

CDS/2

WATERFRONT URBAN SPACE

Designing for Blue-Green Places

edited by Dimitra Babalis



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Cities, Design&Sustainability. The New Series / 2

This Series seeks to present some new concepts concerning current and future roles of cities in supporting sustainable communities. It will discuss the latest issues in planning, designing and building a better future, achieving sustainability through urban and architecture design. CITIES, DESIGN&SUSTAINABILITY. THE NEW SERIES attempts to understand better some factors and principles that condition a range of choices about future urban life. It will address new ways of managing cities and responding to current issues that are key to urban change. The making of real sustainable cities has to be considered as a cultural issue concerning the reconciliation between community living, urban environment and nature. Evolving themes on urban, architectural and climate change matters will be further explored in order to share insights and build a more integrative urban environment.

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CITIES, DESIGN AND SUSTAINABILITY. THE NEW SERIES

Volume I: The Integrative City. The Dynamics of Urban Space / 1
Dimitra Babalis (edited by) (2016)

Cities, Design and Sustainability. The New Series is a peer-reviewed Series. It cooperates with a qualified International Scientific Committee with high standards of advice that each member acts with competence and integrity in order to set out an excellent approach to the wider scientific research.

This Series includes special editions of INTEGRO UAD Annual Meetings, International Conferences and brings together all the fundamental scientific topics on eco-sustainable urban and architecture design from a comparative and advantageous international perspective.

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PREFACE

This book explores research results tackled within the 2nd Annual Meeting of the 'International Group on Urban and Architecture Design' (INTEGO UAD)¹ held in June 2016 at the University of Florence. The Meeting, chaired by Dimitra Babalis, gave the opportunity to the INTEGRO UAD Partnership to exchange opinion focuses on design ideas and methodologies to embrace waterfront regeneration matters. Further, new ideas and proposals, that have emerged to respond to the challenges on *waterfront urban space*, are stressed and the lessons learned from different proposals and case studies across the Europe.

In this perspective, the INTEGRO UAD Partnership had come together to underline that in the today's city local authorities consider waterfront urban spaces as dynamic places to be re-designed. Waterfront planning and design process seems to be essential for the transformation of many urban patterns. Further waterfront change presents complexity but also offers great opportunities for recreational, sport, work and residential utility.

In this book the INTEGRO UAD faced research issues on waterfront urban spaces and proposals in a comparative way that can be considered to urban quality and wellbeing, to more social and culture integration. The International Research Group pointed out opportunities for design and redevelopment intervention to provide enjoyable urban spaces on existing core riverfronts, seafronts, canal sides including abandoned industrial sites and watersides of great environmental value. Proposed projects review environmental improvements and habitat restoration, well-planned urban contexts including preservation of cultural heritage.

Often, availability of land led to create ambitious urban frameworks schemes while environmental regulations led to reconsider differently waterfronts while people's participation guided towards discovering 'lost' waterfronts. Preservation and reuse of existing buildings can give the opportunity to revitalise urban waterfronts. Additionally, changing economies and changing urban landscapes can give the possibility to redevelop waterfront sites for a range of development purposes. It is, therefore, highlighting, that remaking waterfront urban spaces means rethinking urban landscapes of the Contemporary City.

The importance for waterfront change is to understand the planning and design process that should be concreted towards quality of urban spaces and future urbanity. The value to waterfront regeneration and the understanding of urban complexity could be used to respond properly to a range of problems and forms of interventions. By redefining urban policies and strategies with particular waterfront areas, it became possible to develop good planning and design issues.

¹ INTEGRO UAD is a European Partnership founded and chaired by Dimitra Babalis in 2015 at the University of Florence, Department of Architecture, DiDA. The International Group aims to provide multidisciplinary research and studies on innovative issues within the City in Change and its cultural heritage, tangible and intangible for new urban scenarios in different European contexts. The main aims of INTEGRO UAD are as follows:

- To define an innovative research in European Partnership and multidisciplinary
- To provide an international debate for knowledge, education and formation on Cities in Change, sharing ecological and sustainable design issues
- To explore the values of cultural heritage and its transformation
- To put 'fixed points' in preserving, regenerating and developing tangible and intangible cultural heritage
- To define design process in sensitive urban contexts and urban spaces and places.

So, instead of attempting to provide a more or less 'universal' design, it is important to express design that could be targeted by area. So, it remains necessary to define a waterfront area concerned with a very wide range of design initiatives facing different urban problems and needs.

The understanding of waterfront regeneration varied by different urban approaches that should define the areas or territories differently. So, for example, in some approaches it is local authority that being involved in the process with the view to achieving urban quality and economic wellbeing of residents and in order to make cities more competitive. In others it is local community or neighbourhood that are being involved in waterfront regeneration process to achieving practical initiatives and even particular local projects. Much has focused on discussion of such particular projects or of a series of case studies of best practice.

In a changing city improving urban quality and reinforcing urban dynamics is a challenge for urban communities everywhere. Across the world, great cities are regenerating and transforming their waterfronts. Successful results can be seen in London, Amsterdam, Barcelona, Lisbon and in a number of American cities.

Therefore, working in partnership with local authorities and local communities new waterfront visions can be created for great waterfront transformations to be taken into consideration.

The following aspects were particularly supported: Making waterfront urban spaces more attractive; Giving character and identity; Improving public access and connectivity prioritising pedestrian and cycleways; Designing for landscaping, protection and safety.

It is stressed that one of the main planning and design goal is to understand needs and opportunities for a proper waterfront use by introducing focal points that can provide a mix of activities for residents and visitors. The new regenerated waterfront locations can also establish links into adjoining neighbourhoods and create new cultural and social opportunities. Additionally, sustainable design for waterfronts means responding to environmental issues, social responsibility and economic development that can encourage people to live, work and enjoy in such areas.

In this book, the ecology and importance of the planning and design of green spaces and especially of pocket parks is described in many of the reviewing proposals and projects. Waterfront pocket parks would offer quiet places for people to sit and relax as well as plenty of places to be connected with water that can positively reflect to nowadays cities. The trend appears to be continuing and perhaps even accelerating with major designing and community assets.

A wide range of design ideas to resolve various waterfront topics were also identified that can help to give a general information on a number of waterfront key topics. In this context, all faced waterfront issues, they are not intended as a comprehensive list but rather as a set of some essential ideas that can help to achieve more with waterfront regeneration efforts.

Finally, most of the explored issues are still open to a more flexible thinking and discussion and the INTEGRO UAD is working to further develop urban waterfront matters.

Dimitra Babalis
Editor in Chief

INTRODUCTION

Waterfront Challenges for the Contemporary City

Dimitra Babalis

In the last decades, Contemporary City has undergone great changes that have strongly influenced its urban structure and image.

The growth tendencies that have characterised the planning processes of the past has helped to create an hybrid urban condition that revealed important for a significant change of city's urban environment.

Consequently, human and environmental resources need to be protected in order to meet the peoples' needs without compromising the ability of future generations as is established by the sustainable development theory since the Brundtland Report in 1987 and its confirmation later on with the Agenda 21 in Rio de Janeiro.

On the other hand, the recent economic crisis is experiencing a period of profound uncertainty from both urban and social point of view. For instance, the segregation phenomenon, constantly increasing, has contributed to the development of sub-cultures that have hostile attitudes to the rest of society. Additionally, environmental changes related to climate change and resource consumption, create serious problems from ecological and macro e micro climate point of view. In so doing, we have an increase frequency of extreme weather events (heat waves, major rainfall, etc), strongly damaging natural ecosystems and biodiversity.

Further, it is changed the role of public urban space as only space of socialisation. A new conception of open space that leaves the task to individuals to fulfill positive spatial functions has characterising the Contemporary City. The creation of new urban places have now to deal with the community to meet peoples' needs.

The future of Contemporary City depends, therefore, on the ability of those who live in it and mostly for those that should plan and design it and should facilitate its adaptation to underway sustainable urban changes.

Consequently, it is necessary to act on urban space regeneration with alternative strategies and projects and under the concept of sustainability and urban resilience. The new models of intervention they should consider a variety of social conditions, a variety of contexts and different urban spaces and they should act at different scale of intervention.

Contemporary City needs a new integrated approach and capable on guiding the today's urban change.

A starting point for urban regeneration and urban resilience should be considered within abandoned and derelict areas in both inner and outer urban areas. New concepts and methods in designing public space has to consider more than social inclusion but environmental enrichment and new opportunities for both city and people.

In this context, the future direction for Contemporary City should consider waterfront regeneration and heritage, waterfront aspirations and priorities schemes for intervention. To this end, planning policies and strategies should identify core waterfront sites that can drive design towards deliverable major interventions as well as small scale interventions while preserving cultural heritage.

The redesigning of derelict and abandon urban waterfronts is clearly meant to encourage ecological and sustainable urban change. In this respect, waterfronts should highlight potentialities improving waterside environment and reviewing emerging nodes that can add value and aware for a successful waterside design process. To do so, urban watersides can be considered as attractive places for wellbeing and sociability. Improving waterfronts can enhance integration of land and city's accessibility and connectivity. Further, can create new opportunities, re-configuring the image and identity of the city and offering a range of regenerated public open spaces.

These include:

- Adapting to climate change and to smart technologies
- Creating a walking/cycling culture
- Re-imaging working and living places.

Macro and micro urban design, therefore, attempts to propose projects that can give a new characterisation of urban space while their urbanity can offer solutions that should based on more specific criteria of ecological and sustainable management.

In response to climate change, many waterfront proposals seek to respond and promote sustainable development in a variety of ways by:

- Improving water quality and aquatic habitat restoration, where applicable
- Greening the waterfronts by upgrading, creating and linking new and existing parks and greenways to support biodiversity
- Promoting sustainable design and building development including energy use and waste minimisation
- Developing and implementing strategy for risk and urban resilience.

A main goal of urban waterfront regeneration is where a place can express cultural heritage and history. So the protection of cultural heritage can preserve local character including urban form and highlighting legacies.

Finally, the following questions to be put are:

- How can urban waterfront change contribute to tackling environmental challenges while preserving cultural heritage and improving urban environment?
- How can urban waterfronts serve to exchange ideas, information and cultural happenings?
- How can changing waterfronts and changing landscapes contribute to changing economies?

