resilience policies and protection objectives. Cultural landscapes, like all cultural resources, continue to experience the many impacts of climate change. Such valued places benefit from a concerted effort to understand these impacts and respond to the management challenges of protecting them now and for future generations. This requires the joint work of a team that integrates a diverse range of skills, including urban planners, cultural landscape specialists, climate scientists, historic preservationists, ecologists, biologists, resource managers, historical architects, material conservators and others; theirs is the task to directly tackle what may often be an uncomfortable level of uncertainty. The work of researchers, at this stage, is essential, not just to intervene in specific cases in a calculated and safe way, but specially to bring new ideas, more transdisciplinary, more accurate and more creative to undertake such a sensitive matter as heritage in a climate crises scenario.

These crises that we are dealing with are a severe threat to the long-term conservation of the values of heritage sites. And cultural heritage is a valuable, and irreplaceable, record of human activity. Even if we must deal with the irretrievable or with what we have to let go, we have the moral ethics to register, study and try to preserve our memories shaped in historic monuments, buildings and spaces through our towns, cities and rural areas so that our successors can look and feel them safely. Our heritage provides us with a tangible link to the past and connects intangible stories to people and places. It provides many social, well-being and environmental benefits, including a sense of identity and a stimulus for community involvement, learning, leisure and recreational activities.

Cultural heritage is intrinsically linked to economic activity. The preservation of heritage and the historical character of a landscape has a positive effect on communities, while the ways in which heritage is managed can lead to a better understanding of the effects of climate change in other areas.

Resilience is the ability to quickly recover from difficulties. As far as cultural heritage is concerned, resilience to climate change

can be addressed according to three relevant aspects: resilience of cultural heritage, resilience of communities and resilience of places and the environment in general.

We must therefore implement community resilience. Cultural heritage affects the resilience of communities to recover from impacts or adapt to environmental changes associated with climate change. For example, parks and green spaces provide practical resilience by alleviating the heat island effect and absorbing surface water, but on the other hand they also contribute to health and well-being by providing physical, social and psychological benefits to people. Similarly, cultural heritage increases resilience by contributing to the rooting of people and the development of feelings of belonging capable of implementing and spreading care practices to reduce the vulnerability of people and places.

Decision-makers responsible for heritage assets and their future management are facing increasing pressure to accept changes that could potentially alter the historical characteristics of the assets.

In these cases, it can be helpful to remember the vital role that heritage can play within communities to understand that change and adaptation are often central themes in narratives that have allowed them to be continually used over the years.

Ultimately, we must remember that there is no heritage without people and that it is often the heritage of daily life that has the greatest importance for communities.

Notes

The paper was conceived organically by all the authors. Nevertheless, section 1 has been developed by Bruno Monardo; section 2 by Giulia Luciani and Elena Paudice; section 3 by Tullia Valeria Di Giacomo and Livia Calcagni; and section 4 by Claudia Mattogno and Maria Rita Pais.

1. Sapienza, University of Rome

2. Lusófona University of Lisbon

3. André Corboz, in The land as a palimpsest (1983), argues that the territory is the result of different processes through which the inhabitants continuously delete and rewrite the soil, similarly to ancient manuscripts.

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Learning by Portolans: Reading and re-writing the built coastline beyond the climate change and the threatening obsolescence

KEYWORDS:
Portolans, Coastline, Unacknowledged Architecture

Learning by the sea

Before focusing the question, it is useful to dwell on a double issue that particularly links architectural thought (and praxis) and the sea.

Architecture of the sea (the art of ship building) and architecture, so to speak, of land (the "real one") have always been linked by a double thread throughout the course of history. And, indeed, much of the accumulation process of architectural knowledge, especially in its more technical and operational aspects, descends from the experiences of nautical design.

This was, essentially, because at sea a man had to be able to avail himself of the most avant-garde solutions to guarantee adequate chances of survival and effectiveness in his missions, unlike the quieter life on land, in a hut or a cave. It is no coincidence that the etymological genesis of the term "architect" includes the prepositional particle "archi" ("ἀρχι-" in ancient Greek), that means "chief", denoting a degree of superiority, both hierarchical and in thought, and from "tect" ("τέκτων"), which primarily means "carpenter", "axe-master" (in Sanskrit, "taksh-anam" is "to dig with an axe"). A knowledge and technique, therefore, that have much more to do with the ancestral hollowing out — the creation of space by subtraction — of logs to transform them into pirogues (vessels) and with the skilful manipulation of wood to build the planking of a galley, rather than with the construction of foundations and the raising of a building by juxtaposing stone ashlars, blocks or bricks (Antoniadis, Bertolazzi, 2021).

Secondly, it is useful to remember that the sea, especially the Mediterranean, but also the ocean in many cases despite its vastness, is truly the public space that unites and mixes (Nunes, 2019) our lives and communities. Unlike, on the other hand, mountains and even rivers, which have always divided rather than united (just think of the term "rivals" from the banks of a river, not the shores of a sea).

This is why, once again, even when it seems that a "new" threat is coming from the sea (i.e. the sea level rise linked to climate change), it is always from it, and from these challenges, that further opportunities for disciplinary and social advancement are to be found, and will certainly be found. The not-so-difficult-to-imagine condition of the architectures located along the coastline like ships of different sizes beached on the shoreline [Figure 1] amazingly holds together these two ancestral components, the formal-technological learning and the collective one, fostering an intellectual speculation on new forms of inhabiting and manage the territory (including in the hinterland) along a successful adaptive path.

Figure 1: *Floating cities or stranded ships?*. Street Art on the fish market wall of Vólos, Greece. (Photo credits: S. Antoniadis, 2021).

Landscapes by the sea

By 2050 over half of the world's population will live within 50 km of major masses of water. If the present trend continued, over the following 50 years, such percentage would climax to more than 75% (Nunes, 2019). Recently, the Intergovernmental Panel on Climate Change estimated that 680 million people currently live in the low-lying coastal zone and projected this number to reach more than one billion by 2050 (IPCC, 2019). The population potentially exposed to coastal flooding due to sea level rise is projected, in 100 years, to increase by about 20% (IPCC, 2022). A phenomenon, in terms of quantity, according to which it is licit to recognize as a compulsory situation, and not of just an uncalled-for theoretical disquisition. The segments of coastline around the Mediterranean basin and the Portuguese Mediterranean coastlines[2] — though being graced with distinctive geographical characteristics — bristle with *objets trouvés*, ordinary forms and materials, "unacknowledged"[3] architectures, and eyesores, many of which tourism facilities, impacting the environment, often enmeshed in complex issues of environmental risks and of devious and wavering territorial policies.

The nowadays seashore is not made up only by the elements of the historical and consolidated abacus. The vocabulary of objects scattered throughout the coastline has been considerably enriched. The coast silhouette is dotted with intermodal hubs, infrastructural junctions, power lines, pylons, antennas, construction cranes, quarries, landfills, smoking stacks, piezometric towers, hanging water deposits, silos, freight yards, shipyards, terminals covered by thousands of containers, immense docks, extensive car parks, airports, power stations…

That issue pose challenges to contemporary landscape planners, above all with a view to tone the recorded pervasive anthropogenic pressure on coastal belts.

The strategies for bringing back into play this vast contemporary coastal stuff, often declared eyesore, impactful, disordered, must draw inspiration from investigation practices such as those typical of the nautical discipline, represented by the historical and even more recent pilot books, based on experience and observation, containing information relating to the regions to explore: preliminary and forerunner practices that transcended biases.

Figure 2: *Portolan of the Iberian Peninsula*. Catalán Anónimo Portolano, perhaps from the workshop of Cresques Abraham (drawing, approx. 1400). (Photo credits: Wikimedia Commons).

A portolan, that's the name for this kind of nautical chart, reports useful information for the recognition of coastal landscapes by hybridizing different kinds of representation, keeping together textual descriptions, geographical maps and drawings of coastal

silhouettes [Figure 2]. In addition to containing information on dangers and obstacles to navigation such as shoals or wrecks, it counts indications to recognize the entrance of ports, for anchoring and any other information deemed useful for navigation and safety. In it, a medieval watchtower, a hanging water deposit and a spur of bare rock, seen from the water, have the same dignity as elements useful for navigation.

However, transcending the mere utilitarian aspect in the nautical field, we can't ignore the forerunner look on landscape treating all those natural objects and artificial elements by their most basic and true characteristic: they're forms contributing to the construction of a recognizable and transmissible landscape, identity and knowledge. A common ground for the pursuit of a shared, public and cultural heritage.

There is in fact the multifaceted topic of creating — or rather regaining — the Public Space from the reuse of infrastructure, of decommission of facilities, of vacant, abandoned or seasonal architectures, also including those spontaneous processes of reconversion of second homes or hotels into residences, which are transforming seasonal tourist contexts into real cities.

Especially at this time there is a lot of debate and research efforts about the phenomena, reinvigorated by the Covid-19 pandemic, of the smart workers and digital nomads, who clearly often choose the coastline as a congenial and pleasant habitat for their existences, together with the dynamic of the retirement stay in certain european countries as Spain and Portugal which need of course the presence of permanent activities, community services and territorial protection.

All these instances are requiring updated territorial governance tools. The study of the reassessed seashores could bring to the notice of owners, decision-makers, tourists and citizens in general the topic to avoid systematic obsolescence, total demolitions, waste production, or the whole displacement of volumes, and improve an active awareness of the contemporary landscape.

Coastal challenges among post-pandemic reboot and climate change

Nowadays the will to restart after the pandemic provides for strong and coordinated initiatives of financial injections for the revitalization of the affected assets. For this reason, there is no doubt that a speculative reasoning on the formal — and paradigmatic — aspect can amplify a qualitative and sustainable transformation effect of the entire built seashore.

Another critical issue to take into consideration, as well as an actual incognita for any promoter, is often the regulatory one; in this junction it is unthinkable to ignore the directives for the containment of the effects of climate change, especially sea level rise.

The European Union produced The Floods Directive, which «requires Member States to engage their government departments, agencies and other bodies to draw up a Preliminary Flood Risk Assessment. This assessment has to consider impacts on human health and life, the environment, cultural heritage and economic activity» (EU, 2007). In Portugal there are already fears of bills no longer allocating economic compensation to owners who will not move their built volumes beyond a certain safe distance from the shoreline after 2050. In these changing times in which the consolidated urban planning laws present a non-negligible level of uncertainty, it is better to focus on more immune to sudden changes scenarios. What will be done with all the coastal buildings at risk? Is it at all possible to hypothesize the demolition of a great amount of buildings along the coastal areas? How to manage the clearing out and hoarding of further billions of square meters of hardly recyclable rubble? Is it financially sustainable? Is it culturally correct? Downstream of these arguments, "acknowledging" the existing built coastline, both in terms of recalling/inventing a sort of heritage component and its effective reusing potential, can antidote to obsolescence and reduce the number of constructions to be demolished and, therefore, the production of waste (of which the building process is the first cause) [Figure 3].

The strategic guidelines identified by the European Union for 2050 have established the redevelopment of the building heritage

Figure 3: *Demolition of the eyesore of Punta Perotti. Bari, Italy* (April 2nd, 23rd and 24th, 2006). (Photo credits: Wikimedia Commons, 2006).

as the main objective for the entire construction sector, with a radical impact on land management, the training of professionals and the awareness of property owners.

The recent crisis due to the Covid-19 pandemic could also represent an opportunity: the financing injections for the economic recovery to rethink and invest in significant redevelopment actions. The challenge is instead to attempt a theoretical and cultural operation of rethinking the opportunity as the occasion not only concerning mere problems of technology and energy-management (most of the economical bonus initiatives for the transformation of the existing building stock are declining into mere thermodynamic compliances), but also the entire paradigm of inhabiting, with formal and experiential repercussions. The goals will be applied hopefully to even more impactful categories of the existing building heritage to pursue and extend strategies to improve the life quality in the transition process carried out by the European Union through the measures of the "New Renaissance" (**EU**, 2009).

The climate change universal critical issue seems to be the main incognita for any stakeholder and promoter investing in property along the coast. In this junction it is unthinkable to ignore the directives for the containment of its effects, especially the intensity of precipitation and the sea level rise or, in any case, of the feared interaction with water along the thresholds (in truth, nothing new under the sun since St. Mark's Square in Venice has been remade and raised seven times over centuries). A major awareness of the climate metabolism together with some contemporary green trends have spawned a series of regulations that will influence for sure land planning and management practices.

New scenarios among wrecks and ruins

With certainty, much of the infrastructure, "pieces of engineering", architecture and in general buildings along the coast will meet the irreproachable fate of ruin, or of being partial ruins, or ruins at certain seasons of the year or handful of years (in fact, we know that the width of the coastal threshold varies with seasonality).

However, if we look at this phenomenon of ruin as an opportunity instead of a problem, it could open up interesting speculations that, in fact, belong to all architecture itself, but which becomes even more interesting when it comes to sea wreckage. First of all the condition of ruin frees a construction from function, paradoxically making it easier to manipulate the object, both in physical terms (with more or less necessary interventions) and especially in psychological terms (of re-signification, before reuse).

Normally, the unwillingness to overcome the function and abstract the form of things, which end up being defined according to their functional call, leads to a corresponding inability of the buildings themselves to adapt to new features and new lives. In this unusual — though easily understandable — Sapir-Whorf[4] hypothesis applied even to the built realm, the destiny of buildings seems to be unsplittable from the language describing them, piling up cognitive and manipulative staples that condition any possible future re-purposing. And once again ships come to our rescue: vessels change their names a thousand times during their life cycle, but never incorporate that resistance to transformation and their oneiric component, unlike the building as "former-" plus the name of what they have been or have produced, which accumulates inertia among their building stones, betrayed by this established urban *cliché* of naming, which affects any eventual and subsequent reuse or rethink. And, along with ships, portolans: a sunken ship is no longer a tragedy, but is coded as an object to pay attention to, an underwater oasis, artificial reef, or simply an outcropping element on a par with a rock, and therefore a landmark.

With the same impulse, not only figurative, these charts invite us to carry out operational censuses also of the architectural and infrastructural wrecks of the inland, applying the same pro-active gaze to the decommissioned buildings lying not necessarily on the coastline, in a virtuous process that also regenerates the inland areas from the sea.

This metaphor — actually more than a metaphor: a real process — could inspire new types of interventions (Antoniadis, 2018) for colonizing and reactivating the at-risk coastal built stock, averting the obsolescence of artefact products and the proliferation of demolition debris.

Starting from the layout of the simple elements of the composition, but also from basic types of accommodation, such as that of the campsite, cells or camping tents, it would be possible to re-organise them according to formal configurations consistently and suitably, depending on the case studies. Such transformations are meant to enact a new, flexible spatial set-up that can be applied in different ways, depending on the features of the context[5].

Tents, pulled-aground boats, containers, insulated cells [Figure 4] — and in this challenge the segments of knowledge covered by the research project come in handily —, corroborated by tangible and intangible services[6], can constitute parasitic and surprising architectures capable of suggesting the traveller an active awareness on contemporary landscape

Let's imagine what it might mean to repopulate existing concrete skeletons, from small basic to large eyesore unfinished buildings, from the ruins of hotels and eyesores to the obtained structural frame of those constructions that fall within a future flooding threshold (for which it would make no sense to envisage a typical retrofit intervention because at risk) [Figure 5 and Figure 6].

The cave of an incomplete residential building, such a typical presence on the Mediterranean coasts of southern Italy and Greece is none other than the contemporary hypostyle hall, so similar to the one in which ancient storytellers and travellers went to steal the truth from an oracle [Figure 7].

The concrete slab of an eyesore along the coastline is nothing more than the brutal, artificial and squared raised platform from which the Magna Graecia colonists plunged directly into the swollen sea of a cove[7]. A decommissioned and ruined cod liver oil warehouse of the last century simply illuminated (such a low-cost operation!), becomes a temple and a landmark for the passengers of a cruise ship that slowly glides in front of the city of Ulysses[8], working as a trigger for the regeneration of a totally unacknowledged riverside segment [Figure 8 and Figure 9].

These are just some of the visions that could stand out as subversive, but which interpret much more deeper the meaning of our histories and geographies, avoiding the usual recourse to the picturesque and to the (invented) vernacular, in a counter-intuitive reading of the phenomena and in a counter-plan answer to benchmarked regenerative solutions. Beyond the not-so-enticing built coastlines, decommissioned, underused, obsolescent and at-risk coastal facilities lurk opportunities, hospitality and identities requiring updated territorial governance [Figure 10].

Figure 4: *Good Morning Eyesore*. Unfinished hotel in Alimuri, demolished on November 30th, 2014, Naples, Italy. (Photo credits: photomontage, S. Antoniadis, 2022).

Figure 5: *Concrete Vaca[c]tions #1*, subversive tourism paradigms in an abandoned Mediterranean coastal eyesore. (Photo credits: photomontage, S. Antoniadis, 2021).

Figure 6: *Concrete Vaca[c]tions #2*, subversive tourism paradigms in an abandoned Mediterranean coastal eyesore. (Photo credits: photomontage, S. Antoniadis, 2015).

Figure 7: *Hypostyle Hall Temple of Ancient Greece*, reconstructive hypothesis. (drawing, I.N. Tráulou, 1930).

Figure 8: *Contemporary Temple*, decommissioned cod liver oil warehouse in Ginjal, Almada, Portugal. (Photo credits: photomontage, S. Antoniadis, 2021).

Figure 9: *Athena in a Shed*, statue of the Greek Goddess in a decommissioned port storage. (Photo credits: photomontage, S. Antoniadis, 2021).

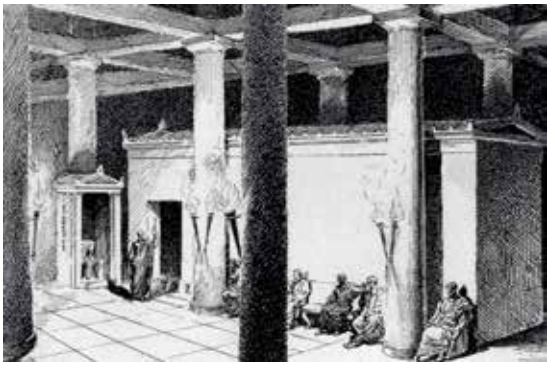

Figure 10: *S'adapte et résiste...*, Matco. Mobilier pour collectivités' advertisement. (Photo credits: Nouvel Environment, 1969).

Notes

1. Lisbon School of Architecture, Universidade de Lisboa & CIAUD Center for Research in Architecture, Urbanism and Design.

2. Orlando Ribeiro, a well-know Portuguese geographer of the 20th century, supports the thesis of a Mediterranean Portugal for those areas in which where certain tree species grow spontaneously. He considers the parameter of the presence of olive trees as a necessary condition to define a territory geographically and culturally "Mediterranean", starting from the scientific consideration that there is only one other non-Mediterranean country in the world that produces moreover in insignificant quantities, olive oil. According to this parameterization, Portugal falls within the Mediterranean sphere for that southern and central part up to the first northern districts, crossing which one effectively feels to have passed the continental-Atlantic threshold.

