

H2020-MSCA-RISE
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Introduction

Vulnerability and Opportunity on Waterfront Facing Climate Changing

Waterfront Cities have been struggling with climate change, but are they more vulnerable than other cities?

In recent years the built environment settled along the shore registered major damages from natural disasters and the effects tend to have a growing impact in the next years. At present urban areas near the water are confronted with greater risks, bringing major losses, high maintenance costs and new threats for their communities, thus raising new challenges.

The SOS Climate Waterfront is a H2020 interdisciplinary project, focused on five European cities: Stockholm, Thessaloniki, Gdansk, Lisbon, and Rome facing climate new patterns. Researchers involved in the project aim to identify specific vulnerabilities and envision possible solutions for each city. The research network intends to identify the coming challenges and explore new opportunities for each city enhancing the capacity to develop solutions of resilience by benefiting from the international and interdisciplinary exposure.

The city of Rome is built over a multitude of layers spread out along large periods of time. The eternal city offers a theoretical framework for the present debate that is meaningful to exchange ideas addressing current and future societal, spatial, and environmental challenges. Though poorly equipped to adapt to climate disasters, such as heatwaves, flooding, and rising sea levels, Rome holds an outstanding repository collection of design solutions that have been tested for centuries and that are relevant today.

At present Europe is committed to decarbonize. The United Nations World Population Prospect stipulates that the quality of water services and living conditions in urban areas will decrease due to climatic extreme manifestations. The European Commission claims that the exposure to natural disasters will affect under-equipped cities and their communities thus innovative climate adaptation and mitigation solutions are needed to improve resilience.

Main vulnerabilities emerge with climate extreme manifestations thus strategies of adaptation to new patterns are being implemented. Decarbonization demands decreasing energy consumption, strategies to prevent urban islands' heat effect and the consequent emission of greenhouse gases. It also demands a greener built environment with stronger presence of vegetation and higher permeability of the soil. Impermeable surfaces in urban waterfronts contribute to flooding and pollution of surface waters.

In 2019 the Oslo Triennale discussed the topic “*Enough. The Architecture of Degrowth*” and the Lisbon 2022 Triennale focused on the topic “*Terra*”, both enhancing the importance of reclaiming the balance between humans and the natural environment. The World Congress organised by the International Society of City and Regional Planners in 2020 was dedicated to the “*Post-Oil City: Planning for Urban Green Deals*”. At present degrowth, unbuilding and return to nature are becoming increasingly present in the architectural and urban planning discourse.

Authors such as Pedro Gadanho claim that we will be dealing with the great transition imposed by the urgent need to decarbonize. In his 2022 book *Climax Architecture, how architecture must transform in the age of ecological emergency*, Gadanho argues that emergent new design is inevitable and the process of decarbonizing irreversible. Vishaan Chakrabarti in his 2013 book, *A Country of Cities*, argues that environmental degradation, unsustainable consumption, economic stagnation, rising public health costs and decreased social mobility are threatening the quality of urban life. Density and degrowth are key to enlarging open spaces for the natural environment and enhancement of biodiversity within and around the built environment.

Triennale, Biennale, world congress, authors from various countries share the same concern towards climate emergency. The question is how much change is needed and how long do we have to act. There is an agreement on the main challenges, within a common framework, though solutions are not generic, they are site-specific.

Each neighbourhood requires a delicate approach that holds the knowledge of local historic and geographic circumstances. In Rome, understanding the various scales of urban planning, landscape, architecture, and technology immediately related to water management and the result of previous strategies is required to overcome the gap. The urgent need to collect accurate data on new climatic patterns, learn about the new manifestations, and try to anticipate disasters is present among most of the authors in this book. The main question is how to predict? And to what extent preventive actions, of adaptation and mitigation, are needed?

Throughout the last century, the aim to dominate and control the natural environment has guided most of the decisions on urban waterfronts, both culturally and scientifically. In the 21st century there are new parameters to be considered, as new climate patterns challenge the existing infrastructures. Thus, major costs in infrastructure, still being built at present, represent a huge financial effort for the communities and local governmental agencies.

Outdated and unable to deal with new climatic patterns, they raise the urgent need for a new way of thinking, based on a dialogue with nature. This dialogue is dependent on the capacity to listen, observe and engage with contributions. In the first twenty years of the 21st century there are still major infrastructures being implemented that follow methodologies from the 20th century, driven by the aim to control nature instead of dealing with nature. An approach that does not acknowledge either an interdisciplinary dialogue or the capacity to negotiate and accommodate new patterns.

Some communities settled along the waterfront have been implementing solutions based on interdisciplinary discussions for centuries; there are still some heritage buildings and meaningful public spaces that hold clever solutions and a strong cultural presence along the waterfront. They offer a precious contribution to the present debate. In Rome some territories were redesigned to take benefit from the water, the waterways, maritime activities, and the possibility to moor in the city. When it comes to exploring site specific solutions for the 21st century such knowledge is relevant to improve resilience. Resilient thinking can be described as a way of strengthening the urban fabric, boosting urban life and adjusting to new demands. Urban Resilience is the capacity of the systems within a city to mitigate, adapt and grow while taking advantage of crisis or shocks.