Structure of the book

PART 1 - *Advancing Riverfront Regeneration*

Urban Waterfronts and relations between urban spaces and social dynamics are the topic of planning and design in order to revitalise and re-appropriate urban environment; To restore and define urban form; To re-locate new uses and functions; To guarantee accessibility and interaction of waterfront places; To integrate nature and culture with social relationships.

Chapter 1 - *From River to Riverfront. Sustainable Masterplans and Connected Waterfront Urban Spaces along the Southside of the River Arno in Florence* by Dimitra Babalis. This chapter attempts to establish concepts and methods on urban change for a new dynamism on waterfronts and the creation of new urban scenarios. The Methodology undertaken is to propose a Waterfront Master Vision that should consider the importance of waterfront regeneration of sites in accordance of their location, historic, cultural and environmental values. The waterfront regeneration addresses the issue of core elements such as sustainability, urban quality, environmental improvement.

The River Arno in Florence is a fascinating example of designing with an edge, which in the past was a route of great importance but also a great risk for the City and people. Currently, the River has been poorly maintained, under-utilised and has lost its strong connection with the City. The riverfronts therefore offer an exciting opportunity to revive the contexts and reinstate the historic relationship with water and the City.

The focus is on defining the new role of the River and urban strategies for the creation of new urban spaces with a combination of high quality forms and uses. It is taking into account that the latest City Plan did not set a comprehensive vision for the River Arno while UNESCO urgently calls for a re-consideration of riverfront's risks and the need for detailed site-wide strategies that underpin re-connection with the Florence city centre. In this respect, the proposed Waterfront Master Vision should highlight potentialities and risks, improving waterside environment and reviewing emerging nodes that can add value and aware for a successful land-side design process. The master vision should put strategies identifying central points to transform through good design. Many of the concerns should be relating to the waterfront facilities, well-being, spatial and safety issues. At the same time, the re-connection, accessibility, pedestrianisation and use of green and temporary structures to control rivers' risks can guarantee quality of urban life.

This chapter contains two main sections: The first part includes general waterfront concepts while the second part describes the River Arno's proposed masterplan for future opportunities. The design concepts provide a review of the major problems that arose across the Southside of the River. Finally, a proposed Waterfront Master Vision has to become the basis for a good urban design strategy, an action river plan that will call for revitalisation of Florence riversides. It will identify a network of open spaces and pocket parks that can improve connectivity, social inclusion and environmental benefits.

Chapter 2 - *Industrial Riverscapes and Climate Change in the Dutch Delta Area. Ecological Resilient Strategies: Coping with the Future Noord River's Urban Waterfront* by Irene Curulli presents the Delta River area of The Netherlands. The area is characterised by the streambeds of the rivers Rhine and Meuse

that will undergo to spatial adaptations according to the implementation of the measures required by the National Delta Program (2010). The aim is to prevent future flood disasters consequent to rising water level due to climate change. In the past, the river edges of the Delta area hosted different manufactures such as: brick factories, shipyards and small harbours for recovery and trading. The rivers were the industrial 'highways' for the shipment of goods and raw material for production. Adaptations and integrations of the river edges were carried out during the centuries, giving shape to a unique maritime heritage and urban landscape that is embedded in the river history. Moreover, many Dutch cities, e.g. Dordrecht, flourished thanks to their location close to the rivers. Nowadays, many of these urban areas and water-related industrial sites are in danger.

This chapter focused on the specific Noord riverfront area that it connects the city of Dordrecht and Kinderdijk (UNESCO Heritage site, 1976) that is characterised by unique wetland areas and its industrial heritage. The Noord River area has potentiality to become a cultural and naturalistic route for local citizens and tourists that daily take the water route to reach their work or to visit the UNESCO site. The research on the Noord area is carried out at the Department of the Built Environment at the Eindhoven University of Technology. It aims to show how water dynamics and ecological resilient strategies of design can coexist and can safeguard the cultural heritage of the River. Moreover, it illustrates how water can be a creative source for regeneration, inspiring sustainable design. Finally, is shown an insight into the spatial structure of the Delta area, its historical changes and is analysed the former industrial-shipyard area, along the Noord River. It is also shown experiences of water-resilient design strategies providing new urban scenarios.

PART 2 - Outlining Blu-Green Opportunities

Proposing inclusiveness of urban spaces and places with promotion of sociability and enjoyment, integrating cultural and economic values, health and wellbeing are developed together with the concept of urban resilience and urban quality. Specifically, are taken into consideration waterfront landscapes with a great potentiality for regeneration and understanding of project methods and design principles that have also to be based on ecological, sustainable and smart design solutions.

It is also recorded consequences of human decisions and actions that led to the extinction of surface flows that gradually deteriorated quantity and quality of water and changed gradually urban scenarios.

Chapter 3 - The Waterfront Urban Space of the Argolic Gulf in Greece. Functional and Aesthetic Upgrade and Sustainable Development by Helen Maistrrou stresses a part of a design study which deals with functional and aesthetic upgrade on the Nafplio's waterfronts which lies at the tip of the Argolic Gulf in the Eastern Peloponnese in Greece. The Nafplio-Nea Kios waterfront area runs for approximately 6 km and it disposes some interesting features, offering exceptional features of a seaside wetland which concentrates rare flora and fauna species. Further, important historic and archaeological sites lie in the surrounding coastal zone and historic rivers which flow into the Argolic Gulf. The chapter aimed to formulate design proposals for the protection of the natural environment, for the promotion of the region's historic features, for

the connection of the coastal zone with the functions of the urban space of the adjacent areas and for the region's sustainable economic development. The waterfront regeneration can become an important cultural axis, having environmental, historic and regional value. The zone can contribute on one hand to the sensitisation of the local population in matters of cultural heritage and environmental protection, and on the other to the reinforcement of specialised tourism. Finally, the study proceeds with a pilot design for a sensitive part of the area proposing light-frame constructions to cover the need for movement and pause while allowing activities for bird watching and biodiversity.

Chapter 4 - *Surface Water Flows Management and Change of Urban Landscape in Thiva* by Ismini Kourouni presents the study of the water flows' management in the urban landscape of the city of Thiva, in Greece. The chapter initially highlights the role that the water has played in the establishment and development of the city. The rivers and streams were reasons for the choice of this specific place for habitation. These were for many centuries the main water supply source and main factor for agricultural and economic prosperity. Further, the plain was irrigated, watermills and many laboratories were operating. The water element also determined significantly the culture of the city of Thiva.

During the 20th Century, the quantity and quality of water have been gradually deteriorated and as a consequence its importance to the operation and development of the City has been underestimated. This research study attempts to record human decisions and actions that led to the extinction of surface flows. Permanent removal occurred during the 1980s after the decision on integrating them into the sewer network. At the site of Dirce River the Highway Elefsina - Thiva was formed. An outdoor market operated at the Northern Region of Chrysorroa Stream and the remaining space was used arbitrarily as a parking area. In Ismenos River no configuration performed, a part of it was covered by Oplarchigos Voglis street.

The chapter indicates the negative effects of the coverage of rivers and streams for the City and people. The consequences are not only related to the environmental and economic context. Many features of landscape, such as fountains, arched aqueducts and bridges have been lost. The urban fabric suffered significant changes by the removal of partial landmarks and the elimination of pathways associated with crossing regions of rivers. The social activity in public space was affected too. Finally, the chapter highlights contemporary ways of addressing existing negative conditions and converting them into opportunities for sustainable urban operation. Various methods are drawn from abroad and are related to applied programs. Especially, for the area of the city of Thiva, the recently implemented project of highlighting the stream of Chrysorroa is further analysed. With regards to the entire water network, the research study records the prospects and difficulties for sustainable management.

Chapter 5 - *Urban Bluespace for Human Flourishing* by Tim G. Townshend focuses on urban waterfront development as an essential aspect of human history. In the era of the industrial city, waterfronts were centres of industrial development and commerce. Such waterfronts, however, became effectively disconnected from the cities they served, due to the security needed

around port facilities and the pollution that accompanied industrial activity. Subsequently as ships increased in size - demanding deeper water and port facilities required greater areas of land - industry, transportation and port facilities increasingly relocated away from central locations and ageing 19th Century infrastructure. Historic waterfronts became abandoned, sites of dereliction and obsolescent buildings.

The chapter, analysed the transformation in waterfronts and the role that waterfronts and urban 'bluespaces' more generally contribute to urban living in the 21st Century. Clearly those willing to pay a premium to live and work next to waterfronts derive a benefit from their locale, but what does that benefit consist of? There is a burgeoning academic literature on waterfronts from a whole range of perspectives, economic, environmental and social. However, only relatively recently have more direct links between water bodies and human health and wellbeing been examined.

PART 1

Advancing Riverfront Regeneration



From River to Riverfront. Sustainable Masterplans and Connected Waterfront Urban Spaces along the Southside of the River Arno in Florence

Dimitra Babalis

Waterfronts as an edge environments are of great complexity and potentiality. As related to human history and use, waterfront environments have a long history of changing types and levels of public uses. In the past they have long served as transportation corridors, recreation and general enjoyment, places for industrial activities, port and military areas etc. But, throughout centuries changing land-uses brought directly to the decline and decay of large waterfront places. Nowadays, the challenges for designing waterfronts with significant urban issues is clearly to encourage both public and private investment and guide to ecological and sustainable urban regeneration.

The methodology to waterfront regeneration is to propose a waterfront master vision that should consider the importance of waterfront sites in accordance to their historic, cultural and environmental values. So, urban waterfront regeneration addresses the issue of core elements such as sustainability, urban quality, environmental improvement, urban resilience.

This chapter shows how the creation of a master vision can set out a delivery strategy to guide local authority and designers on future riverfront actions. Further, the chapter investigates on how close working between

public and private sectors is vital to obtain objectives and secure quality of urban form. It attempts to establish concepts and methods on urban change for a new dynamism on waterfronts and the creation of new urban scenarios. A proposed comprehensive Waterfront Master Vision has to become the basis for the creation of an Urban Design Strategy that can call for revitalisation of Florence riversides. Moreover, specific proposed Masterplans have to recognise strategic sites and value of existing while proposing well-connected urban spaces that can improve connectivity, social inclusion, urban and environmental benefits.

Specifically, the chapter contains two main sections. The first one undertakes general urban waterfront regeneration concepts and types of waterfront policies and strategies. The second one is on the River Arno's waterfront descriptions and future opportunities. The design concepts provide a review of the major problems that arose across the riverbanks giving sustainable ideas and design solutions.