3. The expression "unacknowledged"constitutes the key word and semantic basis of many other research works regarding the reading of dismissed and fallen-in-disrepair buildings started with "Beyond Unacknowledged Lines - Landscape, Infrastructure, Urban Regeneration", a cycle of seminars held at the School of Engineering of the University of Padua from Feb. to May 2013, on the topic of upcycling the existing city (Scientific Board: Luigi Stendardo, Stefanos Antoniadis, and Luigi Siviero) and continued with the author's PhD Thesis: "The Form of the Unacknowledged Built Coastline: Objects and Informal Settlements along the Mediterranean Waterfronts between Geography, Landscape and Architecture". DRACo PhD Programme, Sapienza University of Rome and *forma urbis* LAB, FA PhD Programme, Universidade de Lisboa (supervisors: Luigi Stendardo and Carlos Dias Coelho), Feb 2017; and further *postdoc* research projects (ROP ESF DATA_Developing Abandoned Transurban Areas, 2017-2018; ROP ESF iWRECKS_ Industrial Wrecks: Reusing Enhancing aCKnowledging Sheds, 2018-2019, P.I. Luigi Stendardo for both).

4. The Sapir-Whorf hypothesis holds that human thought is shaped by language, leading speakers of different languages to think differently. This hypothesis has sparked both enthusiasm and controversy, but despite its prominence it has only occasionally been addressed in computational terms.

5. i.e. the outputs of the International Summer Workshop "TOURISM HABITAT. The Reuse oh the Abandoned Xenia Hotel in Tsagaráda, Pelion", held in Vólos, Greece (30.08.2021 – 04.09.2021) at the Department of Architecture (TAM) of the University of Thessaly (UTH) in the framework of the Regional Operative Programme (ROP) funded by the European Social Fund (ESF) 2014-2020 "S.O.L.E.H. - Sustainable Operation Low Cost Energy for Hotels" (P.I. Angelo Bertolazzi), DGR n. 1463, 08/10/2019, cod. 2105-0014-1463-2019.

6. One of the most sensational suggestions comes from Archigram's vision LAWuN Logplug & Rockplug devices (1969) by David Greene: connections to the global network, in an earlier era, hidden in fake dry branches and rocks. Nowadays it is not even necessary to resort to these sets, but it would be enough to install a simple and small modem/router on the various floors of a building skeleton.

7. Compare the Tomb of the Diver large-scale Greek painting on the travertine covering slab (Necropolis of Tempa del Prete, Salerno, Italy, 480-470 b.C.).

8. Lisbon (Odyssepolis - Ulyssippo - Olisippo - Olisipona - Lisabona - Lisboa is the etymology evolution of the toponym).

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Dimitra Babalis[1].

Heritage Waterfronts and Well-being Strategy for a Dynamic Urban Transformation and Place Value

Introduction

This contribution presents the notion of health and wellbeing that reflects a decision to accommodate dynamic transformation (protection, regeneration, accessibility, active travel for health and well-being) in sensitive heritage waterfront context with associated place values. To this end, it is essential to define a Waterfront Urban Space (WUS) as "a dynamic space to be transformed with evidence to improve health and well-being". In better defining a WUS "it should be taken into consideration the concept of inclusiveness of an urban space and its transformation towards a place in order to receive sociability and enjoyment, to integrate local cultural and economic values, to promote health and well-being in accordance with urban resilience and urban quality" (Babalis, 2020:20). Specifically, waterfront urban spaces with a great potentiality for regeneration must follow specific urban strategies. On the other hand, proposed project methods to design must be based on ecological, sustainable, and smart design solutions. It is recorded that consequences of good decision-making and appropriate local actions can lead to the quality of blue spaces and can contribute to well-changed urban scenarios. A key consideration is on how heritage waterfronts can identify appropriate strategies to manage change and processes of transformation (Babalis, 2019).

Recent studies consider direct links between greenspace and human health and well-being. Newly, there is an emergent body of work which evidences the health improving properties of blue spaces, generally defined as green-blue spaces, by providing: spaces for physical activity and recreation; spaces for social interaction; spaces for psychological restoration and stress reduction. The benefits of green spaces as places that promote stress reduction and mental restoration,and as opportunities to increase physical activity, socialization and improved environmental quality have been established for some time (Babalis, Townshend 2018:10).

The purpose of this text is to tentatively respond to the following questions: how to create a common vision on waterfront regeneration? How to create a greening strategy to be used for a well-being strategy? How to develop urban design criteria to optimize accessibility and mobility along and to the waterfront? How a WUS can be a space-connector within the city and, at the same

time, being an element for climate change and for hazard protection? How to develop a 'well-being behavior' especially for children and the elderly? (Babalis, 2020).

The chapter is mainly focused on the UNESCO Florence riverfront considering the great potentiality of the river Arno that can effectively maximize urban regeneration and recreational potentiality for health and well-being. This sensitive waterfront context can be great challenge for future master planning, specifically with proposed sustainable urban frameworks and schemes for protection, accessibility, quality, and well-being, and for change with walkability and cycling activities with new blue-green open spaces for health and well-being, such as parks, gym spaces, urban farming, and so on. A Well-being Strategy is proposed that considers several waterfront sections under specific planning and design principles for a more active and resilient riverfront to future events. Finally, knowledge, awareness, temporality, design quality, place value are the key words for an appropriate and meaningful management of a sensitive riverfront context that can strive to prioritize human well-being.

Cultural and Natural Heritage: definition and evolution

Within the UNESCO Convention (UNESCO, 1972: articles 1 and 2) has been clearly defined the notion of cultural and natural heritage. including monuments, groups of buildings, and sites of outstanding universal value to be preserved, protected, and rehabilitated. In turn, to ensure effectiveness and active measures to be taken for the protection, conservation, and presentation of the cultural and natural heritage (Article 5) is fully recommended the adoption of a local general policy and integration of cultural heritage into comprehensive planning programmes to be encouraged by scientific research in this field. More recently, the UNESCO Recommendation on the Historic Urban Landscape (2011), the expanding notion of Urban Heritage includes concerns of the changing global environment and concept of landscape (Bandarin and Van Oers, 2012) possibility to manage environment more sustainably within effective planning and design to achieve quality of life and improvement for health and well-being. Central to the Historic Urban Landscape (HUL) process an urban environment can be considered as a lived space with variations in time and space (Ginzarly et al., 2018).

The 2030 Agenda for Sustainable Development (UN, 2015) adopted by all United Nations Member States provides 17 Sustainable Development Goals and 169 Targets to be used as a basis for urban and community development and as a baseline when

creating visions and developing methods and design principles according to the three dimensions of sustainable development. Specifically: Goal 11, "Make cities and human settlements inclusive, safe, resilient and sustainable"; and Target 11.7, "Provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities". Furthermore, the Goal 3 attempts to: "Ensure healthy lives and promote well-being for all at all ages ensuring good health and promoting the well-being of people demonstrating the timeliness, relevance, and importance of the topic".

The World Health Organization (WHO) formulates health as "a state of complete physical mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2013). According to McDowell (2006:11), current understanding of health is about to consider health in terms of human survival to a current emphasis on quality of life. However, health-related behaviours are also formed in a person's social identity. It is becoming increasingly clear that health and well-being and specifically Subjective Well-being (SWB) is the tag given by scientists to the various forms of happiness taken together. Subjective Well-being, including happiness, life satisfaction, and positive affect, is influenced by both internal factors, such as personality and attitude, and external factors, such as the society in which they live (Diener, 1984). Research studies have demonstrated that happy people are more likely to be healthier and live longer, to have better social relationships, and to be more productive at work. However, the focus on health and well-being it must be ensured on sustainable place transformation and in terms of sense of place, place attachment and sense of identity (Townshend, 2022:118).

Carmona (2018:12) investigates on the importance of place quality for healthy outcomes by using scientific methodologies to explore the field. He underlines that well-designed places including greenery and landscape resources can contribute on positive health benefits in terms of: (a) better physical health (lower obesity and reduced heart disease); (b) better mental health (less stress and depression); (c) better general fitness (increased walking, sport, and cycling); (d) greater daily comfort (reduced air pollution, traffic noise); (e) enhanced quality of life (increased happiness and emotional well-being). In addition, better place quality adds greater place value to their users.

Why a sensitive and dynamic transformation in heritage waterfronts?

A sensitive transformability is a strong point for city planning strategies and policies for protection within heritage waterfronts.

Preservation and recovery of waterfront open spaces of outstanding universal value seems essential for urban quality and social integration in historic environment: (a) for more greening performance and well-being of open spaces; (b) for better use of technology/smart utility of open spaces. In recent evidence that urban heritage, changing lifestyles and pandemic priorities should be given to waterfront change.

Research findings codified how placemaking strategies and projects in diverse waterfront open spaces can contribute to improving people's mental, physical, and social health. Natural environment can facilitate social interaction and reduce isolation. By increasing access to waterfronts: (a) for social support and interaction; (b) to play and active recreation; (c) to enjoy green-blue environment; (d) to walk and bike safety along the water, one can demonstrate how innovative ways of planning and design can maximize both quality of life and place value. However, to create healthy places is essential to having a measurable impact of placemaking improving health and well-being and revitalizing communities. Further, research studies outlined that the processes of creating good public spaces along heritage waterfronts can offer possibilities for adding permanent or temporary recreational physical activity while walking and cycling can help to improve physical mental and public health.

In this framework, a Decalogue for a sustainable transformation of heritage waterfronts has been formulated by the author as follows:

1. Re-shaping sustainably cultural and natural heritage
2. Facing turbulences of local authority
3. Overlapping patterns (urban/environmental/social/economic)
4. Appraisal of the site and considering the S.W.O.T. analysis
5. Considering protection and preservation/local climate and sustainability principles
6. Adopting local policy and dynamic waterfront transformation (protection/regeneration, accessibility/active travel for health and well-being)
7. Identifying a Waterfront Urban Space for sustainable green-blue open space creation
8. Re-creating urban dynamics for a Well-being Strategy
9. Running with temporality to join people needs for health and well-being
10. Re-creating liveability, urban quality, and place value in heritage waterfronts.

Place and health: relationships

Over the last decades, a growing body of literature has emphasized the importance of place to people's direct health and indirect social and behavioural impacts. In defining active travel as "walking and cycling, and also includes some types of leisure activities that can act as a means of travel such as skateboarding and rollerblading" (Sport England, 2015:78), the effects on specific places and attractive scenery such as parks, gardens, well-maintained sidewalks with trees, waterfronts and so on, are also associated with health benefits (Williams, 2013). Further, active travel and the environmental factors such as connectivity, urban form, the provision of sidewalks and cycle paths have been shown associated with walking and cycling for transport (Panter et al, 2008:2). It is important, therefore, to understand how the environment in which we live, work and play interacts and influences public health and how these interactions can impact the everyday life and can be favourable for the subjective well-being. This means that the value of roads, walk and cycle paths is intrinsically connected with public health (Harpen, 1995).

In recent times there is an understanding of how policymaking by local authorities can take advance of place and health. Developing well-being strategies and design guidelines is a key to reach active design objectives such as: (a) improving accessibility in terms of easy, safe access in sport and physical activity and active travel; (b) enhancing amenity by promoting new sports and recreational activities; (c) increasing awareness of creating recreational facilities and sport opportunities through masterplanning (Sport England, 2015:3).

In the face of epidemic emergencies, the fields of urban planning and health must recognize the role of healthy environment in shaping public health and well-being (Babalis, 2021: 26)

Heritage waterfronts, place value and health

To reclaim, promote and regenerate heritage waterfronts strategic masterplan for developing must been creating to reconnect people to the water. Waterfronts can pinpoint opportunities of varying scale to demonstrate improvement, transforming green--blue environment with recreational and sport opportunities for health and well-being. Lessons must be based on valuable criteria and guidelines, best practices for planning and design. "A Waterfront Urban Space must seize moments of opportunity and maximize potentiality of heritage assets by establishing optimal planning and design through consultation with local authorities, planners, and designers". However, along water edges such as

riverbanks, shorelines, riparian buffers, water habitats are critically important for sustainable regeneration, stormwater management, when designing for public accesses, improving open spaces and recreational amenities, including green infrastructure and provision of ecosystem services. Connections to bring people to the water such as sidewalks, public streets, pathways can reinforce the waterfront public realm, re-creating connectivity to the surrounding context. Public activities and events should be taken into consideration for designing special places to accommodate the needs of active travel.

Specifically, within heritage riverfronts feature amenities can increase people's comfort and enjoyment. Amenities can help to establish a convivial setting for social interaction and a good use of place. Connected walkable destinations along riverfronts with a variety of activities can be a great challenge and a key element to attract people to the river on foot and bike. Landscaping can then define local character and protection with green stormwater infrastructures to connect urban environment to the natural one. Proper stormwater management can aid in preventing flooding, pollution and groundwater depletion while restoring the water quality and health of river ecosystems. The revitalization of heritage waterfronts can add value and life to the city and enrich 'sense of place'. So, place and health relationships can influence physical activities for better health and well-being benefits. However, researchers consider regeneration of urban waterfronts a great opportunity for public health.

Florence UNESCO Area and the proposed Riverfront Well-being Strategy

At the current, planning and design for health is important to shape people's living environment and influences decision-making for new lifestyles. Local authorities should take responsibility to promote Active Design by creating walkways, accessible green and blue spaces, safe roads to respond to current health issues. On the other hand, individuals must be aware about their own health and well-being. The way we approach active design for health of future generations is given by creating a healthy urban form, adaptable to urban changes. However, there is a growing body of research highlighting that it is possible to design the green-blue environment for positive health outcomes that will provide: (a) opportunities for active travel (walking and cycling); (b) easy accesses to public transport; (c) social cohesion; (d) health benefits from services and recreational facilities; (e) clean air, water and soil and effective waste disposal. In turn, well-designed waterfront

spaces can recreate connections, improve accesses to and along the water and places to enjoy and socialize.

Florence UNESCO Area appears of a great outstanding value and continues to experience significant change providing walking, cycling and social interaction. The river Arno has been long recognised as a strong ecological, cultural, and social significance to the city's life. Over recent decades, the inner-city riverfront has evolved as the greatest natural asset to be preserved, but the substantial potential of this asset as a living environmental entity remains to be fully realised. Very little is planned for connectivity, recreational activities, and social cohesion. It is therefore clear that opportunities for walking and cycling, and the delivery of change can bring benefits in terms of the environment, tourism, health, and society. There is a need to regenerate and improve the riverfront urban spaces, not only to benefit local community and tourists but also the ecology of the river. Additionally, a key goal is to positively raise a healthy environment.

The proposed Well-being Strategy and schemes are related to developing the river Arno and its edges. Referring to the above-mentioned, the way we design for active travel has been highlighted as the main goal to increase both young and elderly people's physical activity. Access to the riverfront environment is associated with numerous positive health outcomes, including improved physical and mental health while green infrastructure can increase quality of place and protection from risks. An expansive river-edge paved walk and cycle paths can create fashionable places with health-environment benefits including the following: (a) place value to increase significantly and encourage social interaction; (b) riverfront for a stronger identity and sense of place; (c) more physical activity and recreation opportunities, particularly for walking and cycling; (d) opportunities for visitors to extend their stay and enjoy the walkway; (e) open space network for better integration and connectivity; (f) riverfront protection and green infrastructure to mitigate flood risks and water rise.

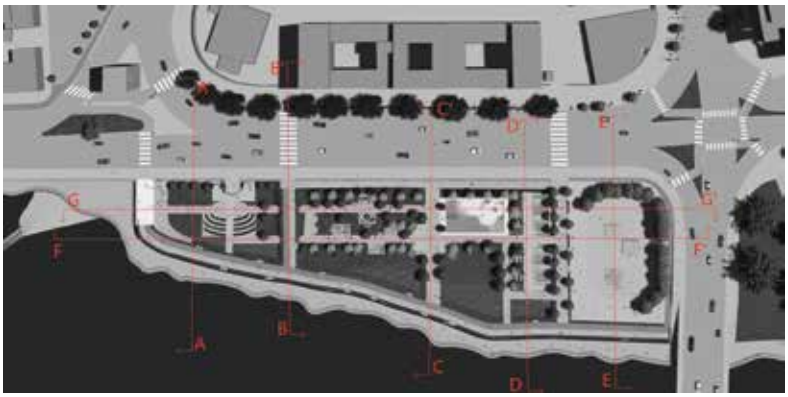
The Strategy is proposed to be adopted, particularly, into the following seven riverfront's sections. To this end, every key site challenges should respond to specific planning principles as defined below:

— Lungarno Acciaioli-Lungarno Diaz. An Active Multifunctional Riverfront characterised by an urban character. This portion of the river is considered a key environment to provide a multidimensional walkability and a network of multifunctional riverfront open spaces to support sport and recreational activities.

— Lungarno Cellini. An Active Riverfront to mitigate flood risks and promote physical walkability and cycling paths in this zone. The offering recreational areas can maximize sport activity outcomes and improving accessibility and amenity
— Lungarno della Zecca. A Landscaped Riverfront for leisure and flood protection to continue as a walkable parkland environment with landscape features, sport and fitness areas, piazzas for relax ready to be transform into water squares during a flood event.
— Lungarno Vespucci. An Active Riverfront that must encourage physical activity, mitigate flood risks with the creation of specific green infrastructures.
— Lungarno Soderini. A Relax and Gym Riverfront with a highly valued context and well-designed urban contemporary landscape to improve smart urban transport, riverfront footpaths, relax areas and gym ways.
— Lungarno Santa Rosa. An Urban Farming Riverfront to advocate for more improved pedestrian and cycling arrangements in the site, and to encourage social interaction with productive landscapes (urban farming activity) and sport facilities.
— Lungarno Cascine Urban Park. A Sport Riverfront for safe accessibility with floating walk and cycle paths. The site design offers a range of opportunities for sport, fitness and recreational activities that also can work for flood risk.

Places and spaces along the Florence UNESCO Area must have a distinct identity and offer a mix of active experiences. Looking to the future, the river should offer a greater diversity of activities for walkability, sport, and recreation.

At the current, there is a huge interest on placemaking by studying features of physical and social environments that promote public health. Research studies have shown that the interactions between waterfront urban space and health produce significant social and behavioural impacts. In addition, sustainable revitalization of heritage waterfronts can add enormous place value and quality of life in shaping physical and social waterfront landscape. Active community along heritage assets can generate a greater social cohesion, improved life expectancy to better update the policy process and better healthy places. Nowadays, the place value of adding water features to build environments or arrangements of natural water environment for mental health and well-being should be plenty recognised by planners, designers, and mental and physical health professionals (White, 2010:429).



Note: All proposals and drawings in this chapter have been developed and coordinated by D. Babalis at the University of Florence in the framework of the Design Studio of the Degree Course of "Urban Design and Eco-sustainable Urban Design", (Academic Years: 2018-2019 and 2019-2020).

Figure 11: Lungarno Zecca (Google Earth Pro).

Figure 12: Masterplan.

Figure 13: Masterplan's Render.

Figure 14: Fitness Area.

Figure 15: Lugarno Vespucci, Masterplan.

Figure 16: Recreational areas.

Figure 17: Workout area.

Figure 18: Relax area.

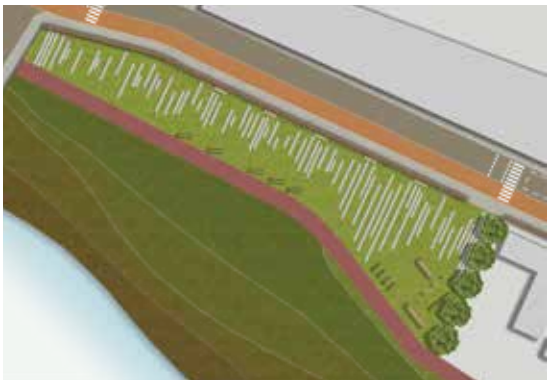


Figure 19: Lugarno Soderini.

Figure 20: Riverfront relax area, Masterplan.

Figure 21: Gym area.

Figure 22: Renders of the gym area.

Notes

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Life Between the Cliff and the Sea Post-Industrial Waterfront Heritage as a natural system: a comparative approach between heavy industry and local ecological, cultural and leisure systems in Fiume (Rijeka).