The exchange of good practices among the five European cities, brings an added value to the debate. Each being settled on a particular landscape, has been dealing with hydrologic conditions in a unique way. Each holds an elaborated relation with the water, the landfill built over time, offering a handful of urban environments. Together, the five cover a large spectrum of approaches and paradigms. In Rome, layers of history offer theoretical concepts that lead to specific design solutions. However, when it comes to dealing with climatic extreme swings, they face similar challenges as they are unprepared. Singular historic and geographic conditions make Rome's waterfront unique, a result of a narrative of previous generations. Built upon visions to succeed natural forces, cities have domesticated the wild, managed the environment and implemented a unique cultural landscape.

Rome was initially settled over the river *Tiber*, affluent *Aniene* and a few more water streams that attracted humans to settle in the region. Buildings were implemented along a large network of waterways, layers of interventions have shaped the built environment to the present day. Throughout centuries generations of Romans have benefited from these lines of clean water taking advantage of the communities and the access to the Mediterranean Sea.

In the five cities the transformation of the territory brought more buildings, more impermeable areas and consequently higher floods that occasionally devastated the city. The city of Lisbon for instance, suffered an earthquake of 1755, affecting mainly the waterfront neighbourhoods. The deepness of devastation is well documented, built over landfill and sedimented soiled many constructions collapsed and were flooded by the subsequent high tide that reached the areas located along the river. Later in the late 19th century, the industrial port built on the river along the city, took in consideration the precedent catastrophe. New buildings had to be prepared for high tides and storms, this wisdom was included in their design. At the ground level materials covering the walls were water-resistant and designed to accommodate flooding. The knowledge of the natural disaster of the 18th century influenced the design solutions implemented in the 19th century.

In Stockholm the new neighbourhood of Hammarby Sjostad built in the early 21st century introduced permeable public spaces to drain the floods. At the scale of the built environment, most buildings have 3 to 5 floors. The density treasures energy efficiency and the public spaces keep the human scale. Most of the buildings use wooden structures.

Public spaces with vegetation, design to privilege pedestrians, soft modes of transport and the relationship with nature. The porosity of public spaces, which drain heavy rainfall and prevent flooding. All waste produced by the inhabitants is recycled in the creation of combustion.

Involvement of the community in the discussion of the program as it develops. Public participation in the development of the project and the implementation of a bottom-up strategy to influence policy decisions.

Lessons from each city offer a broad understanding of past, present, and future solutions that are specific to particular geographies and sensitive to local communities, their urban environments and the local building materials. Crossing visions offer enlightened design to overcome existing vulnerabilities.

This book, dedicated to Rome, is divided into three parts plus one. Part One, *Rome Coastal System*, presents historical approaches and dynamics in progress covering histories and current transformations along the seaside. Part Two, *Rome and the Tiber*, deals with historical perspectives, strategies and transformation programs linked to the most central areas of the city.

Part Three, *Rome Aniene River*, aims to contribute to the rediscovery of the largest tributary of the Tiber, the Aniene, too

often hidden by aggressive urbanisation within the metropolitan part.

Part Four is entirely dedicated to the expressive drawings that were elaborated during the Spring Rome workshop 2022. They clearly realise how important the empathic relationship with places is in order to fully understand their structure and potential in view of their transformation sensitive to the current conditions of climate change.

The authors listed in this book are developing their own research and come from different disciplines. They offer a sharp perception of the present debate on Rome's different waterfront, along the coastline, but also along the two major rivers, Tiber and Aniene. Articles address the role of local authorities, public and private investors; they cover a large spectrum of possibilities, the cultural identity based on historic, geographic, and societal issues addressing the city, and individuals.

It takes different approaches, environmental, social, technological, economic, cultural, each in its own way and aims to protect the Eternal city from catastrophic climate disasters. Each group presents solutions and future strategies, and some of the design proposals demand a new culture to manage and heal the territory. Decarbonization demands profound shifts in the way cities have been organised. The mobilisation of local communities towards more sustainable behaviours, the protection of biodiversity, and the integration of blue and green systems in the urban environment come across several authors.

Some design, landscape, architecture, and urban design illustrated in this book, leads to the urgent need for urban porosity and the necessity to bring nature back to the urban environment. Such an approach incorporates new perspectives to spatial planning at the scale of the city of Rome, rivers Tiber and Aniene. Emerging strategies integrate parameters to reduce energy consumption and shrink the carbon footprint. The results of the research carried out within SOS Climate Waterfront are made available on open access sources through the website of the program, shared database, and the publication of this book which will be also available online.

The aim is to share the outcomes, solutions and strategies that, in many cases, need the support and the mobilisation of civil society. It is meaningful for the research project to disseminate the results, and influence contemporary culture so that waterfront communities may evolve towards more sustainable behaviours, build responsive networks, and protect their local biodiversity.

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