Designing urban waterfronts

Water in the past played an essential role for water transportation and trade.

The Sjovik waterfront square in Stockholm to regenerate the place and increase public open space. The long sunset platform was designed to give a more urban character along the river's edge. Design sketch and Plan by ©Thorbjörn-Andersson with Sweco Architects (source: <http://www.landezine.com>).

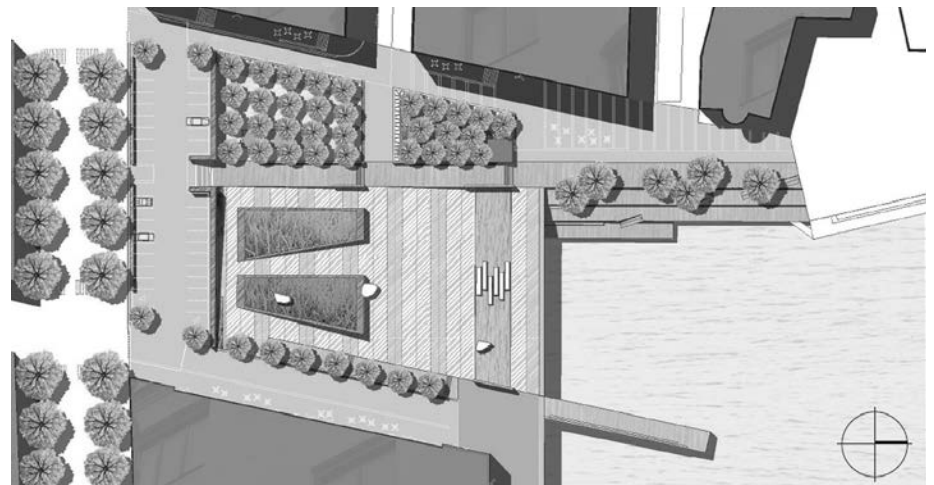
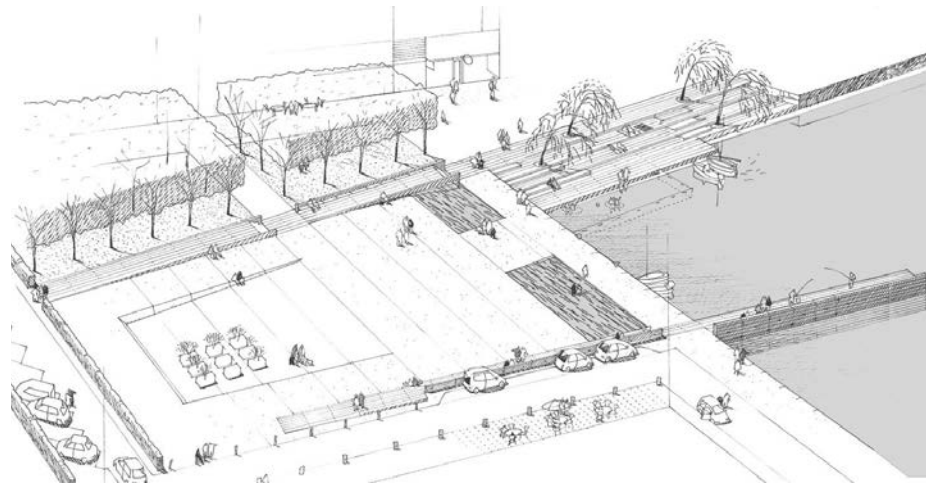
The waterfronts throughout centuries created a variety of important waterfront patterns. With the increase of economic activities the most of waterfronts became rapidly places of several industrial activities. Thereby, growing port activities started to need new areas and waterfront areas largely lost their importance and be abandoned. As a result many waterfronts such as old ports, railways, industrial areas felt into disuse and became neglected and inaccessible.

Nowadays, the interest for waterfront regeneration phenomenon includes re-discovering new methods for planning and design to re-connect waterfronts with the city, to re-create urbanity, to re-gain public use and access, to re-think places' safety. But the most interest factor to be considered in the planning process

is to revitalise economy along water-side spaces and places. Additionally, increasing urban quality is to contribute to preserve heritage culture, to increase recreational areas and to re-create urban connections. It is well-known that waterfront urban regeneration varies according to different contexts and sites and waterfront intervention can include seafronts, riverfronts, canal sides and other water landscapes.

These include:

- New mixed use residential developments within industrial waterfronts
- Urban regeneration of large port areas including reuse of old docks, warehouse, depots, old railways etc
- Urban waterfront connected pedestrian and cycle paths along watersides
- Seafront leisure, sport and recreational areas and other facilities



- Riverfront regeneration opportunities and connected public open spaces
- Waterfront green areas and strips for biodiversity and flood defense.

In recent years it is argued that urban change has difficulties of attempting a single cause of an urban problem (ROBERTS P. AND SYKES H., 2005, p 24)¹ as many change issues are reflecting on the contemporary city. So, before facing urban change it is important to understand differences of urban contexts and social and economic change on them. Identifying key elements for urban change can give a wider view on urban regeneration. This suggests that while dealing with waterfront regeneration it is important to consider diversity of a context, spatial policy that is needed to reach the goals and design different challenges and opportunities.

In such way, urban waterfront regeneration should take into account environmental change, social and economic resilience. Respecting the above purposes urban waterfront regeneration can bring a balance on urban context and benefits to local community. These include:

- Preserving cultural heritage and re-use of old industrial buildings, old barracks etc.
- Creating opportunities for new uses and activities
- Making new mixed use urban quarters and providing new working places
- Increasing property value and creating new economic opportunities
- Improving management of blue green environment, water quality and biodiversity
- Connecting inner and outer urban areas and creating urbanity
- Re-creating new relationships between watersides and the city
- Improving urban quality, accessibility and sociability.

But urban waterfront regeneration can create also some negative effects such as:

- Lack of strategies and policies to respect new urban requirements
- Lack of masterplanning approach, essential for long-term transformation
- Lack of identity and standardisation of urban change models
- Lack to resolve environmental quality and flood risks

- Lack to resolve social resilience and community issues.

GIOVINAZZI and MORETTI (2009)² summarised the 10 principles for a Sustainable Development of Urban Waterfront Areas, elaborated years ago by the 'Centre Cities on Water' in collaboration with the 'German Company Wasserstadt' in the framework of several international seminars.

According to the authors the following 10 principles are recently revised and have been adopted by several local authorities such as:

- Secure the quality of water and the environment
- Waterfronts are part of the existing urban fabric
- Historic identity gives character
- Mixed use as a priority
- Public access is a requirement
- Planning in public private partnerships speeds the process
- Public participation is an element of sustainability
- Waterfronts are long term projects
- Re-vitalisation is an ongoing process
- Waterfronts profit from international networking.

Specifically, urban waterfront regeneration can increase public space use which link good urban design purposes together with creative and environmental solutions. Designing for waterfront sites is strongly recommended to encourage site-specificity and interrelationships with community.

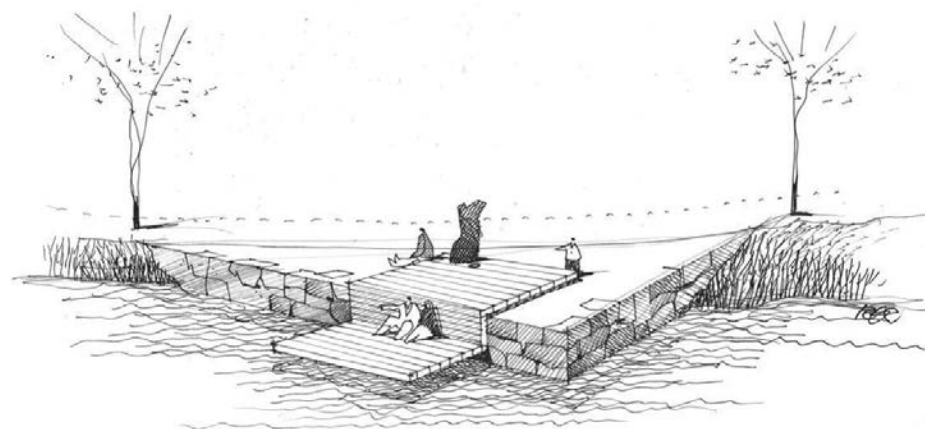
PROJECT FOR PUBLIC SPACE point out 9 steps recommendations (PPS 2009a)³ to be taken into consideration while creating waterfront transformation

A concept sketch to design a system of sunset boardwalks in the Sandgrund Park in Karlstad, Sweden ©SWECO Architects (source: <http://www.sweco.se>).

¹ ROBERTS P., SYKES H, (2005), *Urban Regeneration. A Handbook*, Sage Publications, London, p.24.

² GIOVINAZZI O. & MORETTI, M. (2009), *Port Cities and Urban Waterfront: Transformations and Opportunities*, in TeMA-Lab Journal, Vol.2, N.3, (2009) available at: <http://www.tema.unina.it/index.php/tema/issue/view/15>, (accessed: 25.01.2017).

³ PPS, PROJECT FOR PUBLIC SPACE (2009a), *9 Steps to Creating a Great Waterfront*, available at: <https://www.pps.org/reference/stepstocreatingagreatwaterfront>, (accessed: 20.07.2016).



Sandgrund Park in Karlstad, Sweden has undergone a major transformation from being an unused peninsula of sand into an attractive park in the middle of the City. The new park offers viewpoints and extensive boardwalks by the Klar River (source: <http://www.sweco.se>).

The long viewing platform with sunset boardwalks along the Klar River for sociability and vitality ©SWECO Architects (source: <http://www.sweco.se>).

and in case of sustainable public space use:

- Look first at the public space
- Make sure public goals are the primary objective
- Build on existing assets and context
- Create a shared community vision for the waterfront
- Create multiple use destinations
- Connect destinations along the waterfront
- Maximise opportunities for public access
- Balance environmental benefits with human needs
- Start small to make big changes.

Additionally, PROJECT FOR PUBLIC SPACE (2009b)⁴ outlines the following principles to make waterfront transformation resilient public spaces:

- Encourage 24hour activity by limiting residential development
- Use parks to connect destinations
- Design and program buildings to engage the public space
- Support multiple modes of transportation and limit vehicular access
- Integrate seasonal activities into each destination
- Make standalone, iconic buildings to serve multiple functions.