KEYWORDS:
Post-industrial Heritage, Waterfront, Ecology, Garden, Public Accessibility

Introduction

"What is needed now is a transformation of the major systems of production more profound than even the sweeping post-World War II changes in production technology. Restoring environmental quality means substituting solar sources of energy for fossil and nuclear fuels; substituting electric motors for the internal-combustion engine; substituting organic farming for chemical agriculture; expanding the use of durable, renewable and recyclable materials—metals, glass, wood, paper—in place of the petrochemical products that have massively displaced them" (Hall, 1997).

Fiume's phenomena are characterized by its constant contextualization between creation and destruction, the inclusive and exclusive, the global and the local, and progress and collapse.

The city presents a rare fusion of conflicted identities from many political regimes, economic interests, a multicultural and multilingual community, social variety, and cutting-edge technology.

Its strategic location on the Adriatic coast has afforded Fiume a pivotal role as a world port and industrial powerhouse, that sacrifice the coastal territory for modernization since the early 18th century. Due to the demands of modernization, it has led to both cooperation and conflict between industrial infrastructure and the public realm, alienation from the city, and a dramatic topographical transformation, with notable examples of abandoned quarries, cliffs, and the filled-in sea area.

As Mrduljas points out: "This was a linear mechanized environment consisting of the port, refinery, torpedo factory, shipyards, and other industries. It was never meant to be 'human', to be a part of the city" (Minica et al, 2021). It prompts Barry Commoner's discussion of the environmental consequences linked to the imbalance between the circularity of natural cycles and the linearity of economic and industrial processes that operate independently of nature (Egar, 2002).

Today, the shipyard, the torpedo factory, and the oil refinery—the industrial enclaves[2] that occupy more than a third of the city's coastline, with their impenetrable accessibility, features of the last socialist modernisation, and the status of transition—operate under global investments, privatisation, local political and economic speculations, heritage evaluations, and political-management principles.

The importance of this research, which examines the principles of socio-ecological reinventions of the productive process, integrated within the context of complex heritage-making and the ongoing alteration of Fiume's post-industrial coastline areas, is justified by the contextualization of the key issues.

The research focuses on constant natural and anthropomorphic transformations that have impacted the city on macro- and micro-levels, and the relationships between restricted/unrestricted, public/private, ecological/non-ecological, heavy/green, commodity/resource, and past/present/future.

This text aims to explain various possibilities for the regeneration of several kilometres of coastline, with case studies of three post-industrial areas: the oil refinery, the torpedo factory, and the 3. May shipyard, within the context of their existing settings and values of these post-industrial areas.

The case studies' proposals provide future-oriented socio-economic and environmental solutions to re-establish the industry's territorial, social, economic, and technological importance as a defining aspect of the city's identity [Figure 23]. Additionally, by drawing lessons from history, by comparative research the scenarios explore re-establishing a connection with the past as a potential future solution. Currently, the coastal area faces a lack of long-term planning for its overall re-programmatic development, with abandoned buildings left unused and invasive short-term investments and speculation occurring in "grey zones" within different status of protected areas. As a result, the area is left to decay uncontrollably without political vision or interest in its regeneration.

Informed by research results, the urban development strategy employs three theoretical concepts of gardens as a fusion of two philosofical principles: humanity and nature, that would reinvent the three abandoned post-industrial areas and the production process—with the aim of creating environmental solutions and a new coexistence of economic, leisure and social activities. Forming an environmentally and socially productive ecosystem, the new public, cultural, recreational, technological, and leisure production programmes showcase the re-establishment of relationships between nature, abandoned post-industrial structures, and the public domain, both in terms of heritage and socio-environmental solutions, as well as a reconnection with the city.

This paper addresses local and national authorities regarding the future development of Rijeka's waterfront, warning against a distinctly market-oriented society with the fact that these actions not only concern "the market itself, but it is like removing an organ

from a body: veins, nerves, arteries, muscles are cut off; nearby organs cease to operate or are seriously disrupted" (Kes, 2018). The global tendencies of continuous urbanisation, spatial and social alienation, and the reshaping of land is done without considering environmental impact.

The objective of reprogramming, repositioning and abolishing production must be reinvented in the future, with awareness of the site and the context creating a new framework of a new post-industrial identity and climate change solutions, the outcome of its reinvention should be a more accessible public zone, a social environment with a high social impact, and an area of ecological, green production.

Past experiences, multidisciplinary approaches, and responsible public policies can address issues such as climate change, political accountability, new technological challenges, and living conditions for future generations, helping address the current environmental crisis.

Mediterranean Garden vs the Torpedo Factory

"We can say that the planetary garden has nothing to do with globalisation. Although the scale of impact is the same, the planetary garden protects and develops diversity in all its forms, while globalisation erases it in the name of market forces. The standardisation of urban and rural landscapes is a result of the power of industry lobbies around the globe — why do we live in the same tower in San Francisco as in Shanghai?" (Clément, 2021).

"If you have a garden and a library, you have everything you need"[3], Cicero wrote to gardener Marcus Terentius Varro. His sentiment emphasises the value of knowledge and beauty as found in nature, but which is excluded from the neo-liberal economic, scientific, and technological agenda. Stopping the exploitation of natural resources and the overproduction of non-recyclable products means we must respond to climate change immediately with responsible actions and the general formula of 'back to nature'. As Commoner states: "We must learn how to restore to nature the wealth that we borrow from it" (Commoner, 1980: p. 300).

The torpedo factory is a large industrial and infrastructural complex consisting of a port, a large factory complex with a torpedo launching site, residential and public park facilities and, formerly, a communal bathing area. The chaotic status of varied ownership hinders a common solution, as do the objects' different statuses (e.g., cultural heritage), bankruptcy proceedings, dispersed ownerships, and short-term investments. These factors solidify the facility's status of stagnation, vulnerability, decay, and vandalism:

"Territories that arise as a chaotic and varied repertoire of infrastructure and unfinished, underutilised, or run-down public facilities; warehouses and industrial infrastructure built and soon abandoned because already obsolete or no longer responsive to market needs... Territory dominated by all that is anonymous, spontaneous, illegal, informal, and by the anarchic occupation and modification of the space of everyday life" (Marini & Corbellini 2016).

Re-establishing the idea of the garden as an important source of aesthetic pleasure, the production adapts to the new context of transformation and 'repair' of the complex torpedo factory. The Mediterranean Garden can, through accommodation capacities and new types of leisure activities[4], provide the working and living environment with a new production process, multicultural access to resources and knowledge, and create a foundation for different *social strata*, an 'advanced society'[5], where tourists and locals alike can create a new local mutually beneficial economic cycle for common goods, one not focused solely on profit-driven models. A new opportunity for the Fiume to identify itself as a green tourist destination—and not just of transitions, "which has never been the priority of an atypical coastal city whose urban space is mostly dedicated to work" (Clément, 2021).

The aim is to re-use existing structures and protect heritage as a new perspective on Mediterranean gardening, which invites Clément's vision of the garden, "where the gardener is the 'guardian of the unpredictable', guiding the garden in its evolution and provides clues to the visitor on a journey of discovery among the surprises that nature has in store when it is expressed in its fullness." (Clément, 2021). This approach recalls the illusionary nature of Roman and Greek gardens as landscapes of production, leisure, and beauty. Reference can be drawn to Clément's Planetary Garden, to "living in harmony with nature, appreciating the ecosystem in all its diversity and acting as a gardener and guardian" (Clément, 2021). It also recalls the once innovative Crystal Palace, a type of public space for urban society as a generic and total space, a market system, monument, and recycling process of an inseparable production-consumption relation [Figure 25], and "therefore the real agent of recycling" (Marini & Corbellini, 2016: pp. 616-617). It provides insight into the importance of progress and maintaining the balance between man and nature while ensuring future environmental sustainability and recovery:

"Ecology's primary concern is nature in its entirety, and not the garden in particular. The enclosure was always an illusion; a garden is bound to be a planetary index" (Clément, 2021).

The philosophy of gardening, as a source of replacing market-oriented production and consumption with leisure-oriented production and consumption, introduces an environmental-humanist solution for advanced society. In this case, the process of reusing, protecting, and reinventing mega-industrial facilities into leisure spaces and the garden into a production space, becomes a tool and source of free time.

The Wild Garden vs the Oil Refinery

"Instead of the metal empire of oil pipes, the omnipresent smell of oil derivatives, and oil workers in mumbled blue work clothes checking the functioning of the driving pumps, listening to the working rhythm of the compressor for the stale air and turning/turning the valves, the scene dominated — a large peaceful green area, arranged with a horticultural hand, more precisely, a baroque garden. It was designed according to French models of that type, which is to say pedestrian walkways (...) It has a pool with water, a dovecote, a birdhouse, and a pavilion with a lookout point, offering an atmosphere for more relaxed, comfortable moments. The garden is surrounded by a long wall, guaranteeing privacy (Velid, 2020:16)."

The French Garden, which no longer exists in the local memory, has been replaced by the oil refinery, which does evoke nostalgia as well as status and pride. The dual heritage of the site can only be gleaned from fragments of buildings and ruins, absorbed by newer, metallic structures, or which were reused throughout centuries of changes to the refinery's production: sugar, rice, and oil. Changes in ownership, ideology, social relations, private and public spheres, and economic prosperity were also transformative.

The refinery, being one of the first in the Mediterranean (1883), brought great economic potential and environmental impact: "It was a miracle of science, industry and money" (Mimica et al., 2021: 135).

Figure 23: *The Mediterranean Garden vs The Torpedo Factory.* Heritage, nature and leisure-oriented production and consumption, introduces an environmental-humanist solution. (Photo credits: Nika Bronic, 2022).

Today, it lies abandoned, a polluted reminder, according to Choay, "of ourselves to the future" (Marini & Corbellini, 2016: 263). It exists in a state of stagnation, awaiting a solution while caught between private ownership (MOL), heritage protection, and public interests.

Where the linear cycle of artificial production-consumption ceases, it is nature that responds, through overgrowth of native vegetation, setting off the long-term purification process of soil, water, and air pollution, independent of political or lobby interests. However, as Commoner said in a 2007 interview with the New York Times: "Pollution is an incurable disease" (Vinciguerra, 2007).

Ironically, it is nature that begins an autonomous process of recycling the diverse types of entities as a socio-ecological solution to regenerate heritage, memory, and identity, with the aim of preservation, recycling and reinvention. The natural transformation of the heavily polluted industrial site of the refinery into an impressive botanical garden, where plants outgrow the abandoned facilities, calls to Clément's 'undefined' territory—abandoned or overlooked spaces as a 'paradise of weeds' with unexpected assemblages of species and new aesthetic formations, rather than 'brownfield sites' or 'waste ground' in the conventional negative sense (Gandy, 2012). Commoner's critique of man's paradoxical role in the natural environment ("at once participant and exploiter") illustrates meanwhile nature's reclamation in face of the negative effects of human development and exploitation (Commoner 1980: p.14).

In this context, the solution for the refinery recalls historical relationships between nature, cultivated as a french Baroque Garden, and the heterogeneous/diverse man-made landscape of industrial and residential facilities, with the added theme of wildness and indefiniteness that draws mind to Robinson's image of the wild garden, a critique of the cultivated french garden (Robinson, 1870),

Figure 24: The Mediterranean Garden vs The Torpedo Factory. The scenario proposes a new opportunity for Fiume as a green tourist destination, that is provided by accomodation capacities and a new type of leisure inside the Mediterranean garden provoking the Crystal Palace as a type of urban space for urban society. (Photo credits: Nika Bronic, 2022). https://www.fa.uni-lj.si/seminar/hudnik/

and Clément's Third Land as a potential for reinvention within an existing heritage (Clément, 2003).

The future landscape of heterogeneity, diversity, and wildness is a botanical garden of hardy, eco-friendly plants, and indigenous vegetation, combined with cultural, educational and research production [Figure 26]. Such is one possible scenario for the survival of the ecosphere, as Commoner states in an interview with the New York Times, "that action has to be taken on what is produced and how it's produced" (Vinciguerra, 2007). Such a landscape, as a wild urban space, according to Dierer Ring, offers a long-term solution as an interpretation of changes "in the relationship between nature, landscape and modern culture" (Gandy, 2012:12). It transforms borderlands and heritage into public spaces that, if restored or rehabilitated, have the potential to support an enormous exchange of local and global knowledge and an equal amount of biodiversity.

Dopolavoro Garden vs The 3. May Shipyard

"Once abandoned, a "kava" is becoming an enormous wound, in the topography which nature, for the most part, heals slowly. There is no greenery here; erosion makes a considerable difference, neither. The "kava" is simply there; almost imperceptible despite its spectacularity. In Fiume, the artificial soil was reserved for the industry and the port; the natural flat ground was scarce" (Mimica et al, 2021:342).

The radical transformation of landscape, following the various phases of industrial restructuring, appears as such: "In the total reshaping of the landscape, hills visibly disappeared, and the sea was reclaimed. What used to be nature became the foundation for the new industrial age" (Mimica et al, 2021:341-342). As for the shaping of future activities, according to Kern and Morin: "The awareness of the community of the terrestrial destiny must be the key event of the end of the millennium; we act in solidarity on this planet, our life is linked to its life" (Marini & Corbellini, 2016: 262).

The extended coastal area was originally designated for exclusive industrial use, with ports and infrastructure serving as a multifunctional economic, technological, and social driver of progress. However, the abandoned quarries—artificial plateaus between cliffs and sea—informally became a new territory for sports culture: "Precisely these abandoned quarries became the first playgrounds for the new space-intensive sports: football and motorcycling" (Mimica et al, 2021:342).

In the past the shipyard fostered public amenities with playgrounds, communal bathing areas, and the Dopolavoro Social Centre. It served as a popular leisure site among factory complexes,

residential areas, administrative buildings, and parks. However, this pragmatic solution and the contemporary tendency to mix diverse programs and *social strata*, represented rare instances of public accessibility on the otherwise linear industrial coastal territory. Despite this, it helped build a significant social identity and a sense of community:

Figure 25: *The Wild Garden vs The Oil Refinery.* The future proposal for the oil refinery presents a landscape of heterogeneity, diversity and 'wildness' as a public space and botanical garden with hardy, environmentally friendly plants and indigenous vegetation, combined with cultural, educational and research production (Teja Kranjec, 2022).

"However, important spaces of togetherness were situated on the plateaus of the quarries in a recognizable natural-artificial environment stretching between the see and the cliff. Those actions commenced spontaneously and evolved on the strength of individual initiatives and enthusiasm at the time when sports performed socially cohesive roles. The quarries became the sites of collective "joy, pride and thrill" (Mimica et al, 2021:347).

The shipyard, once a centre of technological, economic, and social prosperity, is now desolate, replaced by images of obsolete industrial mega-structures along the coast, no longer affording high-tech progress, local and global skills, social security, workers' affiliations, *dopolavoro* (leisure and cultural activities), or global competitiveness. Despite a surviving remarkable identity in the area, it searches for new owners amid struggles with production, though it does represent 30% of the area's production and 10% of its workforce.

As a result, the shipyard is exploring new ways to reinvent itself for a socio-ecological future, blending past and future, production and *dopolavoro*, and promoting circular processes for producing, consuming, recycling and reusing existing structures instead of demolishing them. This approach, as noted by Marco Bovati (Marini & Corbellini, 2016:206), brings urban life closer to ecology, and as Kern and Moran note, towards solidarity with the planet. Both aspects involve new interpretations of potential and modes of

operation, uncovering the latent qualities of space 'that is usually disregarded, rejected, forgotten or in a state of standby (ibid:303).

The shipyard's complex new programmes, which juxtapose new green productive realities with *dopolavoro* [Figure 27], rebuild social identity and a sense of community and reshape the territory, reconfiguring private and public interactions, restrictions on accessibility, and the heterogeneity of space.

Conclusion

The critical point of environmental crises and damage to natural systems, with industrial impacts on land and in the air and water, has become globally tangible. Andrea Oldani writes:
"We have reached a critical point, a crossroads, in the history of the environment, a situation, which casts doubt on the very potential of survival of the planet and the human race and thus requires us to rethink and redefine the strategies we employ to organise, manage and consume this resource" (ibid:232).

The shipyard, the refinery and the torpedo factory, witnesses of degraded post-industrial areas, are threatened by demolition or collapse due to highly volatile political, economic, and social interests, the lack of historical reflection or environmental awareness, difficulty of obtaining legal status, and the fact that many of them are under limited authority. These structures are in dire need of open public, academic and scientific research, and evaluation, to determine their status and future ecological direction.

Overall, the comparative research of three case studies, each with slightly unique aspects, comparing the garden system with the industrial system can contribute to a more nuanced understanding of the potential and limitations of these two systems, and highlight ways in which they can be integrated and complement each other to advance social-ecological solutions. This methodology contributes to a more complex understanding and discovery of the latent territorial potentials between the cliff and the sea, their ambivalent character, and their socio-cultural impact. These aspects could be explored, linked, evaluated, classified, redefined, preserved and reinvented within the ecological paradigm of reduce, reuse, recycle.

The potential scenarios — The Mediterranean Garden, The Wild Garden and The Dopolavoro Garden — offer a different perspective on the future of abandoned industrial structures. In a strong social, multicultural, public, and ecological context, the projects offer the opportunity to test and reflect on the ideas of leisure, nature, memory, culture, production, and dopolavoro by applying the principles of sustainability and community from the garden to the

industrial system or exploring ways to make industrial production more environmentally and socially responsible.

A consensus for the reinvention of problematic post industrial areas and contemporary management principles in the name of unity, in the balance between neoliberalism and heritage, the common good and various political-economic interests, should be accepted as an ecologically responsible planetary future agenda of advanced society, or in the words of Commoner, who believed that an educated public could demand an end to "the corporate imperative for wasteful growth that is the root cause of the environmental crisis" (Dreier, 2017) (...) "Biologically, human beings participate in the environmental system as subsidiary parts of the whole" (Commoner, 1980:14).

Figure 26: *Dopolavoro Garden vs The Shipyard 3. May.* The shipyard's complex new programmes, which combine new green production programmes with sports and leisure activities to rebuild social identity and a sense of community. (Photo credits: Gal Lesnik, 2022).

Notes

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2. According to Mrduljas, the development of industrial enclaves began in 1718, when Fiume was declared a free port, located independently of the city, marking the beginning of its modernization: “Until the middle 19th century the focal points of the development of the urban periphery were the autonomous functional units resembling urban enclaves (Mimica et al., 2021:126).

3. This phrase is quoted in the article “Hortys & Bibliotheca – Cicero al fresco”, in Etre Jardin, 5 March 2018, https://etrejardin.com/hortus-bibliotheca-cicero-al-fresco (last access 26 January 2023).

4. “Leisure is time for creativity and activity that has little to do with daily grind. It is free time of an individual, who can choose to spend it in activity, hedonistic or creative pursuits, or just doing nothing, but get bored. This part of our lives complements everyday work and its time and purpose are just as allocated and programmed.” (Mimica et al 2021:393).

5. According to Commoner, the ‘advanced society’ where machines allow us to escape our biological dependence on the natural environment seems ‘an almost fatal illusion’, replaced in this scenario by the illusion of the Mediterranean garden (Commoner 1980:14-15).

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The Consecration of Water through Architecture in the Eternal City
Contributions to the Art of Memory in the Anthropocene

In grateful memory of Luis Conceição[1]

KEYWORDS:
Sustainable Water Strategies (**SWS**), Sustainable Urban Drainage Systems (**SUDS**), Historic waterscapes, Cultural heritage, Urban morphology, Urban stream channels, Water architecture, Water squares, Rome historic centre, Water symbolism

Introduction

The present article aims to understand how water-related architecture — and its memory — can act as a valuing and supportive approach in the cultural and educational axis of sustainable strategies regarding the rehabilitation of historical urban waterscapes.