In short, sustainable waterfront management should be incorporated into a structured vision for the waterfront as a whole. In addition, a walkable waterfront with good public accessibility is the key to achieve continuity and cycle and pedestrian connectivity allowing mixing uses. Creating connections also means preserving existing, revealing potentiality to the adjacent areas.

Moreover, a range of uses and activities should be identified and defined at each waterfront place in order to create diverse, ensuring quality of place.

Urban waterfront regeneration and urban acupuncture as a strategy to undertake the process

HEALEY (2007)⁵ consider strategies as devices for focusing attention. If strategies are used to shape urban design they have a real impact on the potentialities of the urban areas. Healey argues that “spatial strategies focus attention on the ‘where’ of activities and values, on the qualities and meanings of places, on the flows that connect one place to another and on the spatial dimensions of the way activities organised”. Healey confirms that what gives spatial strategy a significant contribution are the ‘geography matters’ (MASSEY ET AL, 1984)⁶ but introduces cultural identity affirming the prospective of a ‘relational geography’ meeting the tensions between a ‘geography of physical patterns’ and a ‘geography of relational dynamics’.⁷ Considering ‘relational dynamics’ of spatial strategies for urban areas is important to delineate how one place is possible to create connectivity to other places.

Urban acupuncture is an eco-friendly urban planning strategy that combines theory of urban design with conception of acupuncture technique of traditional chinese medicine⁸. This design process uses small-scale interventions to possibly transform extensive urban contexts.

⁴ PPS, PROJECT FOR PUBLIC SPACE (2009b), *How to Transform a Waterfront*, available at: <https://www.pps.org/reference/turnwaterfrontaround>, (accessed: 20.07.2016).

⁵ HEALEY P., (2007), *Urban Complexity and spatial strategies, Towards a relational planning for our times*, Routledge, London p.201.

⁶ MASSEY D.,(1984), *Spatial divisions of Labour*, Macmillan, London.

⁷ HEALEY P., (2007), *Urban Complexity and spatial strategies, Towards a relational planning for our times*, Routledge, London p.203.

⁸ https://en.wikipedia.org/wiki/Urban_acupuncture, (accessed: 27.11.2015).



The sites under intervention are well-chosen after a comparative analysis form social, ecological and economic point of view and is often developed by a clear interaction between designers and community. The strategy, therefore, consider cities as living organisms that sustainable projects can act to revitalise selected core areas by designing well-connected micro urban spaces. The most of the selected sites are localised on those nodes that present the greatest possible regenerative value.⁹ Every citizen is able to join the creative process of participatory planning and feeling free to use the urban space for several proposed purposes in order to develop the proper environment but according to the community needs. The urban acupuncture is often focuses on private resources rather than on public ones and generally promotes the idea of citizens who often democratically realised urban interventions. In short, urban acupuncture theory, in fact, proposes small scale urban spaces and low cost projects, where city needs to be regenerated.

Originally coined by Manuel de Sola Morales, the term urban acupuncture has been further developed by the Finnish architect and social theorist MARCO CASAGRANDE.¹⁰ In a period of economic crises this design tendency could democratically and economically offer wider regeneration opportunities. Casagrande considers the city as human organism that its complexity is presented at the different levels of urban context, significant for local people's actions. Specifically, urban acupuncture concept was developed within the 'Tamkang University in Taiwan' at the 'Center of Multidisciplinary Research Academy' and was focused on environmentalism¹¹ and urban design theories. Casagrande defines the urban acupuncture as a design tool where small interventions can contribute to sustainable urban development, with specific reference to the city of Taipei.¹² Finally, Casagrande describes the urban acupuncture as a cross-over urban collective process of a city's intellect. it aims to dealing with natural resources, understanding city's sensitivity, developing people's energy and making a reaction on core urban nodes.¹³ This planning and design methodology

⁹ The term 'urban acupuncture' has been recently developed by Finnish architect Marco Casagrande. This school of thinking prefers local innovative projects within a community approach to massive and extensive transformation projects. In a period of great restrictions of budgets and limited economic resources can be a way to restore democratically and economically the city. Urban acupuncture can regenerate 'urban pressure' to the wider city. Urban acupuncture is likely presented as a sustainable urban regeneration method that highlights a long-term planning and design, especially in existing and sensitive built environment. Available at https://it.wikipedia.org/wiki/Agopuntura_urbana (accessed 27.11.2015).

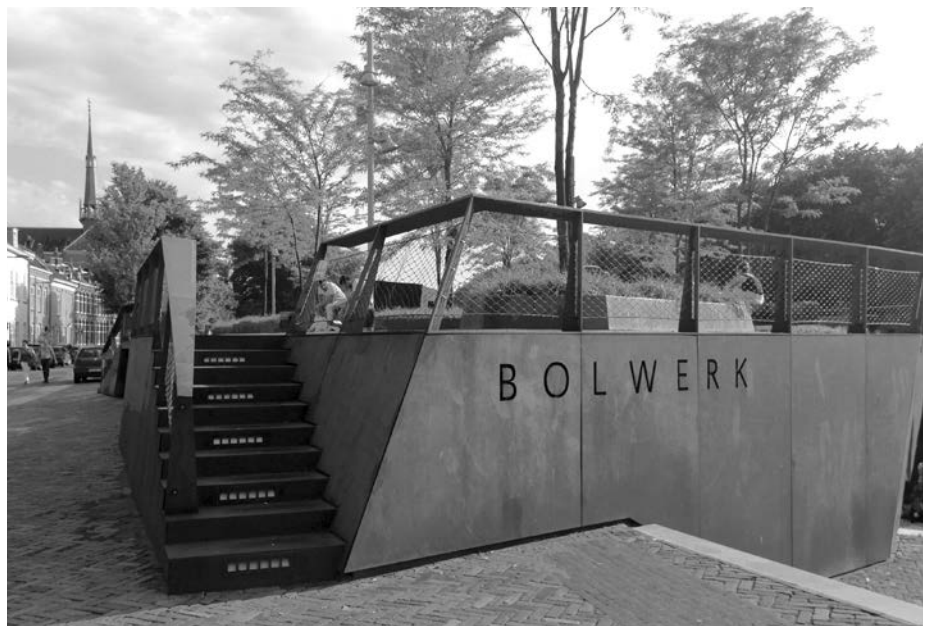
¹⁰ CASAGRANDE M., (2013) *Urban Acupuncture*, available at: <http://helsinkiacupuncture.blogspot.com>, (accessed: 27.11. 2015).

¹¹ The term 'Environmentalism' advocates to balance relations between humans and natural environment

¹² Ibidem.

¹³ Ibidem.

's-Hertogenbosch in the Netherlands. Riverfront regeneration for relax and sociability (photos by D. Babalis).



London and the 'More London Pocket Park' located between London Bridge and the City Hall on the South bank of the Thames. The landscaping includes green strips, tree planting and water features to create a lively social environment on the riverside (photo by D. Babalis).

¹⁴ LERNER J., (2003), *Urban Acupuncture*, available at: <http://politicheurbane-pcta.blogspot.it/2010/11/jaime-lerner-agopuntura-urbana.html>, (accessed: 27.11.2015).

¹⁵ CHRIS R., (2013), *Eco-Acupuncture: designing and facilitating pathways for urban transformation*, for a resilient low-carbon future *Journal of Cleaner Production*, Vol. 50, pp 189–199, available at: <http://www.sciencedirect.com/science/article/pii/S0959652612006221>, (accessed: 31.1.2017).

¹⁶ See 'pocket park' available at: https://en.wikipedia.org/wiki/Pocket_park, (accessed: 31.11.2016). Urban resilience has conventionally been defined as the "capability to prepare for, to respond to, and cover from significant multi-hazard threats with minimum damage to public safety and health, the economy, and security, available at: https://en.wikipedia.org/wiki/Urban_resilience, (accessed: 20.01.2017).

¹⁷ 'Urban resilience' has conventionally been defined as the "capability to prepare for, to respond to, and cover from significant multi-hazard threats with minimum damage to public safety and health, the economy, and security", available at: https://en.wikipedia.org/wiki/Urban_resilience, (accessed: 20.01.2017).

¹⁸ "Understanding how sense of place develops and changes is relevant to understanding how people interact with their environment in general and considering how this interaction may become more sustainable", available at: https://en.wikipedia.org/wiki/Sense_of_place, (accessed: 20.01.2017).

appears more responsive to the community needs in respect of traditional planning schemes of a large-scale urban interventions. It permits a deeper understanding of how city planning process can easily manage small urban sites that can generate strategic design.

At the latter, urban acupuncture thinking belongs to JAIME LERNER, former Mayor of the City of Curitiba.¹⁴ LERNER (2003) stresses that designing in small urban areas helps to re-evaluate the wider ones. Small interventions, in fact, they do not need large funding and, therefore, it is easier to reach sustainable actions in a short time and well-connected spaces in urban environment. Furthermore, acting with micro-interventions into core urban contexts can positively effects the surroundings areas. So, such places can become fertile grounds for better urban quality, wellbeing, sense of belonging for a new trajectory of development to a resilient low-carbon future. Lerner and other scholars consider urban acupuncture not only a micro-space intervention but also a consciousness urban action that would stimulate knowledge and culture in the city. A latest ecological design approach introduced the eco-urban acupuncture¹⁵ that has to be considered as a new

way of thinking for small-scale interventions in order to achieve wellbeing and sustainability.

Finally, urban acupuncture is likely presented as a sustainable urban regeneration method that highlights a long-term planning and design, especially in existing and sensitive built environment. Accordingly, the design of a number of 'pocket parks' advocates a methodology approach to be taken into consideration within the urban waterfront regeneration.

Waterfronts and pocket parks for well-connected public spaces

Pocket parks¹⁶, or vest-pocket parks, mini-parks, or pocket gardens, are small green areas recognised as a type of urban public spaces, usually located in residual urban areas for direct initiative of a community or for a choice of a local authority. General characteristics of these spaces are the small size, 'lot-size' for community recreational activities.

A pocket park can be of various typologies such as: playgrounds, small green spaces, spaces for temporary use or small business places for special events. The types are depending of the context in which they are located and the dynamics that led to the definition of a place and the people's need.