Based on the case study of *Piazza Mancini* in Rome, this reflection extends utilitarian and symbolic purposes onto the broader scale of the city centre, enlightening, by topographical and historical analysis, its stream channels and flood basins as some of the essential patterns that have formed the urban fabric ab urbe condita. Through the inspiration of some local examples of water-related architecture and urban spaces, supported by previous case studies, and taking into account some typologies of "architectures of water", this mainly historical approach also refers to external speculative references: as symbols, although not built, some iconic designs are representative of archetypal landmarks and can be quoted locally as poetic drive, through their allegorical virtues and acting symbolically as sources of inspiration in the broader "architecture for flooding" theme.

Although this perception is based on a major basis of a glocal problematic — as seen between global issues versus local threats and opportunities —, it justifies the importance of the "musée imaginaire" concept (as André Malraux conceived it) in the collective memory — in this case, the Latin culture and its undeniable classical identity. Thus, it can be shown how a multi-layered historical approach, as in "collage city" methods and other allegorical cross-references, combined with morphological and topological readings, can contribute to enhancing cultural adaptiveness on global sustainable strategies by focusing on identities, contextualization, site-specific issues, but also affective heritage, imaginary, politics of memory and civic education on historic waterscapes which are increasingly threatened by climate changes.

1. The art of memory

"From the relationship between man and water can be born the dream, the reverie; and from this oneiric imaginary can be born Architecture. Whether in the small or large hydraulic works that, since the most remote times, man has devised to improve the conditions of his survival or in the small and large acts of superstition and devotion to which man has given himself to revere his awe before the Cosmos, in all eras, in all places, he has consecrated water, building temples to it, using it to conform spaces nostalgic of paradise, of the origin and the end of all things.

By constituting itself as an informal element by nature, the design attitude towards water is that of its containment or adduction because, as already mentioned, it is always situated before and after the form."[2]

From Marcus Agrippa to Giacomo Della Porta, the consecration of water through architecture is one the most coveted themes by the masters who built Rome, as the city's memory blends in the water element from ancient times to modernity. History teaches us that it is by accepting the informal nature of water that we can develop ways of shaping with water. As Theodor Schwenk recalls, motion is the basic principle of water as it tends, because of gravity, to reintegrate its primal spherical form[3]. All movement of water on Earth is due to this basic physics principle of reintegration into unity. At a molecular level, water is not an informal element: we can almost perceive it, as a single drop of water tends to reassemble itself into a spherical form. In non-gravitational space, water assumes the form of a sphere. In fact, it is because of Earth's gravity that we commonly accept water as an informal element, and we can therefore say that motion is the basic principle of water. The restlessness of water, always adaptive to the terrain, is due to its memory of gravity and by extension, a memory of reuniting into its original form: the sphere[4].

With this in mind, we can commonly conceive that water constitutes itself as an informal element by nature — in its earthly nature[5] — pulled by gravity. Thus, gravity and topography are the key referentials to understanding the memory of water [Figure 28 and Figure 29].

Water, as an informal element, always situated before and after the form[6] — wild, unbridled, restless, always adaptive — conditions a design attitude of "domestication" which is based on one of two principles: containment and adduction[7]. But for making these principles work in practice, they also need to be — as water is — adaptive. Since the ancient times of the "hydraulic civilizations"[8] (Egypt,

China, Peru), mankind has learned how to develop skills of containing and adducting water. However, the industrial era has ever increased the need of restraining flooding in the growth of the modern urban fabric, up to a progressive denying of the natural dynamics of water, through the construction of large-scale engineering artifacts, such as damps and embankments. Since then, given the advance of new technologies, hydraulic knowledge in the 20th century has been used for a pretended absolute domestication of water, almost as "fighting" it. Illusional strategies of "total control" in the "machine age" were mostly preferred, up until recent times, to adaptive approaches. Although these tend to be increasingly favored in the scope of the increasingly extreme weather phenomena such as prolonged droughts and flash flooding events, it was only a few decades ago that inclusive strategies for water management and urban adaptation for climate changes have been considered on a global scale.

According to SOS Climate Waterfront Research Project's main goals, as "to expand the realm of possibilities meant to adapt and transform urban waterfronts while also enabling them to become meaningful areas for the community"[9], several adaptive strategies and tools may be valued as examples of water resource management as a new approach to urban design[10], such as the "River Contracts", born in France forty years ago and widely used across today's Europe, considered by many as "virtuous planning boosts public-private partnerships, incorporating adaptation strategies into planned actions through the evolution of sustainable policy tools"[11].

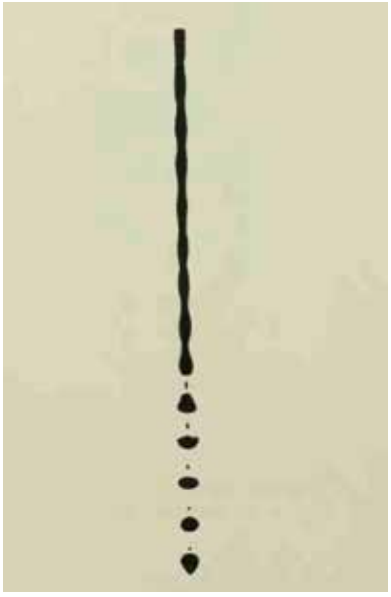


Figure 27: Falling water separates off into drops, in Sensitive Chaos, by Theodore Schwenk, p. 13

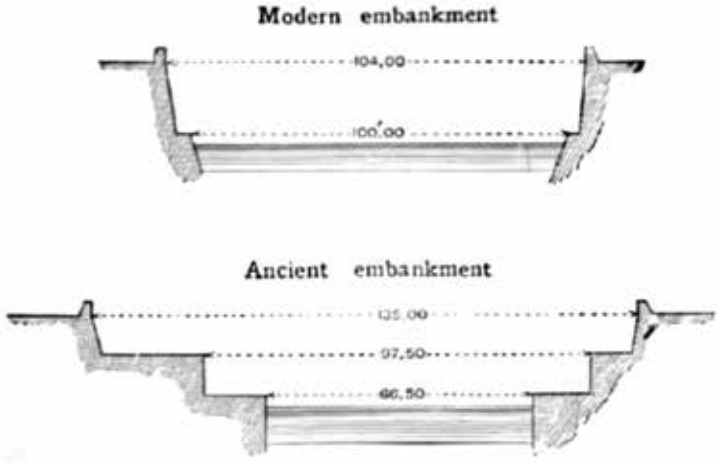
Figure 28: Naturally flowing water always endeavors to follow a meandering course, in Sensitive Chaos, by Theodore Schwenk, p. 15

In the context of the Tiber River Contract[12] implemented in 2017 as a tool for "activating a process of re-appropriation by the community and rebuilding the relationship between the river and the city"[13], there is a recognition of two main problems which are most important to our thematic: a) the 8 km embankments whose construction began in 1876 that have separated a part of the river corridor from the city, preventing proper connections[14], and b) the area's numerous sites of historical-archaeological value, which are in decay and neglected, despite their enormous potential in terms of cultural heritage and attractiveness[15].

Recapturing the case of the Tiber River waterfront in Rome, it is known that the difference between the ancient system (formed by several stepped embankments) and the modern one by Raffaele Canevari (consisting of a steep single-high wall), is a significant example of the shifting attitude towards the flooding problematic[16]. Indeed, the ancient stepped system took into account the adaptiveness to the variations of the river water levels, while the 19th century modern solution, through the elevation of an 18,75 meter high wall[17] — the muraglione — cuts off the presence of the riverside in the city and has contributed to the growth of the urban fabric detached from the waterfront, as Rodolfo Lanciani had already denounced in 1897[18] [Figure 30].

In contrast with this attitude, one should remember that, back in the 18th century, in one of the Tiber most important piers in Rome, the design of *Porto di Ripetta* (Alessandro Specchi and Carlo Fontana, 1703) was conceived in adaptiveness to the riverbed and water level variations. This functional multi-leveled pier was formed by curved stairs with deep treads, in a majestic baroque gesture of a theatre connecting the river to the urban square in front of the church of *San Girolamo degli Schiavoni* with symbolical eloquence [Figure 31]. This is the reason why the toponymic name of the actual square is *Piazza del Porto di Ripetta*, although the port doesn't exist anymore. It disappeared under the *muraglione* during the great reconstruction works of the riverbanks that started in 1875. In fact, it was not demolished, as it lies in the underground — and its memory stood. Its original two columns, which served as hydrometers (i.e., for measuring the level of the floods), were dismantled and placed in a warehouse only to be reassembled in 1930, with some modifications, in the latter *Piazza del Porto di Ripetta*[19].

Unfortunately, amongst many other consequences of the great flood in 1870[20], the demolition of *Porto di Ripetta* in 1875 is an example of how the city, through the glorification of the human technique in the industrialization era, has progressively cut off



the "memory of water". The symbolic function of the ancient pier, which generously opened itself to the waterfront through a scenographic gesture, is a perfect example of the consecration of water through architecture. Its allegorical imagery, valuing water in several aspects, was an important landmark as being practical, cultural, symbolical, and poetical. One should remember that a related archetypal example, in the form of a sloped pier, can still be seen in the *Cais das Colunas* (i.e., "the Pier of Columns") as part of the neoclassical design of *Praça do Comércio* in Lisbon (1755)[21].

Formed upon the morphological footprint of the ancient Roman Stadium of Domitian (80 AD), the *Piazza Navona* is another paradigmatic case study of how water was celebrated in Rome in the Baroque period. In 1653 Pope Innocent X had the idea of flooding the square for the purpose of water festivities. The square was then concave — as *Piazza del Popolo* still is today — and people would come to leisure, bath, or simply refresh, and even coach games were organized on the water[22]. The ludic scenery was efficient in its simplicity, and although the level of this artificial lake was barely half a meter, the concaveness of the ground was sufficient to create an aesthetic *miroir d'eau*, where the sky and the facades of buildings reflected with poetic drive [23] [Figure 32].

The popular practice of transforming the piazza into an artificial lake, as in ancient *naumachiae*[24] spectacles, disappeared in 1875, during the city's riverbed great remodeling works, when it was no more possible to flood it, as the ground was paved in a convex shape. Water was no longer seen as a natural element of contribution to the urban ambiance but instead as a force that needed to be 'fought' and 'expelled'.

Figure 29: Comparison between the modern and the ancient embankment of the tiber riverfront in Rome, in The ruins & excavations of ancient Rome: a companion book for students and travellers, by R. Lanciani (the adaptation is ours - N/A).

Figure 30: Veduta del Porto di Ripetta (engraving, G. Piranesi, c. 1760). View of the ancient port of Ripetta in Rome, in the 18th century, showing the church of San Girolamo degli Schiavoni and the longtime missing two columns who acted functionally as hydrometers (i.e. for measuring the level of the floods), as referred on the caption: "3. Colonne o mete, nelle quali sono segnate le maggiori escrescenze del Tevere." (i.e. "Columns or marks, in which the major excrescences of the Tiber are marked." N/A).

In some manner, the memory of *Porto di Ripetta*, as other case studies of architectures of water or related to water, such as the "Navona Lake", as referred by Annalisa Metta[25], are inspiring examples for promoting the rehabilitation of Roman historical "terrains of water", such as the *Flaminio* district and *Piazza Mancini* in particular.

Undoubtedly, many cases of architectures of water still prevail in Rome today. Some are more visible and obvious, namely because they are commonly perceived as "identifiable objects" — as the popular baroque fountains: the *Trevi*, the *Quattro Fontana*, the *Quattro Fiumi in Piazza Navona*, the *Barcaccia in Piazza di Spagna*, to name but a few — while some other spaces are lesser known or even vaguely understood as urban "terrains of water"[26]. This is the case of some squares, streets, and, by extension, the urban morphology of the city centre by itself, according to stream channels, valleys, and, namely, the flatland area correspondent to the ancient *Campus Martius*, where the *Pantheon*, the adjacent thermal baths of Agrippa and the thermal baths of Nero were built, amongst other notable buildings[27]. Regarding the baths of Agrippa, one should mention that they were the first public baths to be built in Rome by the general, architect, statesman, lieutenant, and son-in-law of Roman emperor Augustus, and were completed in 25 **BC**. With the completion of the *Aqua Virgo* Aqueduct in 19 **BC**, the baths were supplied with water and served also as the castellum of water for the city's supply, and a large lake and canal were built at the west (the *Stagnum Agrippae*)[28]. The remains of the central, domed space of the *Thermae Agrippae*, vaulting dated to the fourth century **AD**, can still be seen aggregated with existing buildings in *Via dell'Arco della Ciambella*[29], two blocks south of the *Pantheon*[30].

The construction of the doomed iconic form of the *Pantheon* is generally more directly related to the octagonal doomed hall and oculus in Nero's *Domus Aurea*, designed by Severus in 64-68 AD and longtime buried in the Esquiline, and is known for having inspired the constructive solution of the rebuilt *Pantheon* by Apollodorus of Damascus in 126 AD. Nonetheless, one must refer to the large pool in the thermal baths of Baia, the so-called Temple of Mercury [Figure 33], also commonly known as *truglio*, for its circular shape, which dates from the first century BC (as it has been dated from the end of the Republic era to the beginning of Augustus reign), as the older concrete-made doomed architecture of water that inspired the *tholos* prototypal form of the *Pantheon* in Rome and, possibly, its doomed final version as it still stands today. Besides constructive comparisons, the water-related symbolism of the circle and the sphere can enhance the significance of the *Pantheon*, not only as "water architecture", as part of a long-gone complex of thermal baths in *Campo di Marzio*, but also because it marks the urban ending path of the *Aqua Virgo* Aqueduct as if water, wild, unbridled, chaotic, returns from the hills into its primitive and ordered form: the sphere. Again, let us remember the reflection of Theodor Schwenk about the forms of water:

"We see moving water always seeking a lower level, following the pull of gravity. In the first instance it is earthly laws which cause it to flow, draw it away from its spherical form and make it follow a more or less linear and determined course. Yet water continually strives to return to its spherical form. It finds many ways of maintaining a rhythmical balance between the spherical form natural to it and the pull of earthly gravity. (...) A sphere is a totality, a whole, and water will always attempt to form an organic whole by joining what is divided and uniting it in circulation."[31]

Figure 31: Piazza Navona Allagata, Antonio Joli, c. 1750.

This reflection about the shapes of water, shifting between stages of adduction and containment, from flowing serpentine movements and spherical stillness [Figure 28 and Figure 29], can also evoke the duality between the aqueduct (a linear movement) and the Pantheon (a centered stillness) and may contribute to another hermeneutics about the multiple meanings of its axial, gravitational and archetypal circularity, namely, as the *Axis Mundi* symbolic foundation of Rome *ab urbe condita*. The same reasoning also seems to coincide with the conjecture of Filippo Coarelli, about the mythic significance of the *Campus Martius* — and at its center the wetland named *Palus Caprae*, "the pond area where, mythically, Romulus ascended to the sky" — originally the lowland area at the north of ancient Rome "between the city and the Tiber", which was, according to the author, the true mythical reason for siting the *Pantheon* there[32].

2. The paths of water

Based on the Hydro-geological Map of Rome[33], combined with referential research documentation[34] and the support of flooding simulators software[35], it is possible to analyze the exposition of these lowlands to heavy flooding. Focusing on the downtown, on the right side, the most floodable area covers the districts of *Della Vitoria*, *Pratti*, *Borgo*, and *Trastevere*; on the left side, it covers a north-south axis, from the *Flaminio* district, down the *Via Flaminia* to *Piazza del Popolo*, *Piazza del Porto di Ripetta*, *Piazza Augusto Imperatore* (*Augustus Mausoleum*), down to the ancient wetted area of the *Palus Caprae*[36] in the *Campus Martius* — which was, as referred before, and according with Filippo Coarelli, the true mythical reason for siting the Pantheon there[37]. These lowlands[38] also cover the Murcia valley, situated between the *Palatine* and the *Aventine* (the *Circus Maximus* area), the *Cloaca Maxima*[39] along the *Velabrum*[40], the *Via Sacra*, the Imperial Forum, and up the Flavian amphitheater (i.e. the Colosseum) — actually built over a pond — where *naumachia*[41] events possibly also took place[42].

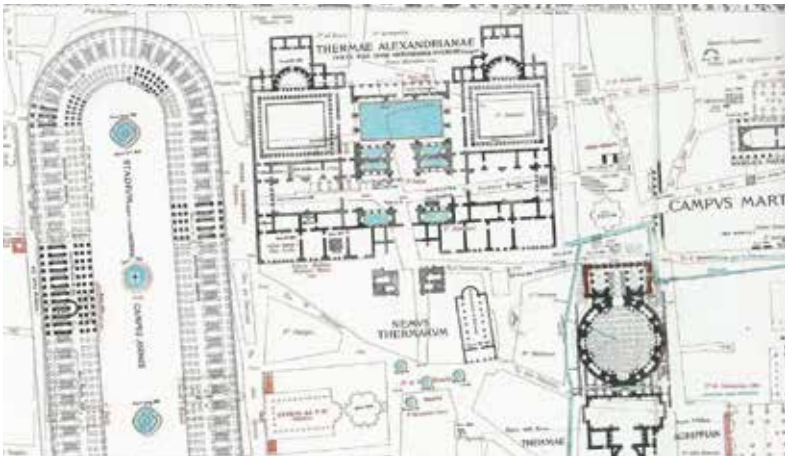


Figure 32: Temple of Mercury (engraving, G. Volpato, from a drawing by Natali, Naples, 1768). Large Roman thermal pool, also known as *truglio* for its circular shape. Baths of Baia Archaeological Park, first century BC, Campania, Italy.

Figure 33: Pianta del Campo Marzio, R. Lanciani, in Forma Urbis Roma, 1893.

The urban tracing analysis "the paths of water" [Figure 35] along the *Via Flaminia* axis, from the *Flaminio* district and through the lowlands to *Campo di Marzio*, shows how *Piazza Mancini*, as the main square of the waterfront in this northern district, can be related to the city centre, namely the ancient *Palus Caprae* wetland area where the *Pantheon* (R.) and the *Piazza Navona* (S.) stand. These paths, as some notable avenues (such as *Via Flaminia*, *Via di Ripetta*, and part of *Via del Corso*, amongst others), although they may not correspond to the main stream channels in the downtown topography[43], can nevertheless be recognized as tracing references for rehabilitating the presence of water in the urban landscape. Here, the fundamental principles of adduction and containment can be materialized by controlling flooding and heavy rainfall through different and combined solutions, such as a network of street canals, water squares, rainwater collecting ponds, Sustainable Urban Drainage Systems (SUDS), basins, water mirrors and, more generally, shaping ambiances in a broader context of an "architecture for flooding" promoting civic, economic, ecologic and educational strategies for the use and the reuse of water[44]. Although this approach may not be original, as there are, as mentioned before, several planning strategies implemented[45] and built urban projects[46] that prove the efficiency of these combined tools, we believe there is a strong opportunity here for integrating new insights on sustainable environmental solutions and water-related ambiances in a city that is the cultural heritage of all the nations of the world. Overall, we can say that a cultural and historical dimension should be hearted and carefully articulated with the efforts of climate action changes for the implementation of a contextualized strategy.

So, what could be the memory of water on the site? What strategies can gather both natural and cultural values in the Eternal City?