The pocket parks are, therefore, of small-scale urban design conception, in between places of public and private dimension, capable to promote physical improvement and social interaction among people. They are flexible spaces that can absorb small scale urban transformations and are an expression and cohabitation of social diversity.

The sustainable regeneration of public space by definition requires the direct involvement of local people as well as requires environmental approaches, essential for urban resilience¹⁷. At this point, it is important to emphasise that public spaces should be considered as places to achieve a 'sense of belonging'¹⁸.

On the contrary, proposed waterfront projects have to be underlined by a master vision but able to consider





Parco dell'Albereta - Acquedotto dell'Anconella

Lungarno Aldo Moro - Parco Bellariva e impianti sportivi



Parco dell'Albereta - Acquedotto dell'Anconella

Lungarno Aldo Moro - Teatro Obi all



Parco dell'Albereta - impianto sportivo Anconella

Lungarno zona Virlungo



Nave a Rovezzano - impianto sportivo Albereta San Salvi

Lungarno zona Virlungo



Nave a Rovezzano

Rovezzano - Palestra Virgin



Nave a Rovezzano

Rovezzano



OPPOSITE PAGE

Photos and sections along the Southsides of the River Arno in Florence.

small-scale design elements that can structure sites under transformation. Consequently, physical expression of a waterfront pocket park should also be built on a social and cultural dimension. In this context, the typology of a waterfront pocket park can be an active tool to re-create urbanity, quality of public space and urban resilience.

The River Arno and its great potentiality to urban change

The River Arno in Florence is an attractive example of designing with an edge that in the past was a route of great importance, an area of several everyday activities but also a great risk for the City and its people. Along the Centuries the River Arno shaped the urban form of Florence offering many public spaces on both river banks for leisure, sport and cultural events. In addition, in many parts of the River Arno several urban structures as gardens and parks were formed and some residential areas were shaped giving urbanity within the riverfront. Currently, the River has been poorly maintained, under-utilised and has lost its strong connection with the City. The riverfronts, therefore, offer an exciting opportunity to revive the contexts and re-establish the historic relationship with the water and the City.

The focus is on defining the new role of the River and urban strategies for the creation of new urban spaces with a combination of high quality forms and uses. Unfortunately, the latest Florence City Plan did not set a comprehensive vision for the River Arno.

On the other hand, UNESCO¹⁹ urgently calls for a re-consideration riverfront risks and the need for detailed site-wide strategies to underpin re-connection with the city centre²⁰ and the wider city. However, knowledge, awareness and project temporalities are the key words for an appropriate and meaningful management of the River Arno and the surrounding areas. The planning process should act for a waterfront master vision that would allow for sustainable and smart solutions and actions, well-coordinated and well-organised for both River's environment and peoples' benefits.

It is necessary to act sensitively in order to face water risks and vulnerability of the soil together with environmental and landscape issues.

In this respect, recommendation for a proposed waterfront master vision should highlight potentialities and risks, improving waterside environment and reviewing emerging nodes that can add value and aware for a successful land-side design process. The waterfront master vision should put urban strategies, identifying central sites to be transformed through good design.

It should be essential for waterfront places to be revitalised including open space strategy to illustrate how to achieve this vision. Many of the concerns should be relating to the waterfront facilities, well-being, spatial and safety issues. At the same time re-connection, accessibility, pedestrianisation and use of green and temporary structures to control rivers' risks while guarantee quality of life should be considered.

A proposed Waterfront Master Vision and waterfront priority issues

A Waterfront Master Vision for the River Arno is proposed in the framework of some specific studies and researches²¹, essential for an effective regeneration and development of both sides of the River.

To achieve a good Waterfront Master Vision in order to balance sustainability, urban resilience and quality it is essential to set some important waterfronts goals such as:

- *A blue-green riverfront*: A sustainable place that should preserve its natural resources, to minimise environmental impact and to respond to climate change
- *A connected riverfront*: A place that is highly accessible to get and to move around. A well-connected place with the wider city by improved pedestrian and cycling linkages
- *A liveable riverfront*: A vibrant place for both residents and visitors with safe and attractive open spaces; with accessibility to local services and facilities
- *A smart riverfront*: An innovative and attractive place for waterfront activities.²²

¹⁹ COMUNE DI FIRENZE, *Firenze Patrimonio / Florence world heritage*, Available at: http://www.firenzepatrimoniomondiale.it/wp-content/uploads/2015/11/opuscolo_FI_World_Heritage.pdf, (accessed: 20.01.2017).

²⁰ Florence City Centre has been included within the UNESCO World Heritage List since 1972.

²¹ *Waterfronts and Eco-sustainable Urban Management* research is developing at the University of Florence under the coordination of DIMITRA BABALIS. This chapter shows some results of a work-in progress research that also has seen the involvement of students within the "Urban Design and Eco-sustainable Urban Design Laboratory" (A.A.2015-2016), coordinated by the author.

²² See AUCKLAND COUNCIL, AWD (Auckland Waterfront Development Agency Limited), *Waterfront Plan*, available at: www.waterfrontauckland.co.nz, (accessed: 20.1.2017).

The proposed Waterfront Master Vision should involve a number of planned actions and good investment of many parties from both public and private sector and other organisations. In this respect, Florence City Council should play a significant role in implementing the Waterfront Master Vision throughout sustainable masterplans. By funding and leading the delivery of a number of waterfront urban space projects, these actions should be considered as key social, economic and environmental drivers for the City.

The key South riverfront urban spaces: Gavinana and Varlungo Districts

According to the latest Florence's 'City Structural Plan'²³, Gavinana and Varlungo district areas are both corresponding to the Planning Area UTOE 3²⁴. The City's Structural Plan strategy within the above Planning Area, in fact, includes regeneration of the two urban quarters with connectivity priorities of the existing pedestrian and cycling paths along the left and right banks of the River Arno; The upgrading of some main roads and the proposal for the construction of a tramway to connect the urban areas with the city centre; The enhancement of existing green waterfront areas and the creation of park areas.

Moreover, the City Structural Plan has provided important information regarding constraints related to riverfront protection by hydraulic hazards; Constraints related to the preservation of the existing cultural heritage and the choice of some public open spaces to be transformed.

In addition, the Local Authority within the current 'City Planning Regulations' (RUC 2015)²⁵ has identified a number of 'Areas of Transformation, (AT)²⁶. Although, the City's planning system gives useful information on the existing areas in transformation and helpful to evaluate public intentions and future needs, the RUC does not give clear and specific design purposes for waterfront places and spaces. There is no clear masterplanning process for the 'in between' riverfront spaces and the existing parks.

²³ COMUNE DI FIRENZE, *Piano Strutturale 2010 (PS)*, available at: <http://pianostrutturale.comune.firenze.it>, (accessed: 31.1.2017).

²⁴ According to the *City Structural Plan (PS)* every UTOE Area is a planned area/district. Florence City's Structural has been divided into several UTOE planned Areas each with the proper planning regulations. UTOE 3 is an area of 6,38 kmq, 58.070 inhabitants, density 9.102 inh/kmq.

²⁵ COMUNE DI FIRENZE, *Regolamento Urbanistico (RUC)*, available at: <http://regolamentourbanistico.comune.fi.it>, (accessed: 31.1.2017).

²⁶ AT: 'Areas of transformation' are identifying as the main planning tool to urban regeneration introduced by the *City Regulation Plan (RUC 2015)* in COMUNE DI FIRENZE, *Regolamento Urbanistico (RUC)*, available at: <http://regolamentourbanistico.comune.fi.it>, (accessed: 31.1.2017).

A proposed Waterfront Master Vision Scheme to the Southside of the River Arno in Florence. Proposals are planned to give a more sharper profile along both river's shores. The closeness to the City and the abundance of space along the central settings of Gavinana and Varlungo riverfront areas are obvious powerful places to work with.



Planning concepts for Albereta Park Area, Anconella Aqueduct Area and Varlungo Area relating to their connectivity, mobility, walkability and green asset

²⁷ COMUNE DI FIRENZE, *Schede Aree di Trasformazione RUC2015*, ATt03.12: Albereta Area - (500 sq m), located close to Ravenna Piazza and strategically placed as the gateway to the Albereta Park Area; currently proposed to accommodate a building complex, available at: <http://regolamentourbanistico.comune.fi.it>, (accessed: 31.1.2017).

²⁸ COMUNE DI FIRENZE, *Schede Aree di Trasformazione RUC2015*, ATs03.16: Anconella Area - (28,678 square meters), a municipal property area currently used by Publiacqua Acqueduct. It is proposed for a leisure and sport facilities area, <http://regolamentourbanistico.comune.fi.it>, (accessed: 31.1.2017).

²⁹ COMUNE DI FIRENZE, *Schede Aree di Trasformazione RUC2015*, ATs03.24: Villamagna Area - (9,674 sq m) a municipal property placed along "Via Villamagna" with the former school complex of the 70s, currently occupied by the social center "C.P.A. FI South". It is proposed to be redeveloped for community services, <http://regolamentourbanistico.comune.fi.it>, (accessed: 31.1.2017).

³⁰ COMUNE DI FIRENZE, *RUC2015* (Bellariva Area still not defined).

³¹ COMUNE DI FIRENZE, *RUC2015*, (Varlungo Area still not defined).

Planning strategies are not enough to guarantee a well-coordinated Waterfront Masterplan Vision, especially to the Southside of the River Arno. Consequently, it is crucial to provide specific Southside Waterfront Masterplans including the 'Albereta Park Area'²⁷, the 'Anconella Aqueduct Area'²⁸, the 'Villamagna former School Area'²⁹ to the left bank and the Bellariva³⁰ and Varlungo Area³¹ to the right bank of the River.

The Gavinana Area: In order to better understand the planned transformation areas and in particular the proposed Albereta Park Area Masterplan, it is important to understand the central role that this area had played within Gavinana urban quarter placed along the left bank of the River. Gavinana's development begun in 1864 within the creation of the new planned outer areas during the period of Florence as the Capital of the Kingdom of Italy. But in the early 19th Century the District began its real urban expansion and urban form that gave towards the South-East side of the City of Florence while the Albereta Park Area is designed in the '50s. In the second half of the Twentieth Century the left bank has been further developed and integrated with the right one through the Varlungo Bridge. Over the years both neighbourhoods lost their relationship with the River due mainly to the River's inundation in the '60s and the more recent forceful rainstorm in 2015. Moreover, most of the Albereta Park space has been taken by the Anconella City's Aqueduct structures. Today, the Albereta Park Area is in an evident state of abandon and it needs to be re-designed in order to create resilient urban spaces, to re-create

connectivity with the Gavinana quarter and with the rest of the City.

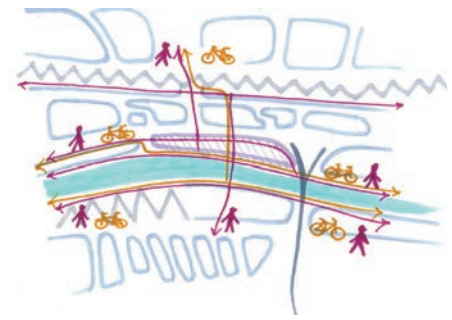
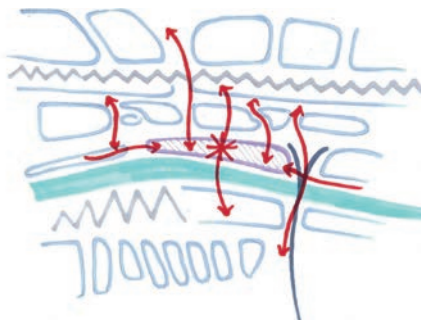
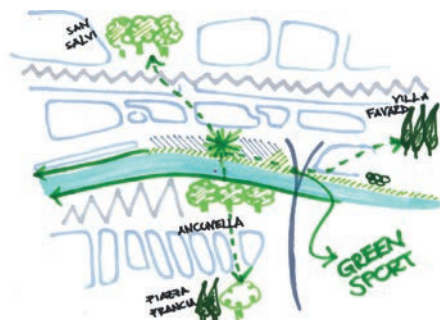
The Valrungo Area: Bellariva e Varlungo Areas are located along the right bank of the River Arno. It includes the 'Bellariva Garders', the 'Obi Hall Theatre', the Former 'Tram Depot' Transformation Areas. The Varlungo's new urban quarter was developed between the '50s and '80s along the riverfront and nearby the old Varlungo village.

The Obi Hall Theatre was built in 1978 and has been renovated in 2002. At the same time an intervention of the Obi Hall's surrounding area has led to the creation of a pedestrian and cycle path along the River Arno.

This intervention, has improved the image of the right bank but more design is needed. Besides, the former Tram Depot of Florence, built in the early 19th Century, is a building of great value. Currently the building is in a bad state of repair. Thus, the entire area needs to be regenerated and its riverfront has to be better managed for protection and safety from the frequent flooding risks.

Proposed Waterfront Masterplans within Albereta Park and Varlungo Area

To address the specific design themes on regeneration of Albereta and Varlungo riverfront urban spaces and micro spaces it was essential since the beginning to focus on the existing contexts and aware of what the aims and objectives were been set with the above mentioned proposed Waterfront Master Vison. Therefore, it was important to take into account City's policies and strategies.



The City's Structural Plan was essential as a good starting point in order to frame the River Arno axis and to investigate on its relationships with the wider City.

In this respect, it is considered the River Arno as the main urban axis to be regenerated with the regard to identify specific riverfront urban spaces and micro-spaces along the Albereta Park Area and Varlungo Area. Therefore, the existing riverfront historic gardens, parks and green areas (Albereta, Bellariva, Varlungo, etc.) have serious accessibility problems with a lack of connections with the surroundings and the wider city. But the most of them are of a great ecological, environmental and historic value.

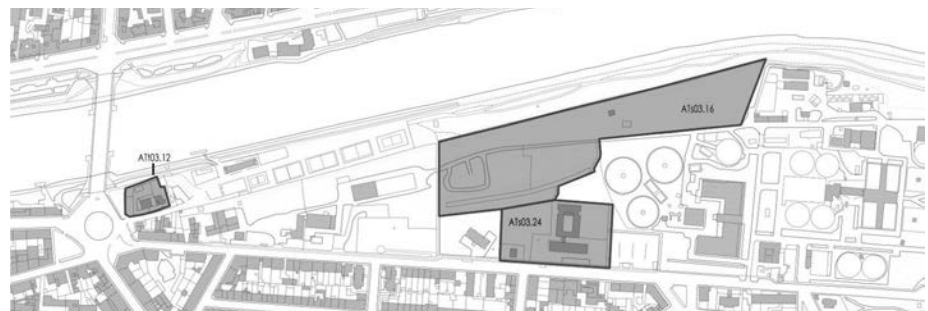
Surely, the main goal is to create a strong interaction between the two rivers banks and Gavinana and Varlungo urban quarters. This connectivity also appears as the main aim of the proposed Waterfront Master Vision that must be taken into account for the whole regeneration process. Hence, the design seeks to create different waterfront configurations for new uses and safety, masterplanning process seems to be essential for the regeneration of both river banks. Here it is briefly reported that the 'City Planning Regulations' take into consideration for planning both historic parks and the more recently developed green areas whose alignment on a North South axis has suggested the definition of a number of green cross edges on the riversides. In order to define the proposed 'ecological network'³² including the existing waterfront green areas, the Albereta and Varlungo park areas should be considered as the main sites for designing the riverfronts. The proposed Gavinana and Varlungo Masterplans stressed some main goals such as:

- The blue-green network connecting the entire axis of the South River Arno
- The improving of the pedestrian and cycling network
- The improving of accessibility to the River and the wider urban areas
- The creation of connected urban spaces of attractiveness along both banks respecting all the Structural Plan's constrains.

The latest Structural Plan of the City of Florence showing the planning of the Southside of the River Arno (source: © Comune di Firenze).

Gavinana District and the Albereta Transformation Area in the Southside of the River Arno. Transformation Area ATs03.12 - City Regulation Plan 2015 (RUC 2015) (source: © Comune di Firenze).

³² At the present the so called 'Ecological Network', identified within the RUC (2015), is presented fragmented but also cannot be properly used by the local people. On the other hand, a fragmented and not plenty defined ecological network could not fully express all its potentiality. In this sense, proposal for the creation of the ecological corridors to both North and South sides of the River Arno should be considered of great opportunity and should be integrated with the existing planned ecological network.



Albereta Park Area and Anconella Aqueduct Area in Florence as existing (photos by F. Colonese).

To better reach Waterfront Master Vision objectives is essential to adopt a clear design methodology including urban acupuncture interventions for transformation of urban spaces and micro spaces. At this point it is important to describe briefly the proposed urban acupuncture and the creation of the proposed riverfront pocket parks.

Albereta Park Area: Proposed riverwalks and waterfront pocket parks

The existing park areas of transformation to the left bank of the River, is a public area currently used for recreational and sport activities. As above mentioned, much of the area is covered by the Anconella Aqueduct and the riverside is almost damaged by the rainstorm that hit on the entire area of the South Florence Area in 2015.

The main aims for the waterfront regeneration of the existing park area are the following:

- Creating of green corridors and their embedding within the planned 'ecological network'
- Creating of pedestrian crossings to a sustainable distance
- Creating of an ecological district in Gavinana with a 'green corridor' that should connect the park areas with the surroundings and the city centre
- Respecting relationships with the

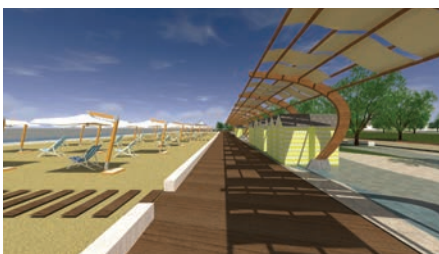
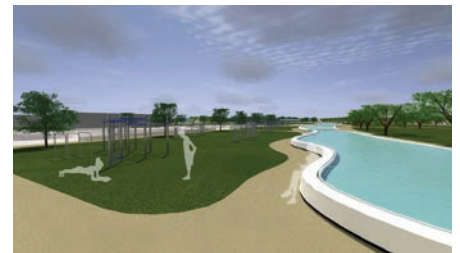
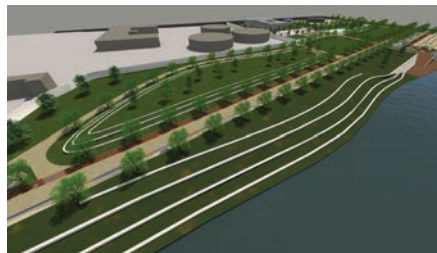
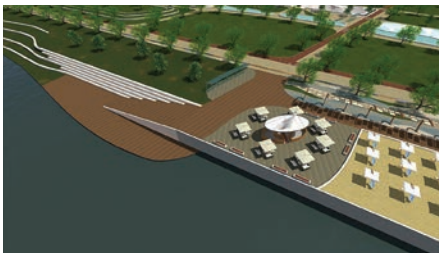
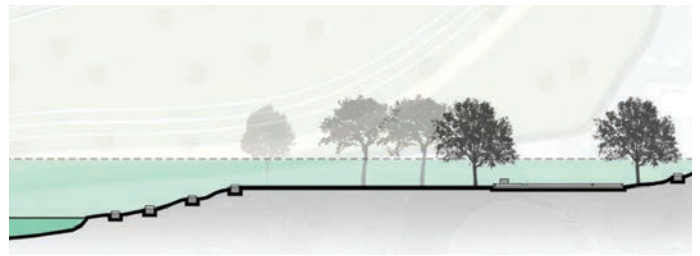
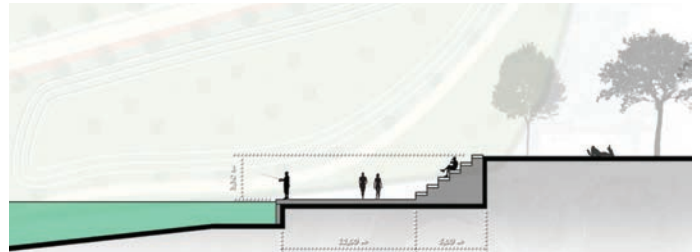
River itself and protecting riversides from flood risks

- Designing strips of green and pocket parks with suitable parking areas to the main entrances of the park
- Upgrading existing sport facilities and creating new ones.