Indeed, *Piazza Mancini* is one of the main squares in the historic centre of Rome that needs the most rehabilitation. As a case study of the SOS Climate Waterfront Research Project[47], some academic studies were developed combining green-blue solutions for this area. Here, most proposals were utilitarian in their environmental and ethical purposes: the implementation of SUDS through basins with water drainage connected to the river by underground pipes[48], combined with water mirrors, green spaces, and trees, for shadowing and air-cooling purposes. That combination also contributes to reducing the heat island problem on the *piazza* and, simultaneously, creates ludic spaces and gives its users new senses for its appropriation and utilization. Mobility issues were also taken into account, as

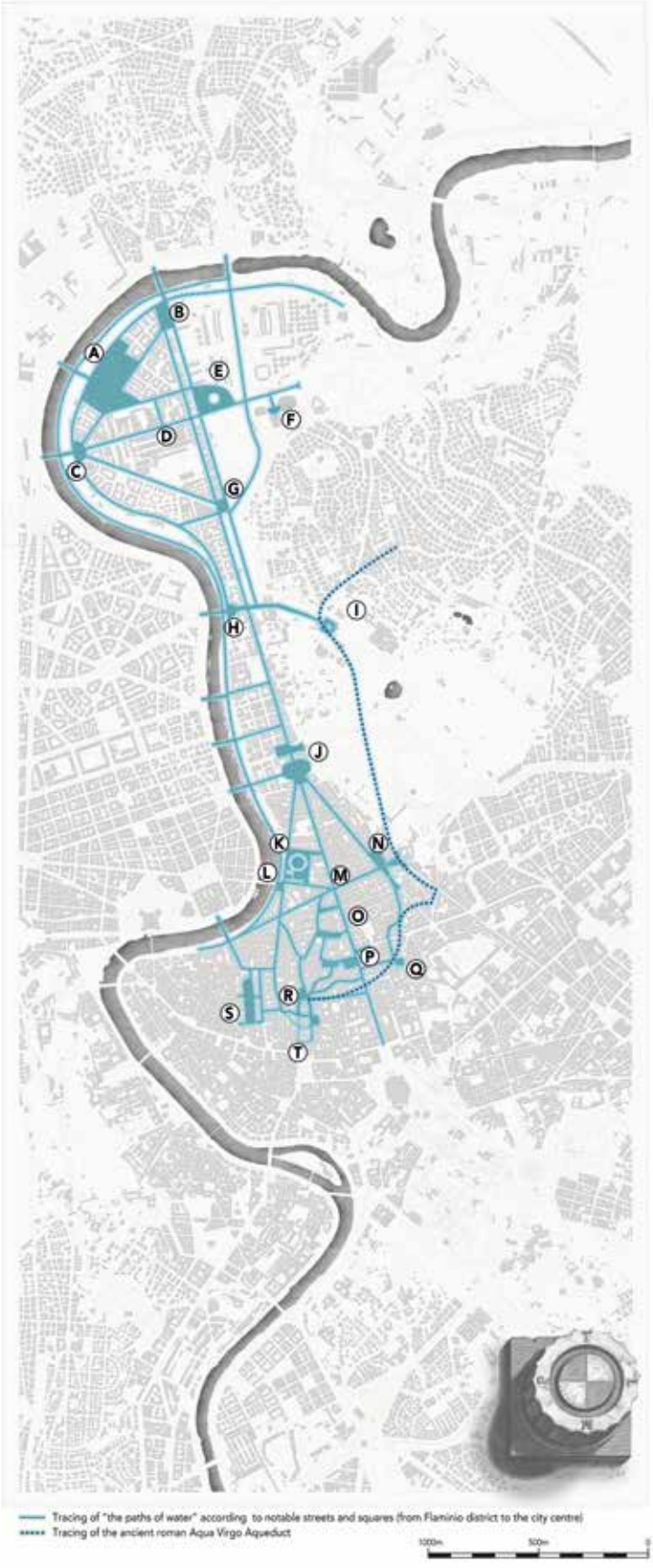


Figure 34: Urban tracing analysis "the paths of water" near the Tiber River and from the Flaminio district to Campo di Marzio, through the Via Flaminia axis, with reference to main notable squares, fountains and buildings, from Piazza Mancini to the Pantheon (author's study / design and artwork by Enrico Capanni) ©Enrico Capanni 2023

A. Piazza Mancini / Giardini Viale Pinturicchio

B. Piazzale Cardinale Consalvi

C. Piazza Gentile da Fabriano

D. Maxxi Museum / Piazza Alighiero Boetti

E. Palazzetto dello Sport / Piazza Apollodoro

F. Parco della Musica / Largo Luciano Berio

G. Piazzale Manila

H. Piazzale delle Belle Arti

I. Ninfeo e giardini di Villa Giulia / Fontana dell'Acqua Vergine / Museu Nazionale Etrusco di Villa Giulia

J. Piazza del Popolo / Fontana dei Leoni / Piazzale Flaminio

K. Piazza Augusto Imperatore / Mausoleo di Augusto

L. Piazza del Porto di Ripetta / Fontana del Porto di Ripetta / Fontana Ara Pacis / Largo di San Rocco / Fontana della Botticella

M. Largo Carlo Goldoni

N. Piazza di Spagna / Fontana della Barcaccia / Piazza della Trinità dei Monti / Scalinatta della Trinità dei Monti

O. Piazza di San Lorenzo in Lucina / Piazza del Parlamento

P. Piazza di Monte Citorio / Piazza Colonna / Fontana di Piazza Colonna

Q. Piazza di Trevi / Fontana di Trevi

R. Piazza della Rotonda / Pantheon / Fontana del Pantheon / Piazza della Minerva

S. Piazza Navona / Fontana del Nettuno / Fontana dei Quattro Fiumi / Fontana del Moro

T. Ruins of the Termi di Agrippa / Via dell'Arco della

heavy traffic was replaced by light mobility solutions. Yet, the adduction of water remained restrained to the *piazza* and its waterfront.

What we are focusing on here is a broader approach to *Piazza Mancini*'s urban contextualization and its strategical implementation for controlling flooding and heavy rainfall, taking into account its major importance as the main square of the northern city centre, i.e., the *Flaminio* district. Thus, on a larger view of an "architecture for flooding" problematic, we can stress that its urban morphological implementation is crucial to understand the possibilities of containment, adduction, and reuse of rainwater and increasing flooding events. This also means that on the broader scale of the district and beyond, some symbolical liaisons may conduct to the historic centre and the most sacred "terrain of water" of Rome: the *Campo di Marzio*.

3. The consecration of water / vers une architecture d'eau

Based on the previous analysis, we can conclude that the urban connection between *Piazza Mancini* and the Maxxi Museum public space (*Piazza Alighiero Boetti*, [Figure 35-D]) is crucial to understand the "paths of water" possibilities, as the Maxxi's smaller square bridges *Piazza Mancini* [Figure 35-A] with the *Via Flaminia* axis and, subsequently, with the city centre. Thus, according to its centredness and historical relevance, some questions regarding major opportunities may be raised: is it possible to consider the square as a space for the containment of water for the city's water supply network? Can this vast area be capitalized for rainwater storage by building large underground cisterns interconnected on a major scale? Can new green spaces integrate drainable pounds for rainwater reusing? Regarding the *piazza's* public/ludic forms of appropriation, is it possible to consider a "Mancini Lake", as in *Piazza Navona*'s aesthetic case during the baroque period [49]? What benefits could outcome from assuming the possibility of flooding this major *piazza*? What sort of new "urban dialogs" can be created by combining extreme weather occurrences and intelligible design? In sum, what sustainable development goals (namely social and cultural) could be achieved by combining different approaches? Could there also lie symbolic connections — through water — with the city centre? Finally, could the consecration of water through architecture on the site be an opportunity to highlight the city's educational, civic, and sustainable memory of water?

Indeed, the allegorical images presented here [Figure 36 and Figure 37] don't pretend to be representative of effective design and constructive solutions. As utopias, from which they genetically

Ciambella
Due to editing reasons and to present this study in a more understandable form, some urban elements (squares, streets, buildings, and fountains) have been aggregated into a single entity (represented by a letter), according to each location and main site characteristics. In the same way, the names of the streets that compose the main structural tracing have been omitted to improve graphic clarity. Indeed, more complex degrees of urban analysis can be achieved using other graphic scales and/or criteria, thus depending on the pretended level and type of research specificities, by zooming on each locus information and in the scope of the sum of each part. Again, one must stress that this is a very resumed presentation of a broader research theme (i.e. "the waters of Rome") that surpasses the space and the scope of the present article and was designed to serve a specific synthetic purpose (N/A).

derive, they act as what they simply are: visions. However, we consider their iconographic symbolism as contributions to the adaptation of ideas and contextualized solutions. As far as we know, Ledoux didn't contemplate the spherical form of the Maison des Gardes Agricoles for Park Mauperthuis (1789) as primarily related to water. Yet, its flooding contextualization seems to reenact the purism of the sphere through a new poetic drive, in a symbolic architecture of containment for the non-gravitational memory of water[50] [Figure 36]. In this case, the symbolism of the quadriad water/sphere/unity/purism may recall the water-related symbolism of the *Pantheon* in many aspects[51] and unfolds new interpretations of the poetry of water[52], not only because of its circular geometry but also because of the mythical reason of its *Axis Mundi*'s implementation, between sky and earth, in the very center of the *Campus Martius*, as already referred — the most sacred "terrain of water" in Rome[53].

Conversely, the gravitational memory of water, always situated before and after the form[54], can be evoked in the Maison des Surveillants de la source de La Loue (1789), which enacts the contrast between form and the informal shape of water [Figure 36]. Here the water flows, springing from the source and through the house, as maybe one of the most picturesque and peculiar examples of architecture of adduction of water[55]. Again, the riverfront contextualization changes the original significance of Ledoux's project, as the source becomes the city in itself and *Piazza Mancini* a *locus* of containment, draining water literally through the building and conducting the flowing downstream to the Tiber. Consequently, the appropriation of the original design changes its meaning into an environmental metaphor of an "architecture for flooding", as a metonymy of building adaptiveness to water drainage — not "fighting" natural phenomena, but rather in a larger context of a 21st century allegory for resilience to climate changes.

So, our final question is: what more can we learn through these "hybrid visions" of the architectures of water? And, broadly: how many ancient or vernacular examples are inspiring enough for us to develop new sustainable and adaptive models in the Anthropocene?

As referred in the beginning, since the first hydraulic civilizations, many examples of ancient waterfronts, ports, peers, and water-related architectures can be quoted to remember us that some of the most basic principles of sustainability and integrative strategies were already developed and implemented in the Holocene and that the development of site-specific urban design, by our ancestors, was not dissociated from architectural knowledge, engineering and building implementation.

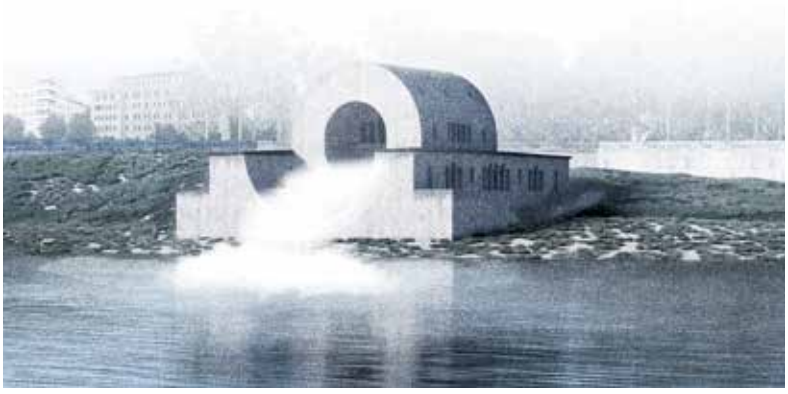


Figure 35: The non-gravitational memory of water: Claude-Nicolas Ledoux's Maison des Gardes Agricoles as an architecture for flooding inspiration on Piazza Mancini (author's concept / design and artwork by Enrico Capanni) ©Enrico Capanni 2022.

Figure 36: The gravitational memory of water: Claude-Nicolas Ledoux's Maison des Surveillants de la source de La Loue as an architecture for flooding inspiration on Piazza Mancini's Tiber waterfront (author's concept / design and artwork by Enrico Capanni) ©Enrico Capanni 2022.

Furthermore, phenomenology intends to understand that the ancient Roman concept of *Genius Loci*[56] exceeded modern epistemology as we may understand it, thus by the evidence of synchronicity between utilitarian and symbolic functions on ancient sites and buildings. This insight is based on the cognition of a different notion of the sacred through tradition, centuries before the 19th century positivism divided exact sciences, humanities, arts, and technologies into separated domains of human knowledge. We also learn, through cognitive archeology[57], that the conscience of an epistemological bias, here, is fundamental to accept that we may never be able to capture the full essence of our progenitor's psyche and actions, as the notion of the sacred — and its embodiment through nature — has evolved into a more edgewise aspect of knowledge, whereas it was, by tradition, the centredness of the ontological

posture of our ancestors in every aspect of life[58]. Paul Ricoeur[59] remembers that the basic function of hermeneutics is to restore meaning which is, as a matter of fact, the concern about the ancient mind as the main theme of contemporary cognitive archeology[60].

Indeed, ancient equivalent concepts such as the Latin term *Ars* (Art) and the Greek τέχνη (*Techne*) have diverged from classical antiquity into modernity in such a way that they have become in many aspects antagonists domains or, to the least, mutually exclusive in academia and research, remaining in contemporaneity as different fields of knowledge and by that, difficult to understand in their epistemological primitive *corpus*[61]. Yet, the syncretic qualities of some ancient buildings and sites can emerge in many forms, revealing different aspects of knowledge, such as utilitarian, technical, aesthetic, and even sustainable/ecological functions and virtues — which could emerge from concerns about some local *oikos* — that can make us sense the legacy of some ancient form of unitarian knowledge[62] in the mindset of our ancestors in a way that can be difficult for us to understand, with the exception of the regency of wisdom, based on the accumulation of experience, from vernacular empiricism to tradition and the construction of a scientific *corpus*[63].

As it is not the aim of the present article to present a methodology for the inventory and categorization of ancient urban integrated systems, we will still resume some relevant aspects that should be valued in the scope of the Sustainable Water Strategies (SWS) on historic waterscapes, cultural heritage, urban morphology, and the symbolical importance of water architecture in the Anthropocene.

For the aim of this article, which is based on Rome's waterfront theme, we will only remember some case studies evoked as far, as examples from which we can learn virtues through simple ideas and basic principles, such as flexibility, adaptivity, and resilience.

Firstly, we refer to the ancient stepped system of the Tevere embankments, before the *muraglione* construction, as a mechanism of adaptiveness, flexibility, and resilience to the variations of water levels, which allowed a more integrated urban riverfront, in liaison with the river [Figure 30][64].

Secondly, we recall that the same principles of adaptiveness, flexibility, and resilience, have been embodied through the form of erudite architecture, as for the monumental stairs with deep treads that functioned as a multi-leveled pier in the ancient Porto di Ripetta [Figure 31][65]. One should remember that a related archetypal example, in the form of a sloped pier, can still be seen in the *Cais das Colunas* (i.e., "the Pier of Columns") as part of the neoclassical design of *Praça do Comércio* in Lisbon (1755)[66].

Thirdly, one must point out the flexibility, adaptivity, and resilience characteristics of some buildings and typologies to extreme natural phenomenae, such as river flooding, heavy rain, and flash flooding, that can be pedagogically valued in both ancient/erudite architecture and in vernacular construction, and that we symbolically evoked in the syncretic and iconographic project of Claude-Nicolas Ledoux Maison des Surveillants de la source de La Loue, as an architecture for flooding inspiration on Piazza Mancini's Tiber waterfront [Figure 36]. We also should mention that, for the stake of the present subject, the appropriation of the iconographic qualities of Ledoux's design moves away from utopia, or some form of naivism or vague idealism, but rather stands as a metaphor for the best virtues we may develop in prototyping new resilient buildings and sites adapted to climate changes.

Here we should encounter common architectural virtues as for the traditional typologies of architectures of containment of water (for collection and/or storage), such as cisterns, cloisters, thermal baths and public baths, baptisteries, elevated tanks, public washhouses, water gardens and water mirrors, springs, ponds and fountains and, more recently, typologies of architectures of water, such as water squares, amongst other Sustainable Urban Drainage Systems (**SUDS**) related solutions. In fact, water squares are considered, since the last decade, as a new urban typology, namely since the construction of the Water Square Benthemplein (Rotterdam, 2013)[67], which stands as an exemplary model in its category and has been seen, over recent years, as a new benchmark in this specific **SUDS** approach. Other exemplary models of integrated green-blue systems, such as the *Sponge Garden* (Rotterdam, 2019) present some very complete **SUD** research systems, namely regarding the implementation of containment and porosity strategies as they pretend to "test new concepts for collecting, retaining and returning rainwater to the natural environment. For this, experiments are being carried out with soil compositions, planting types, and sponge techniques"[68]. As for the latter, the implementation of porosity strategies through integrative solutions can be regarded as a subtle variation of the traditional principle of adduction, as its basic objective is to allow the motion of water in a collectible, unwasted, and serviceable form.

Conclusion

In sum, after having enhanced the need for a syncretic vision towards a new architecture of water (*vers une architecture d'eau*), we rephrase our final question, regarding both Ledoux's allegories

— as interpreted here —, contemporary water squares and other contextualized solutions: what more can we learn through these "hybrid visions" of architectures of water? And, broadly: how many ancient, erudite, vernacular or pragmatical examples are inspiring enough for us to develop new sustainable and adaptive models in the Anthropocene?

Although this perception is based on a major basis of a glocal problematic — as seen between global issues versus local threats and opportunities —, it justifies the importance of the "musée imaginaire"[69] concept, as André Malraux conceived it, in the collective memory — in this case the Latin culture and its undeniable classical identity. Thus, it can be shown how multi-layered and trans-historical approaches, as in Colin Rowe's *Collage City*[70], the 1970's *Roma Intterrota* exhibition[71] based on Nolli plan[72], up to the theoretical corpus of the city's heritage, from Rodolfo Lanciani[73] to Filippo Coarelli[74], from Aldo Rossi[75] to Françoise Choay[76], amongst other historical cross-reference[77] combined with archeological, morphological and topological readings, can contribute to enhancing cultural adaptiveness on global sustainable strategies — as Sustainable Urban Drainage Systems (**SUDS**), or Water Sensitive Urban Design (**WSUD**), Low-Impact Development (**LID**) and other green-blue and/or "soft edge" solutions that are mostly utilitarian in their environmental, economical and ethical purposes — by focusing on identity, contextualization, site-specific issues, adaptiveness, but also affective heritage, imaginary, politics of memory and civic education on waterscapes which are increasingly threatened by climate changes.

Finally, we should add one last thought: as referred before, we may never be able to understand the full essence of our progenitor's psyche and actions in the past, but in the same way, this also applies to the future and our descendant's actions, as we cannot predict the amount or type of evolution in adaptive, resilient and sustainable models and strategies over the next centuries. Whether this will occur under the form of "hard edge" or "soft edge" approaches, we can only expect that the syncretic qualities of buildings and sites specificities can emerge in many forms, contributing to and reshaping different aspects of knowledge and identities, including **AI** for building design and territorial planning, water research for supporting life on Earth, R&D and prototyping, on such combined aspects such as utilitarian, technical, aesthetic, cultural, sustainable and ecological functions — as virtues which should emerge from concerns about some local *oikos* — be it on Gaia… or on Mars[78]. Altogether, taking into account the number of

negative reports and predictions regarding climate change, it is our responsibility to leave all scenarios open.