The proposed Albereta Masterplan on the left bank of the River Arno should include the following main functions:

- The safety of the river bank against flood risks with proper structures
- The construction of a floating platform that would restore the riverside and its physical configuration, for multiple uses such as fishing, sunbathing or just relaxation
- The design of a river beach as a focal point with facilities and the creation of a river terrace directly accessing to the water with a ramp and seating steps
- The making of a green hill with ridges adjacent to the river beach for both walking and against flood risks
- The creation of shady pergolas to whose aesthetic value is added to the climate issues as solar and windy protection
- The definition of a number of central green strips for enjoyment and relax
- The creation of different types of pocket parks to be used as playgrounds, small green spaces with water features for both children and adults



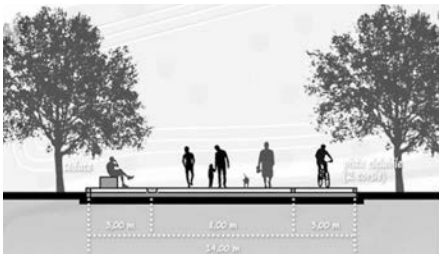
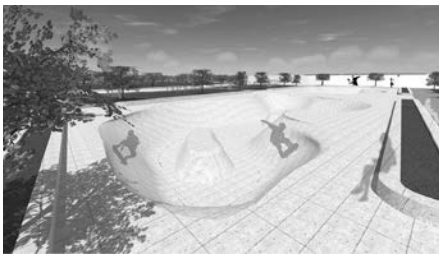


Albereta Park Area in Florence. Render and sections of the proposed spatial concept of a powerful setting with attracting walk and cycle paths.

OPPOSITE PAGE

A proposed Masterplan for Albereta Park Area in Florence with a riverfront beach for swimming with sport facilities and other green structures running along the River's edges for safety facilities.

Albereta Park Area in Florence. A fluvial system was proposed as a shaped undulating terrain with five parallel ridges (the first one higher and the others gradually lower) and with a number of proposed water tanks to protect in case of inundation. The highest ridge was planned to offer green viewpoints and activity areas for rest and play.



- The making of waterplaces/pocket parks for relax and for overlooking the riverfronts with picnic areas all over the wider park area
- The creation of a variety of pocket parks for outdoor fitness, skate parks, water games for relaxation and enjoyment
- The making of a main urban boulevard to connect one side to another of the Park
- The creation of a hierarchy of walkways with new proposed elements including: linear and multi-functional water tanks that help to mitigate micro climate and at the same time can be used as a passive defense against the rising level of the river in case of flooding while integrating LED for night lighting
- The reuse of the existing Villamagna former school to provide mixed uses.

In short, the designing of a grid of waterplaces and walkpaths of any variability can provide easy visitor's accessibility and pedestrian flexibility along the Park while the creation of dynamics waterfront open spaces can encourage movement along, through and across the riverfront.

Finally, the main idea is to create a viable riverfront but also able to create a passive defense against the flood risks. In this respect, the main aim is to preserve the natural landscape and to create panoramic views with walkpaths for contemporary lifestyles with gathering and meeting points.

Varlungo Area: A waterfront mixed use development

Varlungo area is currently considered as an outer residential area with shops, commercial and old manufacturing activities that need to be developed with new mixed uses.

The 'Obi Hall Theatre' is important for cultural activities and the nearby park area with a number of sport facilities is essential for the quarter's urban quality. But riversides are presented with no character, well-connected open spaces, green areas, meeting points for leisure. So, it needs to be regenerated with new uses and to be designed with new urban spaces for recreational and sport activities. Therefore, the 'Obi Hall Theatre', is of great potentiality for cultural events and accessibility to the waterfront that can bring people for physical activity back to the riverbanks. A number of great opportunities including services that can improve liveability and safety on the riverfront can create a green belt along and coherent with the planned RUC 'ecological network'.

The main proposals are as follows:

- The reuse of the former Tram Depot into a cultural center
- The improvement of existing accessibility to Obi Hall Theatre
- The improvement of accessibility with the existing Varlungo historic village
- The creation of a new commercial center
- The creation of integrated waterfront structures for both outdoor performances and reduction of flood risks
- The creation of facilities on riverbank for community recreational activities
- The creation of a pedestrian bridge with a central square to connect Varlungo with Anconella Park Area and the adjacent areas.

In short, accessibility to the site and permeability to the waterside are the main goals of the proposed Masterplans. Proposed cross pedestrian paths can allow more accessibility to the site. In so doing, the creation of well-connected spaces and micro-spaces can add value on the site to guarantee waterfront urbanity.

Varlungo and the transformation of three proposed riverfront sites

Area 1 - Obi Hall Theatre. The re-organisation of its outdoor spaces to guarantee the continuity with the existing waterfront green strips and walkpaths. The proposed connected waterfront pocket parks can emphasise existing natural resources and can add value to the riverfront. At the same time, seating steps along the riverbank can re-create sociability with a number of picnic areas, especially if used during summertime. Further, a cycling network goes to be integrated with the existing one.

Area 2 - New Varlungo. It turns out to be the most involved within the masterplanning process. Since then the area was with a few modern buildings; The addition of new buildings with mixed uses has been proposed. The re-design took into account the need for a good interaction with both right and left riverbanks.

A walkway along the riverfront is proposed with the development of a series of open spaces with services and facilities. Easy of movement and accessibility into the whole area is proposed with new pedestrian and bicycle paths. Providing the presence of a high number of people, large car parking areas should be created.

Area 3 - Varlungo Village. The third proposed waterfront site takes into account the presence of the two existing elements: The Varlungo village with its historic urban image; The existing motorway junction and the Varlungo Bridge which is presented as a limit. The proposed design choice is to preserve the existing buildings and natural features with the creation of well-connected urban spaces in transition from the urban context to the rural one.

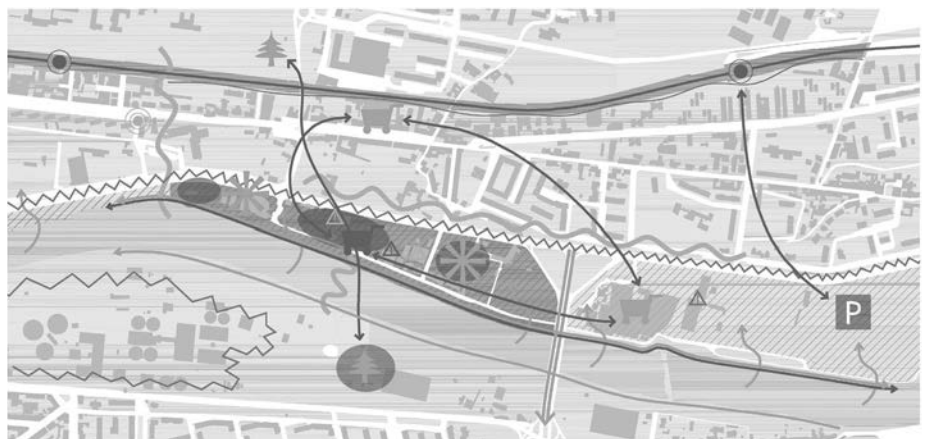
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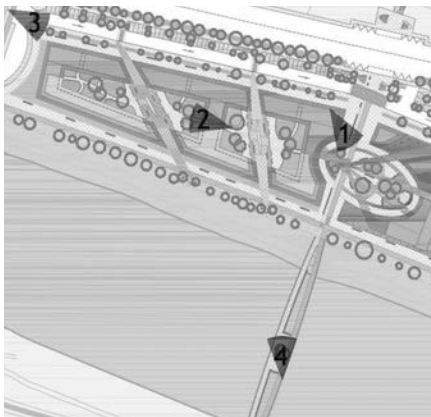
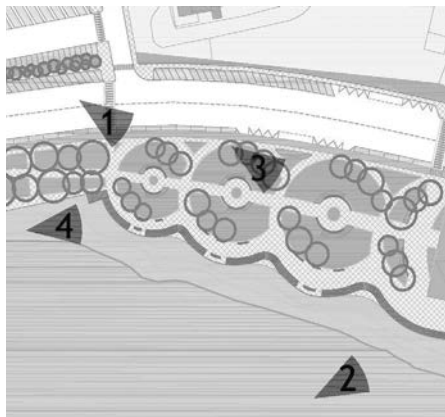
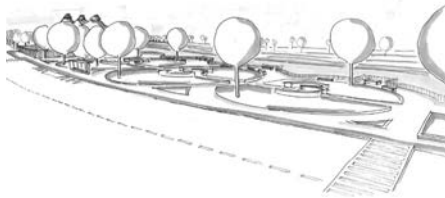
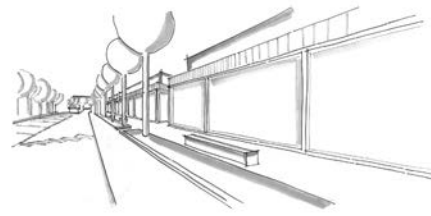
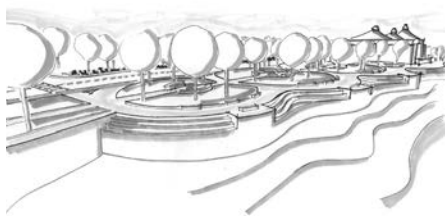
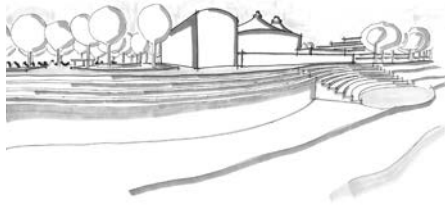
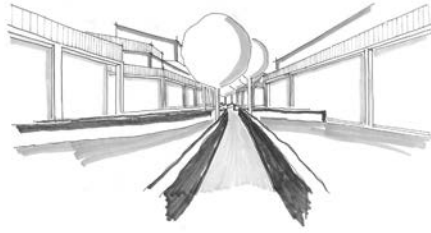
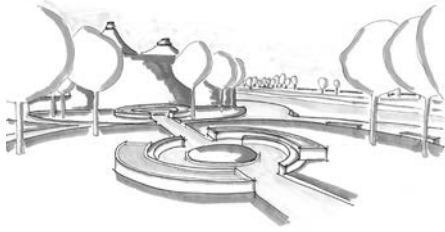
The planning and design of urban waterfronts is a complex process in which several difficulties should be faced with different typologies of interventions that often behave differently.