In essence, what we have involved here was, in addition to the need for urban resilience mechanisms and planning adaptiveness, the urgent need for a cultural contextualization for an integrated memory of water, social action for its ethical and local valuation, and the possibilities of new paths for the consecration of water through architecture in the Anthropocene.

Notes

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1 In grateful memory of Luis Conceição (1952-2019) and in honor of his doctoral thesis, A Consagração da água através da Arquitectura - para uma Arquitectura da água (The consecration of water through architecture - towards an architecture of water), Faculty of Architecture / UTL, Lisbon, 1997.

2. Op. Cit. L. Conceição, 1997, "1.4. The poetics of water", p. 59.

3. "Wherever water occurs, it tends to take on a spherical form. It envelops the whole sphere of the earth, enclosing every object in a thin film. Falling as a drop, water oscillates about the form of a sphere; or as dew fallen on a clear and starry night it transforms an inconspicuous field into a starry heaven of sparkling drops.
We see moving water always seeking a lower level, following the pull of gravity. In the first instance it is earthly laws which cause it to flow, draw' it away from its spherical form and make it follow a more or less linear and determined course. Yet water continually strives to return to its spherical form. It finds many ways of maintaining a rhythmical balance between the spherical form natural to it and the pull of earthly gravity. (…) A sphere is a totality, a whole, and water will always attempt to form an organic whole by joining what is divided and uniting it in circulation." in T. Schwenk, 1976, p. 13.

4. Idem, p. 13.

5. Cf. L. Conceição, 1997, p. 59.

6. Idem, ibidem, p. 59.

7. According to these two architectural principles of containment and adduction of water, as referred to by Luis Conceição (cf. L. Conceição, 1997, pp. 11-12), it is possible to enumerate different typologies of architectures of water: a): architectures of adduction of water (aqueducts and water canals); b): architectures of containment of water (for collection and/or storage: cisterns; cloisters; thermal baths and public baths; baptisteries; elevated tanks; public washhouses, water gardens, and water mirrors; springs, ponds, and fountains). It is also possible to conceive a third typology that doesn't form from adduction or containment but as architectures that actually live with water, as for c): architectures of the limit between land and water (by transposition — bridges; by mechanical use — tide mills and water mills; by confrontation — ports; docks; bastions and coastal fortifications; lighthouses) and d): architectures that use water as a medium or physical support (stilt houses; ships; floating theaters). In that case, it is even possible to speak of architectures on water (cf. L. Conceição, 1997, p. 12), (N/A).

8. Idem, ibidem, p. 17.

9. According to C. Mattogno, B. Monardo, T. V. Di Giacomo and L. Kappler, 2021, p. 16.

10. According to C. Mattogno, B. Monardo, T. V. Di Giacomo and L. Kappler, 2021, p. 16.

11. Id. ibid., p. 16. The same authors also refer: "More specifically, the most common approaches in different geographical areas are as follows:
– the French policy of 'permeable cities', connected with the 'green and blue frame', which provides for specific urban planning instruments (SDAGE) to reduce pollution, prevent flood risks, and anticipate the effects of climate change;
– the 'Sponge City' concept initiated in China in 2014 to address urban water issues, including surface water floods;
– the Sustainable Urban Drainage Systems (SUDS) approach, which implies an increasingly important role of green infrastructure in the United Kingdom, minimizing the outflow of surface water and flood risks in an ecological way by imitating natural water systems such as ponds, wetlands, swamps, and basins;
– the Water Sensitive Urban Design (WSUD) strategy being implemented in Australia since the 1990s, integrating engineering design with the principles of the urban water cycle to provide sustainable results for cities;
– the Low-Impact Development (LID) used in Canada and the United States to describe a land planning and engineering design approach to manage stormwater runoff as part of green infrastructure." Id. ibid., pp. 17-18.

12. Id. ibid., p. 24.

13. Id. ibid., p. 24.

14. Id. ibid., p. 24.

15. Id. ibid., p. 24.

16. "The construction of the embankments of the Tiber, called walls, was carried out following the 17 m high flood that flooded Rome on December 28, 1870 (...) The construction of the walls ended in 1926; in the meantime there were floods like that of 1915 which did not cause any damage, confirming the validity of Canevari's work. The walls of the Tiber certainly solved the drama of the floods, but at the same time they interrupted the dialogue between Rome and its waters, depriving the city of some very important architectural episodes, above all the wonderful system of fronts along the Via Giulia and the port by Ripetta by Alessandro Specchi." In https://archidiap.com/opera/muraglioni-del-tevere/ ArchiDiAP - Department of Architecture and Design - Sapienza University of Rome. Accessed 09/08/2022. "As part of the many cost-saving measures implemented during the construction process, the embankment walls were built as steep as possible in order to use less travertine during their construction", in Carlson, The Past, Present, and Future of Flood Control in Rome [article], 2019, according to G. S. Aldrete, 2007.

17. "(...) the embankments were therefore designed 18.45 m high above the Ripetta zero level." In https://www.isolatiberina.it/index.php/en/tevere-e/muraglioni-e?showall=1. Accessed 22/08/2022.

18. "We have seen how the Tiber is subject to differences of level, which reached 12,86 meters in the flood of Clement VIII., increasing fourteen times the volume of its waters. To give such a capricious river a regular outlet, modern engineers have built a uniform bed 100 meters in width, which has to serve for both droughts and floods. Their predecessors, on the other hand, had adopted a triple section, the narrowest to serve in time of drought, the second in moderate, the third in extraordinary floods (...). The advantages of the old over the modern system are obvious. With the old the river was obliged to run in every season of the year within limits well defined, and proportioned to its volume, without raising sandbanks and depositing silt and mud. The moderate height of each of the three receding steps allowed the river to preserve its pleasing aspect, as is the case in many of the modern capitals of Europe; while the huge walls between which we have transformed it into a deep and unsightly channel, with nothing to relieve the monotony of its banks." In Lanciani, 1897, p. 13.

19. Cf. s 18; 20.

20. "The construction of the walls, which in the urban stretch extend for a total length of eight kilometers, has drastically changed the building fabric and the road system of the ancient coastal districts: Campo Marzio, Ponte, Regola, Sant'Angelo and Ripa sulla left bank; Borgo and Trastevere on the right, destroying entire blocks that faced the river. With the works, numerous popular houses that stood on the river bed, noble palaces, churches, the Aurelian Walls overlooking the Tiber from Porta del Popolo to Testaccio are demolished and the port of Ripetta, built in 1704 by Alessandro Specchi, is destroyed. In reality, part of the port was only filled in and today it is still under the asphalt of Lungotevere in Augusta." In https://www.roma2pass.it/tevere/muraglioni/. Accessed 12/08/2022.

21. Here, the two columns mark the entrance of the city by the sea, and act as an allegory of the two twin pillars, Jachin and Boaz, at the porch of the Masonic temple (in accordance with King Solomon's Temple, cf. Bible, 1 Kings 7:15-22). Here again, a symbolical eloquence that emphasizes an entrance, materialized, in this case, in the form of a neoclassical monumental "U" shaped river square — the *Praça do Comércio* — with one side open to the river, and hereby defines the axial urban design of all the city's downtown, which is currently known as the *Baixa Pombalina*. Here again, one must point out that this lowland is another most symbolic "terrain of water", as it was built over an ancient wetland area that was progressively drained by the Romans in Antiquity and can therefore be easily understood by direct analogy with the Campus Martius and the Palus Caprae in Ancient Rome (cf. F. Coarelli, 1997 and s 27; 32), (N/A).

22. As referred by Annalisa Metta. The author also quotes the paintings of Antonio Joli, *Piazza Navona Allagata* (c. 1750), Giovanni Paolo Panini, *Veduta di Roma con piazza Navona inondata d'acqua e giochi di carrozze* (1756) and Francesco Corsi, *Il lago di Piazza Navona* (1845), as testimonies of this ancient practise (cf. A. Metta, 2022). For a contemporary example of this ludic concept, we can refer to the monumental *miroir d'eau* in the square of the Palais de la Bourse at Bordeaux, as the largest design of this type of architecture of water, built in 2006 by landscape architect Michel Corajoud (N/A).

23. Idem, ibidem.

24. Many sources point to large artificial basins created in the Roman period for this kind of spectacles, which were known in Latin as *navalia proelia*, as Ceaser's *naumachia* (possibly situated in the *Campo di Marzio*), Augustus *naumachia* in the Trastevere, or Trajan's naumachia (*Naumachia Vaticana*), amongst others (N/A). Cf. https://en.wikipedia.org/wiki/Naumachia; https://en.wikipedia.org/wiki/Naumachia_Vaticana; https://pressbooks.bccampus.ca/spectaclesintheromanworldsourcebook/chapter/naumachiae-and-land-battles/. Accessed 20/08/2022.

25. Cf. A. Metta, 2022. From the same author, see also https://www.youtube.com/watch?v=XfKzqJLy1Nw. Accessed 12/08/2022.

26. According to A. Metta, 2022. See also D. Da Cunha, 2018. As an example of the memory of water in Rome's toponymy, one should point out that the famous street named *Via del Condotti* (literally: "the street of the conduits") has this name because of the major underground pipes that were laid by Giacomo della Porta in that urban axis to bring water from the ancient aqueduct *Aqua Virgo* (built by Agrippa in 19 BC) and its successor, the *Acqua Vergine* (built under Pope's Nicholas V hydraulic reform that started in the Renaissance period), to the renaissance and baroque fountains (cf. Rinne, K. W., *The Waters of Rome: Aqueducts, Fountains, and the birth of the Baroque City*, Yale University Press, New Haven, 2011, and https://waters.iath.virginia.edu/acqua_vergine.html. Accessed 20/11/2022, amongst others).

27. The *Campus Martius* (not to be mistaken with the actual fourth rione of Rome — *Campo di Marzio* — R. IV., which covers a smaller section of the original area) was originally the lowland area at the north of ancient Rome "between the city and the Tiber". At the center of that wetland was the *Palus Caprae* (meaning "Goat Marsh" or "the Goat's pool"), the pond area where, mythically, Romulus ascended to the sky. "The marsh was fed by a stream called Petronia Amnis, but by the Augustan period it had disappeared or been drained. The Palus Caprae was in the small basin where the Pantheon was later built [Cf. Richardson, 1992, p. 66 - N/A], west of the Altar of Mars supposed to have been established by Numa Pompilius, Romulus's successor. (...) [Filippo Coarelli conjectured that] "the mythic significance of the Palus Caprae was the reason for siting the Pantheon there." Cf. F. Coarelli, 1997.

28. Cf. Lanciani, R., The ruins & excavations of ancient Rome: a companion book for students and travellers, The Riverside Press, Cambridge, 1897, in https://archive.org/details/ruinsexcavations00lanc/page/138/mode/2up. Accessed 20/07/2022 and https://www.digitalaugustanrome.org/records/stagnum-agrippae. Accessed 20/08/2022, amongst others.

29. Arco, i.e., "vault" in Italian, hence the toponymy (N/A).

30. "Not withstanding various repairs that clearly date to the later empire, the baths continued to be rebuilt along an asymmetrical plan (...) Some have argued that, since the imperial architects and their patrons eschewed a more modern, symmetrical layout, the later reconstructions must have preserved the initial Agrippan plan; the scale of the dome of the Arco della Ciambella, which aligns with Augustan comparanda such as the so-called Temple of Mercury at Baiae, could further support this reasoning. And while that is an appealing notion, based on the surviving physical evidence it is ultimately impossible to reconstruct anything more than the location of the original bath complex. Both the size and the layout of the late first-century B.C.E. Thermae Agrippae must remain speculative." In Kontokosta, 2019, pp. 53-54.

31. Op. cit. T. Schwenk, 1976, p. 13. Cf. 3, id., ibid.

32. Filippo Coarelli conjectured that "the mythic significance of the Palus Caprae was the reason for siting the Pantheon there." [Cf. Coarelli, F., Il Campo Marzio: dalle origini alla fine della Repubblica, 1997], In https://en.wikipedia.org/wiki/Palus_Caprae. Accessed 14/08/2022. See also 24.

33. Carta Idrogeologica di Roma/Hydrogeological Map of Rome, September 2015, Publisher: Roma Capitale (Municipality of Rome), in https://www.researchgate.net/publication/281966009_Carta_Idrogeologica_di_Roma_Hydrogeological_Map_of_Rome. Acceded 20/07/2022.

34. Cf. G. B. Brocchi, Topography of Rome, 1820; R. Lanciani, Hydrography & Chorography of Ancient Rome, 1897; Mario Bruni & Marco Mauti, Rome. The terrains of water, 2021; Matteo Polci, Rome. The terrains of water, 2016,

according to A. Metta, 2022. The map of the 1870 exceptional flood (17,22 m at Ripetta) is quite demonstrative of the inundated Palus Caprae area in Campo di Marzio (N/A): cf. Plan of the Rome areas flooded by the 1870 flooding (dwg drawing by S. Pascolini; Bencivenga, M. et al., 1995. Accessed 22/08/2022). The picture shows the areas flooded either by river or sewer overflow (N/A). See also the research project AQUAE URBIS ROMAE, created by Katherine Rinne in 1998, as "the first comprehensive, interactive study to examine water as a living system related to the 2800-year history of the urban development of Rome. Currently available as a prototype publication that is still under production, it is published on the world wide web by the Institute for Advanced Technology in the Humanities at the University of Virginia." In K. Rinne, Aquae Urbis Romae: The Waters of the City of Rome [article], in https://www.academia.edu/32924256/Aquae_Urbis_Romae_The_Waters_of_the_City_of_Rome; Idem, La Cittá Nuova: proceedings of the 1999 International Conference, ACSA, 1999, in https://www.acsa-arch.org/chapter/aquae-urbis-romae-the-waters-of-the-city-of-rome-2/; https://www.hiddenhydrology.org/aquae-urbis-romae-the-waters-of-the-city-of-rome/. Accessed 12/09/2022; See also https://engineeringrome.org/2019-student-projects/. Accessed 14/09/2022, amongst others.

35. Cf. https://www.floodmap.net/, amongst other flooding simulators.

36. Cf. 27.

37. Cf. 27.

38. The focus here is the city center: more down south we can also refer the districts of Testaccio, San Saba and Navigatore, amongst others (N/A).

39. Cf. https://commons.wikimedia.org/wiki/File:Map_of_downtown_Rome_during_the_Roman_Empire_large-annotated.jpg; https://wellcomecollection.org/works/v78dw9qd/images?id=uapg7wz7. Accessed 19/08/2022.

40. The Velabrum is the valley located between the Capitolino and the Palatino hills (N/A).

41. "naumachia, (Latin, derived from Greek: "naval battle") plural naumachiae, in ancient Rome, a mimic sea battle and the specially constructed basin in which such a battle sometimes took place. These entertainments also took place in flooded amphitheatres. The opposing sides were prisoners of war or convicts, who fought until one side was destroyed. The earliest naumachia recorded (46 BC) represented an engagement between the Egyptian and Tyrian fleets and was given by Julius Caesar on an artificial lake that was constructed by him in the Campus Martius." In https://www.britannica.com/technology/naumachia. Accessed 14/08/2022.

42. Cf. R. Lanciani, 1897. One must point that the naumachia spectacles in the Colosseum aren't completely as certain: "Martial, too, commemorates the display in what presumably is an eye-witness account, and certainly the image of the Colosseum arena being flooded is evocative. But, assuming that the spectacles occurred there and have not been confused with the naumachia Augusti, which would have taken too long to fill and likely never was drained, one wonders how it might have been accomplished." (…) Although it is possible that the venues have been conflated, Suetonius and Dio both are explicit in recording that naumachiae also occurred in the Colosseum." In The Naumachiae of Titus and Domitian, https://penelope.uchicago.edu/~grout/encyclopaedia_romana/gladiators/naumachiae.html. Accessed 14/08/2022. Actually, it is accepted that the flooding and drainage of the Colosseum was effectually possible. According to Martin Crapper: "Naumachiae are widely attested in ancient Rome (…) and there are references in the classical literature which appear to indicate that such water spectacles were mounted in the Colosseum. Martial and Cassius Dio make reference to this at the Colosseum's opening in 80 AD, whilst Suetonius writes that the emperor Domitian arranged mock sea battles in the amphitheater around 85 AD. (…). [The author's conclusion is:] "An engineering analysis has been carried out to determine if it were possible to flood and drain the Roman Colosseum in a reasonable timescale to allow the re-enactment of naval battles for entertainment. While there are a considerable number of missing links in the archaeological evidence, which preclude a fully detailed treatment, it is concluded that the amphitheater could have been filled in a time of 2–5 h, and drained again in a similar timescale." (Crapper, 2007).

43. For the hydrological maps of stream channels in ancient Rome and its topographic and urban morphological superposition,

see the study in ACQUA URBIS ROMAE: K. Rinne, Hydrological setting, 1998-2001 in https://www.hiddenhydrology.org/aquae-urbis-romae-the-waters-of-the-city-of-rome/. Accessed 13/06/2022.

44. We saw that several possible Sustainable Urban Drainage Systems (SUDS) strategies can also be implemented in *Campo di Marzio* (namely according to an adequate use of cladding materials), where a large number of streets are paved with the permeable traditional Sampietrini pavement. Although Sampietrini is a permeable bricked type of pavement, its maintenance, efficiency, and overall sustainability are somewhat questionable (N/A): "Despite their permeability being helpful in preventing floods, Sampietrini pavement is not the most structurally sound form of pavement, and will often take heavy damage from water. Heavy rainfall in the city has, over many years, eroded away the sand located between the joints of Sampietrini bricks, subjecting the pavement to many forms of distress that can harm the structural integrity of roads. (…) Furthermore, erosion from both water and vehicles on Sampietrini roads can lead to the formation of depressions in the pavement. During a minor flood event, water can gather in a depression and create a risk of hydroplaning for vehicles that drive over the depression." In J. Carlson (2019), according to P. Zoccoli, G. Loprencipe and A. Galoni, Sampietrini Stone Pavements: Distress Analysis Using Pavement Condition Index Method. Applied Science, vol. 7, no. 7, p. 669, 2017. doi:10.3390/app7070669

45. See above, cf. C. Mattogno, B. Monardo, T. V. Di Giacomo and L. Kappler, 2021, amongst others, and 11.

46. Focusing specifically on water squares built projects, we should refer two paradigmatic case studies in Rotterdam: Benthemplein (De Urbanisten, 2013) and Bellamyplein (Rik de Nooijer, dS+V, 2012). On Benthemplein: "The water square combines water storage with the improvement of the quality of urban public space. The water square can be understood as a twofold strategy. It makes money invested in water storage facilities visible and enjoyable. It also generates opportunities to create environmental quality and identity in central spaces in neighborhoods. Most of the time the water square will be dry and in use as a recreational space." In https://www.urbanisten.nl/work/benthemplein. Accessed 9/09/2022. "The City of Rotterdam has completed a unique project which aims to control flooding and heavy rainfall. The Benthemplein, Rotterdam's first full-scale water square includes an outdoor sports venue, green areas, and even a theater for locals and visitors. The water square collects and stores rainwater in basins that are visible to the public. The stored water is diverted through steel gutters that run along the square in patterns. The design is centered around a multi-use sports field surrounded by graduated layers of stadium-style bleachers. Instead of hiding runoff water in underground pipes, the square has been designed to make water the main feature. During heavy rainfall, the water square can retain up to 1,700 cubic meters of water. The design also incorporates a self-irrigating water system to maintain green areas." In https://ec.europa.eu/environment/europeangreencapital/rotterdams-water-square/. Accessed 9/09/2022. See also https://www.publicspace.org/works/-/project/h034-water-square-in-benthemplein: "Water Square in Benthemplein - Rotterdam (Netherlands), 2013 - A once-empty, monotonous square now holds three large rainwater collection ponds which, when the weather is dry, can be used as amphitheaters, basketball and volleyball courts, or skateboarding rinks." Acceded 9/09/2022. Also, the same architectural office created the "Sponge Garden" (Rotterdam, 2019) as a very extended Sustainable Urban Drainage System in the same city: "(…) to test new concepts for collecting, retaining and returning rainwater to the natural environment. For this, experiments are being carried out with soil compositions, planting types, and sponge techniques." In https://www.urbanisten.nl/work/sponge-garden-dhkxw. Accessed 9/09/2022. See also https://www.urbangreenbluegrids.com/projects/green-water-square-bellamyplein-rotterdam-the-netherlands/. Accessed 9/09/2022; See also F. Boer, J. Jorritsma and D. Peijpe, De Urbanisten En Het Wondere Waterplein, Rotterdam: Uitgeverij 010, 2010; J. Carter, G. Cavan, A. Connelly, S. Guy, J. Handley and A. Kazmierczak, Climate change and the city: Building capacity for urban adaptation, Progress in Planning, 95, 2015, pp. 1-66, and A. C. Bisschop, Spatial design as a tool to prevent

pluvial flooding: a Rotterdam case study, Rijksuniversiteit Groningen Faculty of Spatial Sciences, July-2020, amongst others. Accessed 12/08/2022.

47. We are referring here to the results from the workshop at Sapienza University, SOS Rome, March 2022 / SOS CLIMATE WATERFRONT - Horizon 2020 Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE) European Union.

48. As for SUDS contextualization and problematics on urban waterfronts, see D. Babalis, 2021.

49. As referred by Annalisa Metta. Cf. A. Metta, The Navona Lake and the eels of the Pantheon. Architecture and landscape for flooding / seminar Roman coastal system - architecture and landscape between history and climate change, [poster presentation] Faculty of Architecture, Sapienza University, 03.15.22, SOS Rome 2022 / SOS CLIMATE WATERFRONT. Regarding the same author, one must point its own design for the Flaminio district, Poste Urban park Rome 2018-19. See also 21.

50. As Theodor Schwenk remembers (cf. T. Schwenk, 1976, p. 13). See also 3 and 4.

51. As referred by Annalisa Metta (cf. A. Metta, 2022). See also https://www.youtube.com/watch?v=XfKzqJLy1Nw. Acceded 12/08/2022. To name but a few of these water symbolism of the Pantheon: let us remember its duomo oculus, opened to the rainfall that drops in the marble concave pavement of the temple. There, twenty-two discreet holes drain water to the original sewer system that is still in use today (N/A). The same author also refers a Pannini's 18th century water-color representing the inside of the Pantheon flooded by the Tiber (Giovanni Paolo Pannini, Pantheon. Interno allagato con barche, ca. 1730) which was in possession of Rodolfo Lanciani and was mentioned in the author's book The ruins & excavations of Rome: a companion book for students and travelers (1897). As we have seen earlier, and according to our point of view, the flooding theme of this painting can also be related to an engraving by Volpato representing the "Temple of Mercury" from about the same period (see Figure 36). As we have recalled, this actually was not a temple, but the swimming pool of the Roman bath complex at Baia, and has a large domed structure that predates the Pantheon by more than one hundred years (N/A).

52. Cf. G. Bachelard, L'eau et les rêves. Essai sur l'imagination de la matière, Librairie José Corti 18, Paris, 1942.

53. Cf. F. Coarelli, Il Campo Marzio: dalle origini alla fine della Repubblica, Quasar, 1997. See also 27.

54. "By constituting itself as an informal element by nature, the design attitude towards water is that of its containment or orientation because, as already mentioned, it is always situated before and after the form." In Conceição, p. 59. See also 2 and 5.

55. Idem, ibidem, pp. 11-12; see also 7.

56. Cf. C. Norberg-Schulz, Genius Loci: Towards a Phenomenology of Architecture, Rizzoli, 1979, amongst others.

57. Cf. C. Renfrew (ed.) and E. Zubrow, (ed.), The ancient mind - Elements of cognitive archeology, Cambridge University Press, 1994, amongst others.

58. Cf. M. Eliade, Le sacré et le profane, Gallimard, Paris, 1965 and Traité d'histoire des religions, Payot, Paris, 1953, amongst others.

59. Cf. P. Ricoeur, De l'interprétation - essai sur Freud, Seuil, Paris, 1965.

60. Cf. C. Renfrew (ed.) and E. Zubrow, (ed.), 1994. amongst others.

61. About the dichotomy between art and technique in modernity, see L. Mumford, Art and Technics, Oxford University Press, London, 1952, amongst others.

62. Or holism, the interdisciplinary idea that systems possess properties as wholes apart from the properties of their component parts. Cf. J. Smuts, Holism and Evolution, Gestalt Journal Press, 2013 [1st ed. 1926].

63. As it is not the aim of the present article to relaunch the debate between art and technique, artistry and craftsmanship (cf. Lewis Mumford), or reconsider the apologetics on tradition, ancient buildings, and vernacular architecture (cf. John Ruskin), or the attempts for the restoration of a "unified tradition" (as within the Arts and Crafts movement - cf. William Morris) or the

Gesamtkunstwerk concept (cf. the Vienna Secession, the Bauhaus manifesto and modernism - cf. Walter Gropius), amongst others historical examples, although we mainly focus the "learning from the past" approach through the study and the possibilities of reusing ancient knowledge in the pursuit of innovative, ecological and sustainable solutions in the modern world, as defended by modern ecology pioneers such as Patrick Geddes and Hassan Fathy (H. Fathy, 1986, 1999 - cf. bibliography), amongst others (N/A).

64. Cf. Fig. 3-4 and 18.

65. Cf. Fig. 5 and 20.

66. Cf. 21.

67. Cf. 46.

68. Idem.

69. Cf. A. Malraux, Le musée imaginaire, Gallimard, Paris, 1965 [according to the author's homonymous essay from 1947].

70. Cf. C. Rowe and F. Koetter, Collage City, MIT Press, 1979, pp. 151 and 179.

71. "Roma interrotta" - Mostra organizzata dagli Incontri Internazionali d'Arte, Mercati di Traiano, Roma, Maggio-Giugno 1978 - Ed. Incontri Internazionali d'Arte, Officina Edizioni, Rome, 1978. Based upon the interpretation of Nolli's plan of Rome (1748), this 1978 exhibition in Rome and the resulting catalogue had contributions from Piero Sartogo, Costantino Dardi, Antoine Grumbach, James Stirling, Paolo Portoghesi, Romaldo Giurgola, Robert Venturi and John Rauch, Colin Rowe, Michael Graves, Leon Krier, Aldo Rossi, Robert Krier, Giulio Carlo Argan and Christian Norberg-Schulz. In https://monoskop.org/images/a/a5/Roma_interrotta_1978.pdf. Accessed 10/09/2022.

72. Pianta Grande di Roma, which Giambattista Nolli began surveying in 1736 and engraved in 1748, and is now universally known as the Nolli plan or the Nolli map. Cf. https://en.wikipedia.org/wiki/Giambattista_Nolli#Nolli_Map. For an interactive study of the Nolli plan, cf. Interactive Nolli Map Website 2.0 https://web.stanford.edu/group/spatialhistory/nolli/. Accessed 31/08/2022 (N/A).

73. R. Lanciani, The ruins & excavations of ancient Rome: a companion book for students and travellers, The Riverside Press, Cambridge, 1897, amongst others.

74. F. Coarelli, Guida archologica di Roma, Mondadori, Verona, 1974; Il Campo Marzio: dalle origini alla fine della Repubblica, Quasar, 1997, amongst others.

75. A. Rossi, L'architettura della Città, CitàStudio Edizione, Turin, 1995 [1st ed. 1966], amongst others.

76. F. Choay, L' Allégorie du patrimoine, Seuil, Paris, 1996, amongst others.

77. As a reference to Piranesi (1720-1789), Volpato (1735-1803), and Canaletto (1697-1768), amongst other authors who contributed to a large number of 18 referential paintings and engravings which are valuable as testimonies not only of historical buildings and sites but also of the imaginary: cf. Canaletto's Capriccio: A Palladian Design for the Rialto Bridge, with Buildings at Vicenza, c. 1740, in https://hoocher.com/Giovanni_Antonio_Canal/Giovanni_Antonio_Canal.htm. Accessed 31/08/2022; Giambattista Piranesi, Veduta del Porto di Ripetta, c. 1760, in https://romaierioggi.it/porto-di-ripetta-piranesi-1760-ca/; Giovanni Volpato, Temple of Mercury, large Roman thermal pool, also known as truglio for its circular shape, Baths of Baia Archaeological Park, first century, Campania, Italy, engraving by Giovanni Volpato from a drawing by Natali, Naples, 1768, in https://www.gettyimages.be/detail/nieuwsfoto%27s/exterior-of-the-temple-of-mercury-large-roman-thermal-nieuwsfotos/1150946755; See also Barbero, L.M., Bevilacqua, M., De Lucchi, M., Gagliardi, P., Martoni, A., Valtorta, R., Piranesi Roma Basilico [cat.], Contrasto, Milan, 2019, amongst others. Let us not forget that the number of examples is large and the need of a formation of strategies is imperative in the referential speech, as Michel Foucault pointed out in L'archéologie du savoir (Gallimard, Paris, 1969), (N/A).

78. Regarding advanced technologies and sustainable design practices on Mars, we should refer to NASA's 3D Printing Centennial Challenge, which is a design competition for human habitation on Mars, amongst others. The competition sought perspectives from outside the aerospace industry to explore how a human habitat

could be designed and delivered on Mars using autonomous 3D printing technologies and sustainable design practices. Cf. Muthumanickam, Naveen Kumar & Duarte, Jose & Nazarian, Shadi & Memari, Ali & Bilén, Sven. (2021). Combining AI and BIM in the design and construction of a Mars habitat. 10.4324/9780367824259-17 in https://www.researchgate.net/publication/350172943_Combining_AI_and_BIM_in_the_design_and_construction_of_a_Mars_habitat. Accessed 2/02/2023; Muthumanickam, Naveen Kumar & Park, Keunhyoung & Duarte, Jose & Nazarian, Shadi & Memari, Ali & Bilén, Sven. (2020). BIM for Parametric Problem Formulation, Optioneering, And 4D Simulation of 3D-Printed Martian habitat: A Case Study Of NASA's 3D Printed Habitat Challenge, in https://www.researchgate.net/publication/341451080_BIM_for_Parametric_Problem_Formulation_Optioneering_And_4D_Simulation_Of_3D-Printed_Martian_habitat_A_Case_Study_Of_NASA's_3D_Printed_Habitat_Challenge. Accessed 2/02/2023, amongst others. See also https://www.ted.com/talks/jose_pinto_duarte_how_can_3d_printed_homes_for_mars_address_the_housing_crisis_on_earth. Accessed 12/12/2022.

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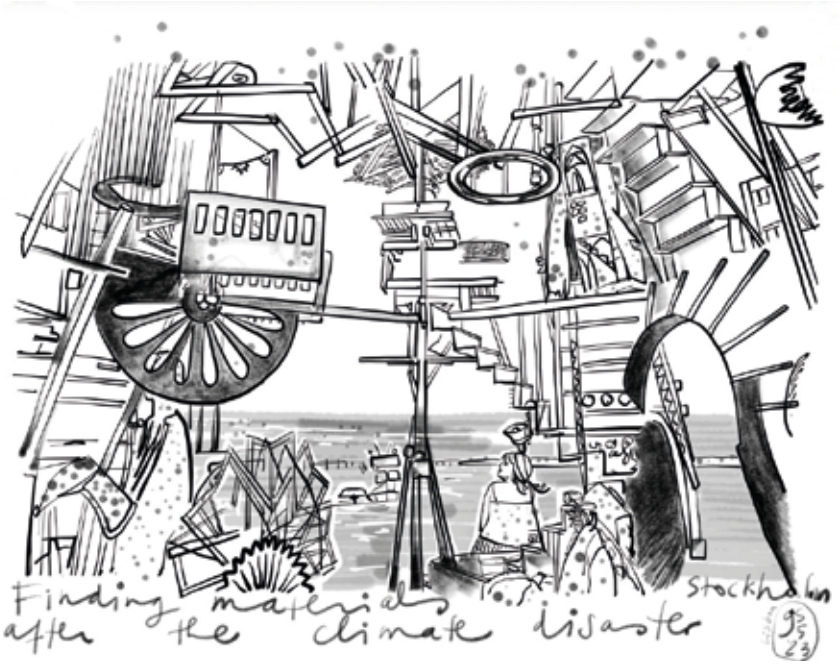
Team Project I

The Arc, Stockholm

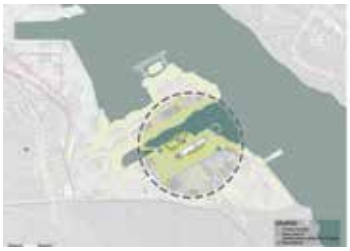


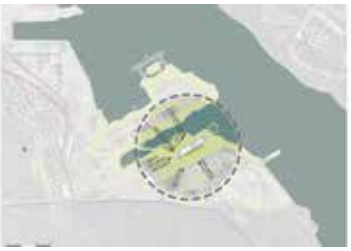
It is proposed to implement green infrastructure along the harbour of Frihamnen waterfront. The new green areas change the existing concrete pavement to permeable surfaces to manage excess rainwater and introduce the sponge effect. Public transport systems will be sustainable, including buses, walking and cycling to reduce greenhouse gas emissions. The current shortage of youth housing requires an increase in supply. The project proposes the reuse of a linner into permanent housing combined with workspace to encourage social collaboration and engage local skateholders in transforming this part of the city. The solution presented is based on three interconnected ideas: Adaptation, Inclusion and Repair — the **AIR**. Adaptation: adapt to climate change, mitigate and contribute to sustainability by developing the place. Inclusion: create a liveable habitat for plants, animals and humans of all kinds that can inhabit the place and be mutually connected. Repair: make the place sustainable before further development and construction of more tradicional buildings.

Figure 37: Conceptual sketch.

Figure 38: Photomontage of Stockholm.

Figure 39: Photographs of studied area.





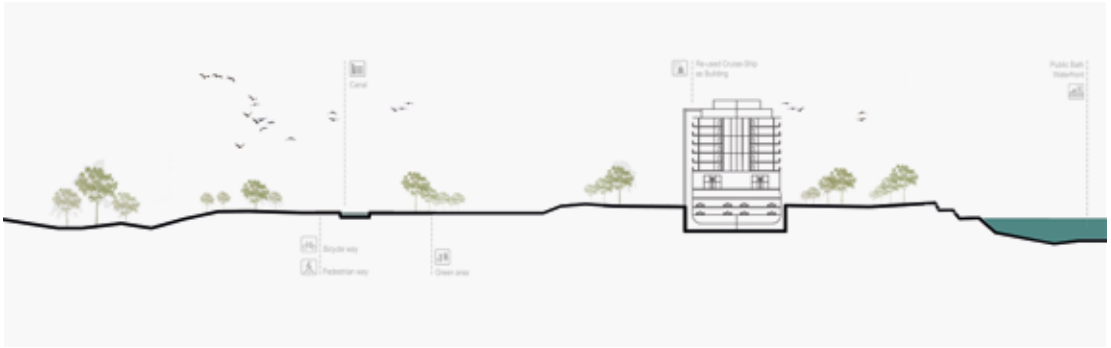
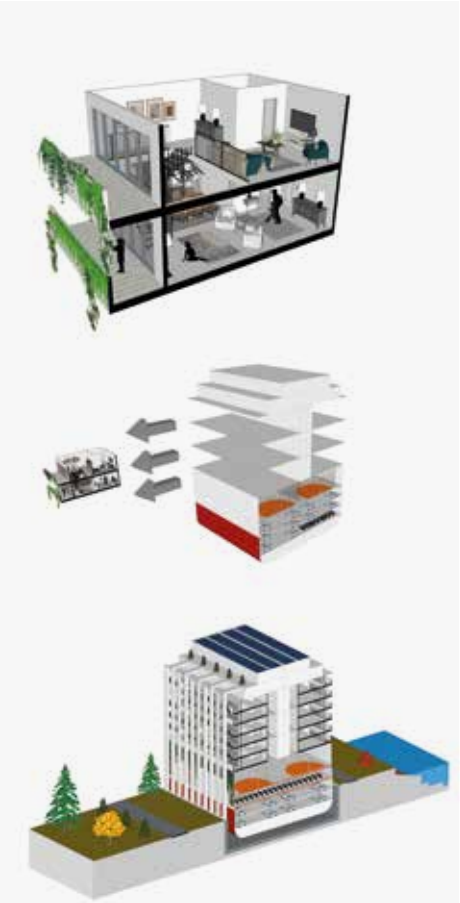


Figure 40: Render.

Figure 41: Diagrams.

Figure 42: Section.

Figure 43: Site plan.



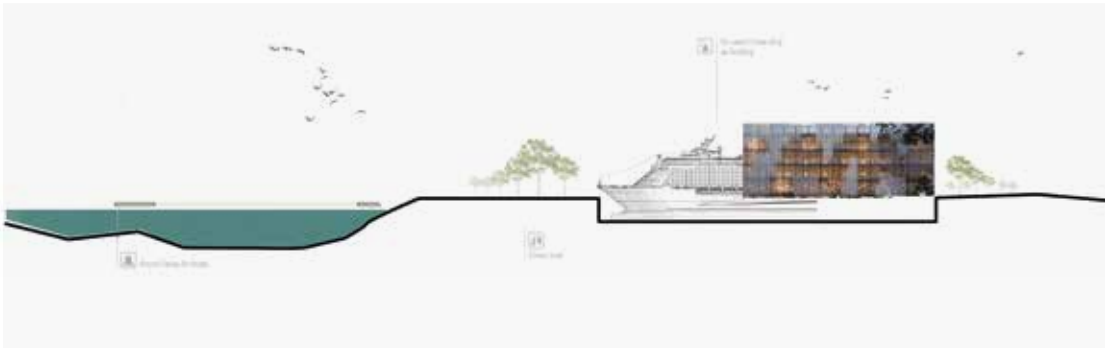
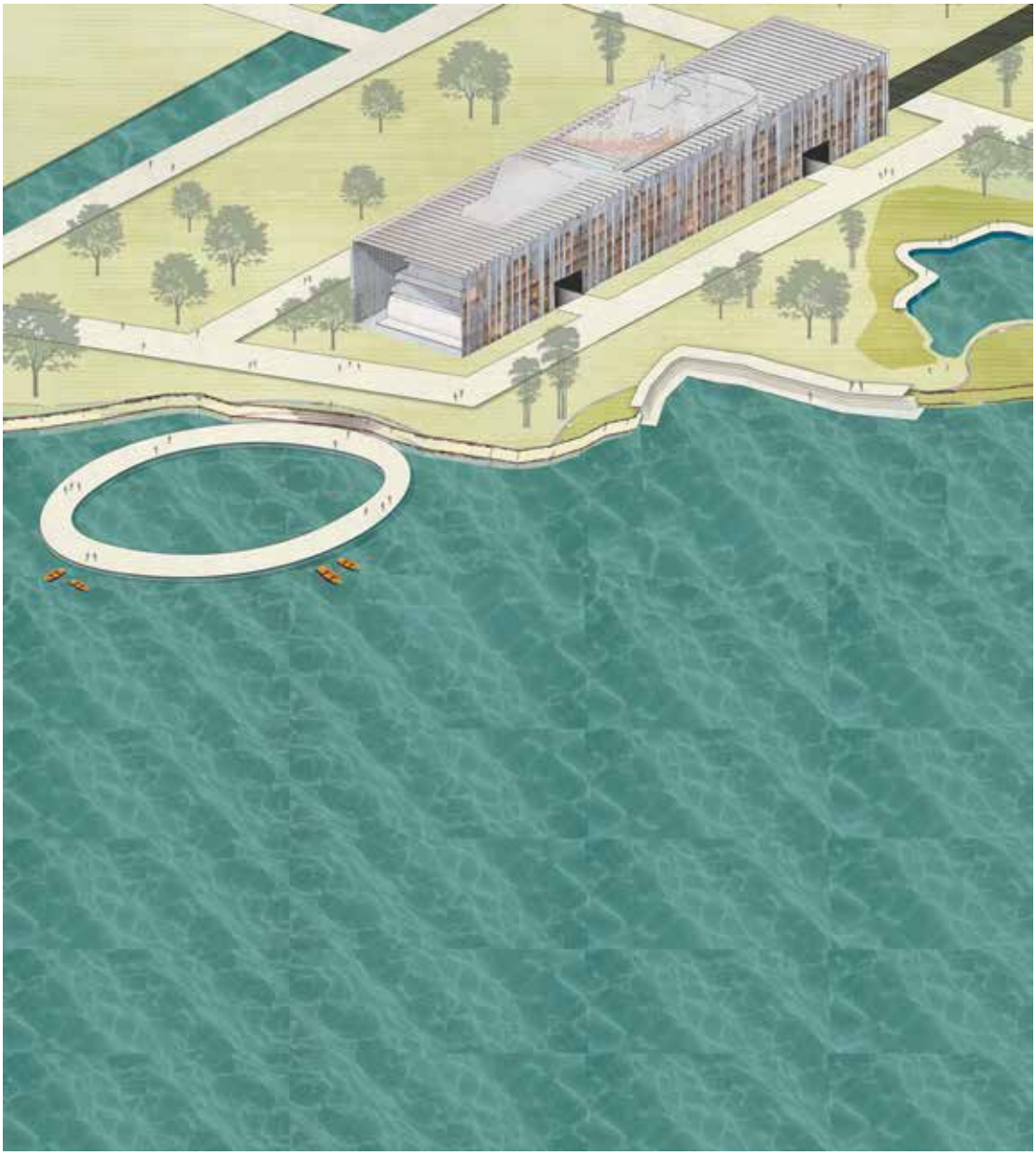


Figure 44: Render.

Figure 45: Diagrams.

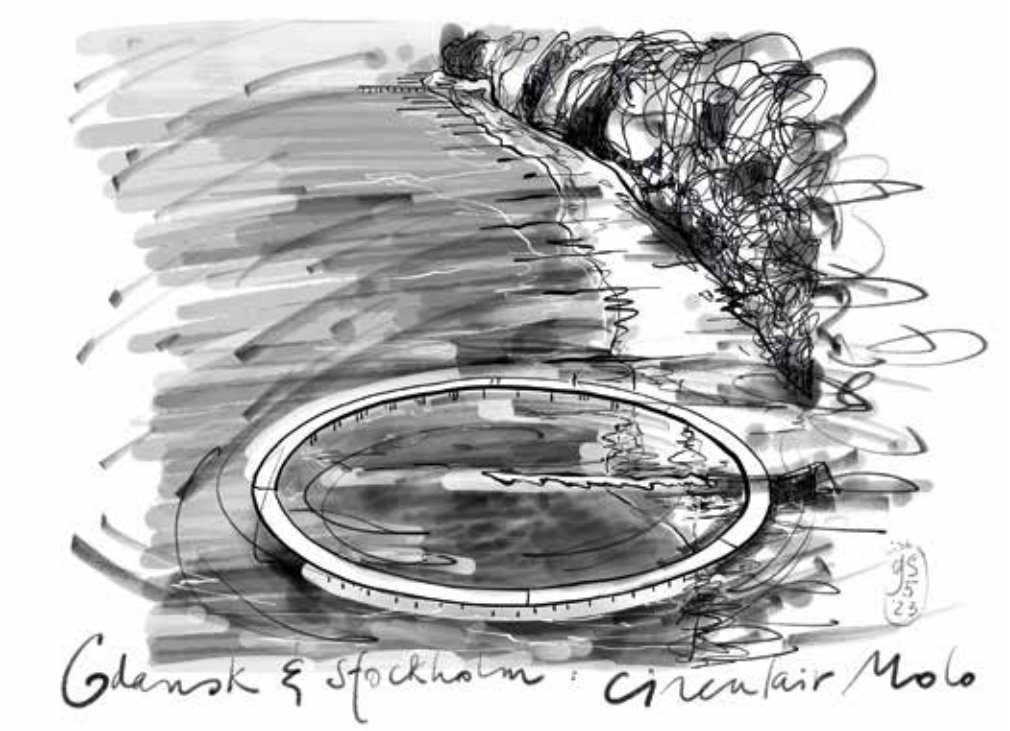
Figure 46: Section.

Figure 47: Axonometric.



Team Project II

A Leaf on the Water, Gdansk



The project focuses on the historic area of Wisłoujście Fortress in Gdańsk, situated in the delta formed by the Vistula River, which undergoes continuous transformations due to sediments and oscillations of the Black Sea. The project aims to preserve the fortress, a Natura 2000 site, and the historical memory of the area. It revitalises the area by creating a network of green public spaces and canals, emphasising the coexistence of the fortress, the river and industrial structures, while proposing a new residential area. To cope with frequent water level changes, floating structures, new river banks and paths are proposed, including a pedestrian bridge and cycle path to connect Gdynia to Wisłoujście and Westerplatte. The project includes the development of the quay north of the Fortress into a recreational area and the transformation of a new residential neighbourhood into a car-free zone with floating green structures and housing.

Figure 48: Conceptual sketch.

Figure 49:Photomontage of Gdansk.

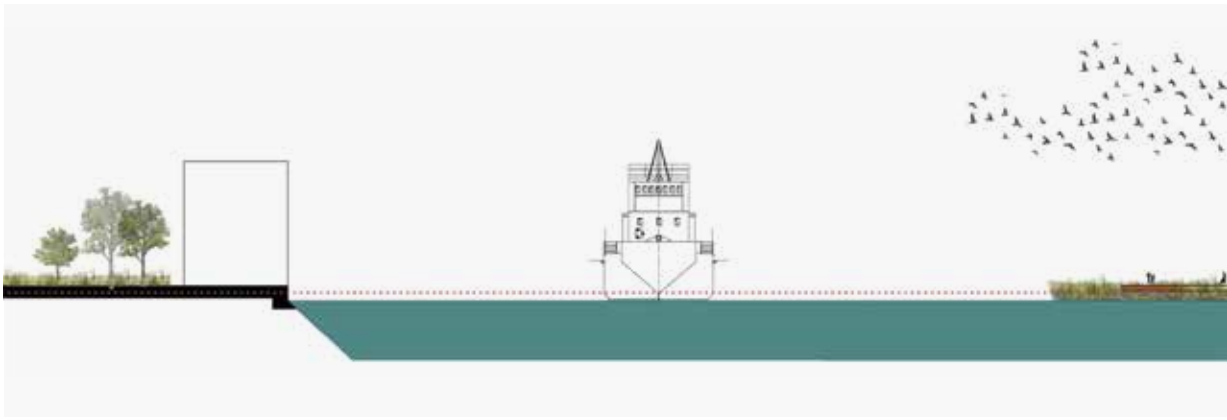
Figure 50:Photographs of study area.

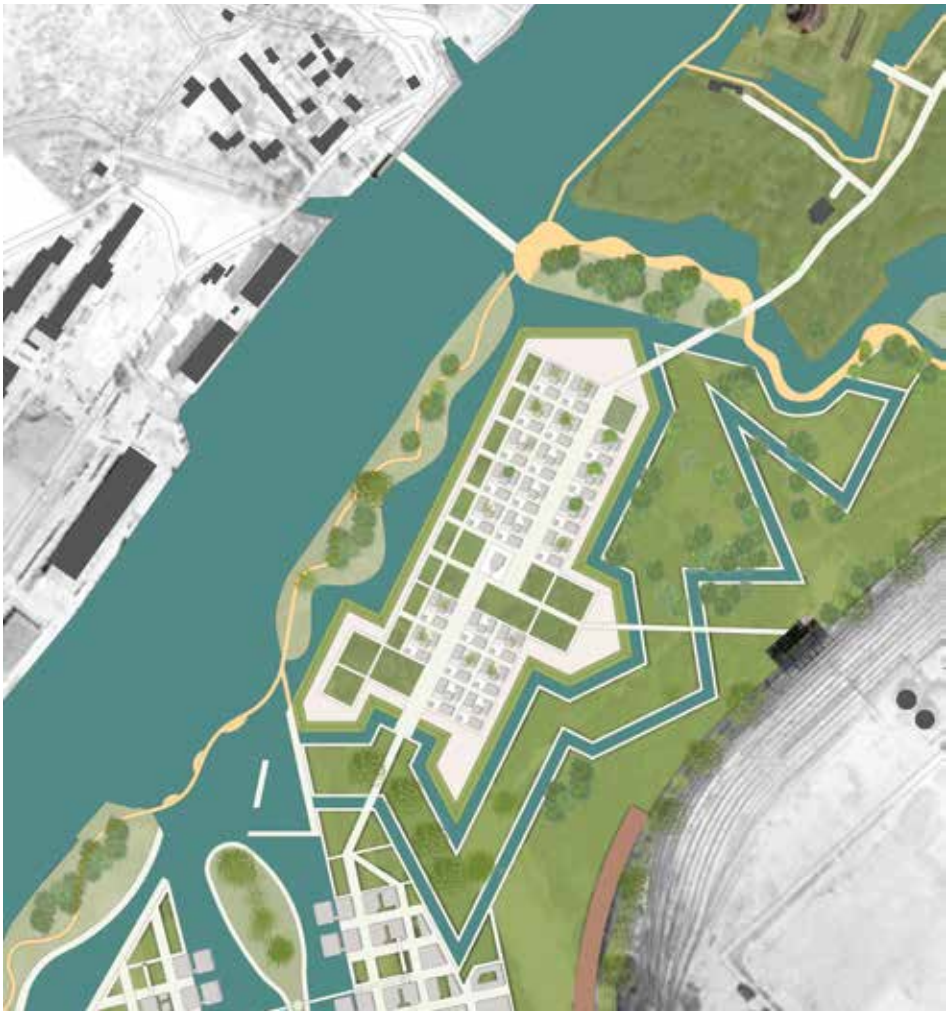
Figure 51: Render.

Figure 52: Render.

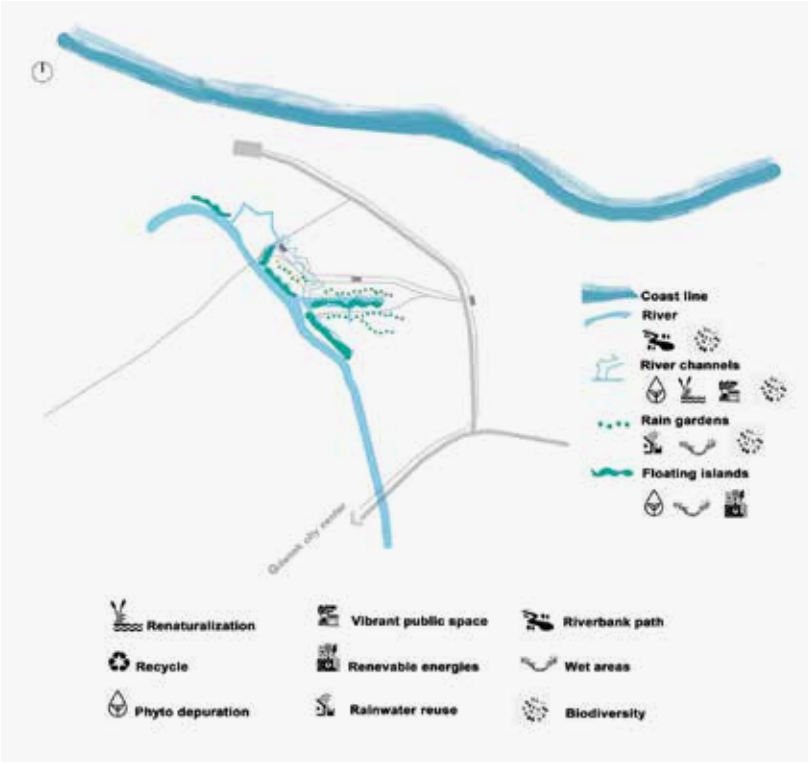
Figure 53: Section.

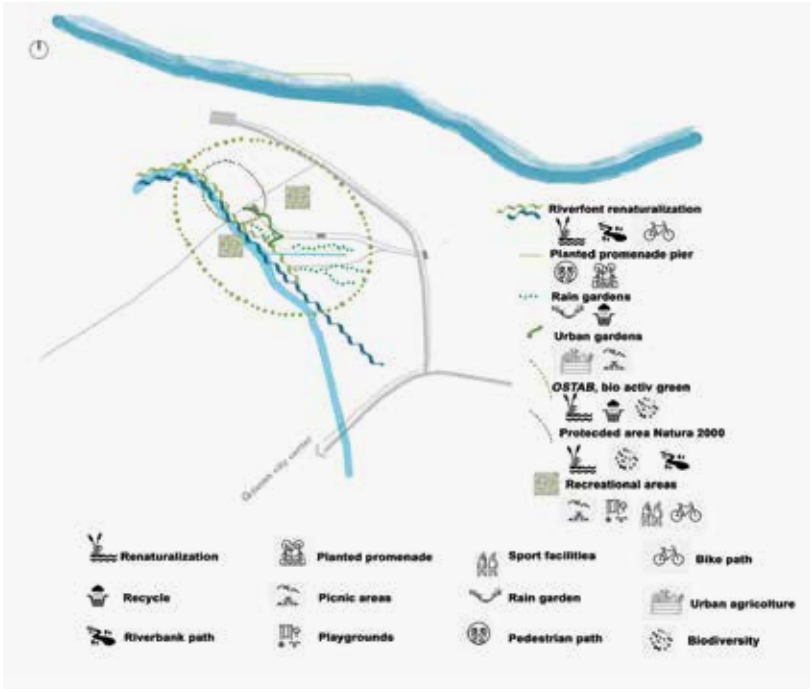
Figure 54: Site plan.






ART
COFFEE
GREEN
HOUSE
EXHIBITION


Coast line
River
River channels
Rain gardens
Floating islands
Renaturalization
Recycle
Phyto depuration
Vibrant public space
Renevable energies
Rainwater reuse
Riverbank path
Wet areas
Biodiversity


Riverfont renaturalization
Planted promenade pier
Rain gardens
Urban gardens
OSTAB, bio activ green
Protecded area Natura 2000
Recreational areas
Renaturalization
Recycle
Riverbank path
Planted promenade
Picnic areas
Playgrounds
Sport facilities
Rain garden
Pedestrian path
Bike path
Urban agricolture
Biodiversity

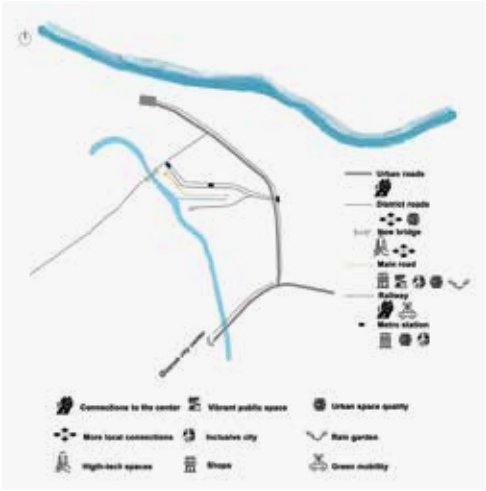


Figure 55: Diagrams.

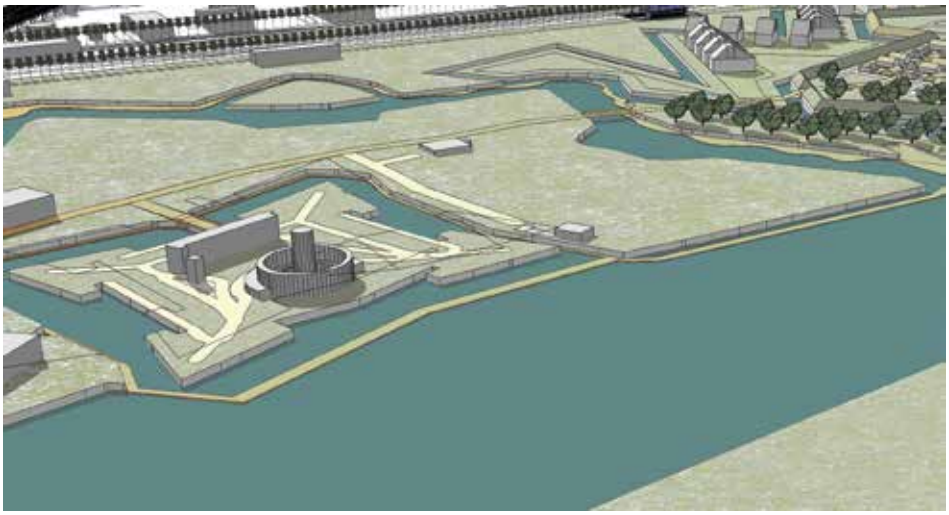
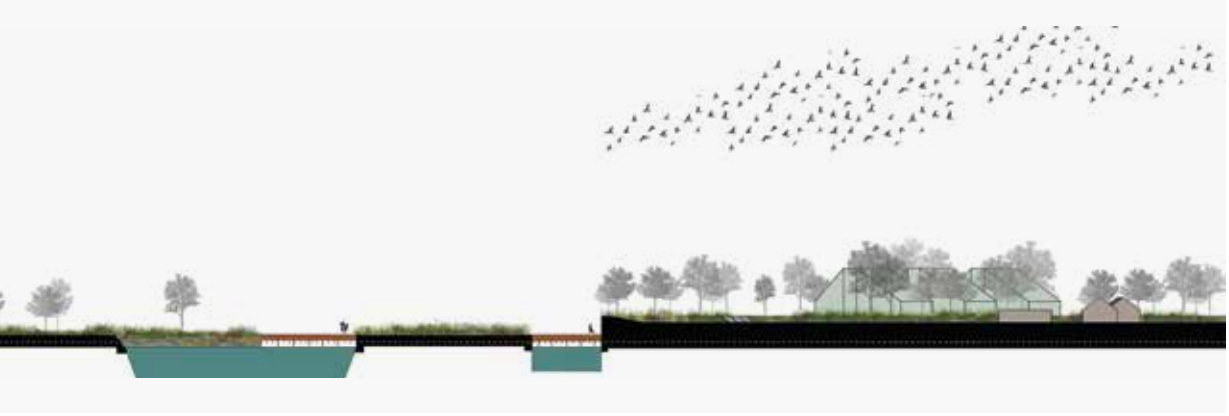


Figure 56: Render.

Figure 57: Render.

Figure 58: Section.

Figure 59: Axonometric.



Designers can facilitate architectural and urban transformations for cities on and near water bodies through visualization and design research as the research project SOS Climate Waterfront demonstrates. Visualizations for urban interventions in five European case study cities demonstrate how to keep Europe livable at a time of climate crisis.

Carola Hein
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UNESCO Chair for Water, Ports & Historic Cities