A Proposed Framework Scheme for Varlungo Area in Florence. Connectivity and re-organisation of outdoor spaces to guarantee continuity with the existing green strips along the River Arno.

NEXT PAGE

Design Sketches and proposed masterplans for Varlungo Area in Florence.





On the one hand, putting aims and goals to express people's needs and to manage urban environment can make liveable waterfront places. On the other hand, masterplanning that takes into account the different levels of intervention can optimise existing natural resources for a more sustainable and smart urban environments. Well-connected urban spaces can be enriched with green spaces and self-sufficiency services for relaxation, for meeting places, for leisure.

It is necessary therefore to provide an ecological network with both green and blue spaces including the preservation of existing green spaces and micro spaces that can increase connectivity and potentiality for the urban context.

Urban waterfront regeneration would put at the center of the masterplanning process waterfront spaces and micro spaces that have been achieved with the most appropriate urban strategies. A proposed urban waterfront regeneration should be extended beyond the limits of what the design goes to consider.

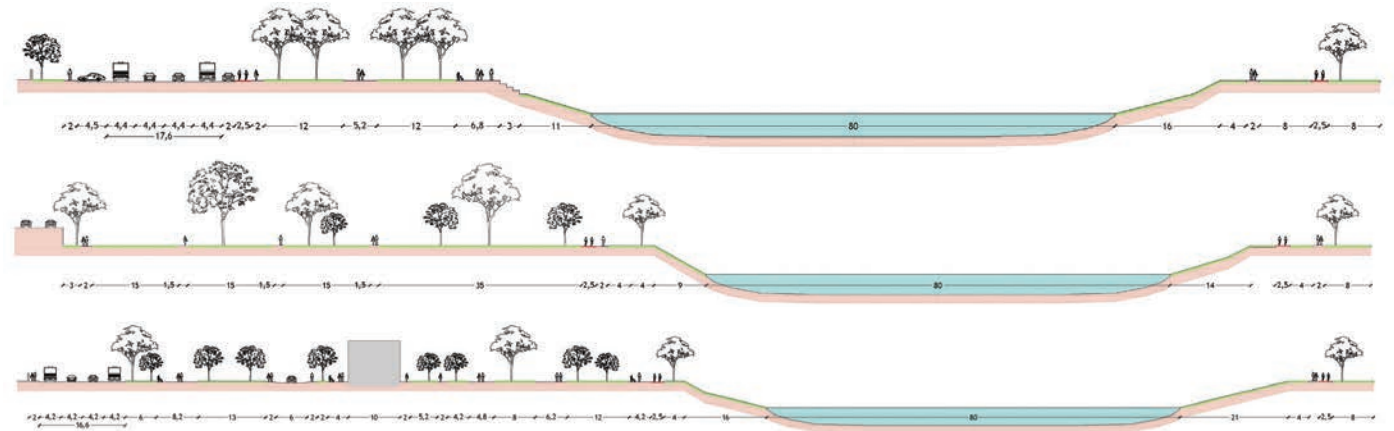
Therefore, it is essential to answer to all people needs identified in order to better encourage waterfront regeneration.

Proposed design solutions should consider parameters that could develop innovative intervention typologies such as pocket parks and urban acupuncture. To better identify waterfront urban spaces to be regenerated is important to underline the links between cultural preservation and other goals such as environmental remediation, shoreline restoration, recreational access etc.

The method of masterplanning within the regeneration of waterfront spaces and micro spaces can help to create urban connectivity, prioritising preservation and historic upgrading while catalysing sustainable urban regeneration. It is clear that environmental improvements are essential for urban quality, social integration and economic benefits.

These include:

- Awareness of the value of waterfront urban space applying for the most convenient key decision-making



OPPOSITE PAGE

Varlungo Area in Florence. Render for the riverfront areas of the Obi Hall Theatre and New Varlungo.

Varlungo Area in Florence. Proposed sections along the River Arno.

- Restrictions within strategies and urban regeneration frameworks for more secure waterfront environments
- Ability of local planning, designers to develop more strategic and resilient waterfront interventions.

Along the Southside of the River Arno the proposed waterfront change has to be considered essential to maintain riverfronts' both urban quality and safety and to sustain a diverse variety of new uses and activities. Riverfront regeneration may possibly adopt the model of the revitalisation of urban spaces and micro spaces. So that waterfront masterplanning can reflect the community needs and can give to the regenerated places urbanity and a unique character. Urban acupuncture intervention with the creation of a variety of waterfront pocket parks can achieve significant and positive urban changes. Therefore, it is necessary to identify and propose innovative urban waterfront regeneration interventions to be 'more than waterfronts' that they would offer resilient spaces and micro-spaces for living, working and socialising.


Note

In this chapter the proposed Urban Frameworks and Masterplans for the River Arno waterfront urban spaces were developed within the 'Urban Design and Eco-sustainable Urban Design Laboratory', Building Engineering Degree Course, University of Florence, (Academic Year 2015-2016), coordinated by Dimitra Babalis. Some drawings of the proposed Masterplans for Albereta and Varlungo Areas presented in this chapter were developed by the students Bruttini A., Colonese F., Boschi T., Presta A. and Sacconi M.

References

- ROBERTS P., SYKES H, (2005), *Urban Regeneration. A Handbook*, Sage Publications, London, p.24.
- GIOVINAZZI O. & MORETTI, M., (2009), *Port Cities and Urban Waterfront: Transformations and Opportunities*, in TeMALab Journal, Vol. 2, N. 3, available at: <http://www.tema.unina.it/index.php/tema/issue/view/15>, (accessed: 25.01.2017).
- PPS (PROJECT FOR PUBLIC SPACE), (2009a),

- PPS 9 Steps to Creating a Great Waterfront*, available at: <https://www.pps.org/reference/stepstocreatingagreatwaterfront>, (accessed: 20.07.2016).
- PPS (PROJECT FOR PUBLIC SPACE), (2009b), *How to Transform a Waterfront*, available at: <https://www.pps.org/reference/turnwaterfrontaround>, (accessed: 20.07.2016).
- HEALEY P., (2007), *Urban Complexity and spatial strategies, Towards a relational planning for our times*, Routledge, London p.201.
- MASSEY D.,(1984), *Spatial divisions of Labour*, Macmillan, London.
- CASAGRANDE M., (2013) *Urban Acupuncture*, available at: <http://helsinkiacupuncture.blogspot.com>, (accessed: 27.11. 2015).
- LERNER J., (2003), *Urban Acupuncture*, available at: <http://politicheurbane-pcta.blogspot.it/2010/11/jaime-lerner-agopuntura-urbana.html>, (accessed : 27.11. 2015).
- CHRIS R., (2013), *Eco-Acupuncture: designing and facilitating pathways for urban transformation, for a resilient low-carbon future*, Journal of Cleaner Production, Vol. 50,pp 189–199, available at: <http://www.sciencedirect.com/science/article/pii/S0959652612006221>, (accessed: 31.1.2017)
- AUCKLAND COUNCIL, AWDA (Auckland Waterfront Development Agency Limited), *Waterfront Plan*, available at: www.waterfrontauckland.co.nz, (accessed: 20.1. 2017).
- COMUNE DI FIRENZE, *Firenze Patrimonio / Florence World Heritage*, available at: http://www.firenzepatrimoniomondiale.it/wp-content/uploads/2015/11/opuscolo-FL_World_Heritage.pdf, (accessed: 20.01.2017)
- COMUNE DI FIRENZE, *Piano Strutturale 2010, (PS)*, available at: <http://pianostrutturale.comune.firenze.it>, (accessed: 31.1.2017).
- COMUNE DI FIRENZE, *Regolamento Urbanistico (RUC)*, available at: <http://regolamentourbanistico.comune.fi.it>, (accessed: 31.1.2017)
- https://en.wikipedia.org/wiki/Urban_acupuncture, (accessed: 27.11.2016).
- <http://helsinkiacupuncture.blogspot.it>, (accessed: 27.11. 2016).
- https://en.wikipedia.org/wiki/Pocket_park, (accessed: 31.11.2016).
- https://en.wikipedia.org/wiki/Urban_resilience, (accessed: 20.01.2017).
- https://en.wikipedia.org/wiki/Sense_of_place, (accessed: 20.01.2017).



Industrial Riverscapes and Climate Change in the Dutch Delta Area. Ecological Resilient Strategies: Coping with the Future Noord River's Urban Waterfront

Irene Curulli

Water is everywhere in the urban milieu, from riverfront and seafronts to water supply. Moreover and throughout history, the relationship between city and water has changed considerably and the past has left a significant heritage to deal with. As a matter of fact, this relationship has shaped our approaches to designing the urban landscape. With the increasing scarcity of this resource and in relationship to its extreme quantities, due to climate changes and the rising sea level, one should start considering whether it is high time to reflect on the cities-water-edge in a more strategic, integrative and inventive way, beyond the technical solutions and multiple techniques that are available nowadays.

Resilience thinking seems to be a necessary step to take in order to comprehend the profound human imprint on nature (i.e. water) and deal with the resulting challenges. 'Resilience thinking is about understanding and engaging with a changing world. By understanding how and why the system as a whole is changing, we are better placed to build a capacity to work with change, as opposed to being a victims of it.'¹

The concept of resilience has many interpretations and it sounds a bit like another threatening popular word, namely 'sustainability'². On the contrary, resilience can be considered a key con-

cept for operationalizing sustainability. While sustainability is a set of socially derived goals based on its three pillars (environmental-ecological integrity, social well-being and economic feasibility), resilience is a conceptual and modelling framework that indicates the phenomena that facilitate or inhibit the achievement of normative sustainability goals.³

In general, the mainstream thoughts on sustainability revolves around the notion of 'efficiency' (maximum productivity with minimum waste of our resources or expense) that is definitely necessary but is not the solution when dealing with the continuous global changes and unexpected events, either natural or economic. This is 'because the more you optimize elements of a complex system of humans and nature for some specific goal, the more you diminish that system's resilience. A drive for an efficient optimal state outcome has the effect of making the total system more vulnerable to shocks and disturbances.'⁴

This might sound like a paradox, but if we borrow the terms diversity, redundancy, plasticity from the vocabulary of ecology, that has been an important source of thinking about resilience, the logic link between sustainability and ecological resilience, or better their complementarity, becomes more evident. In fact, we should refer to the concept of resilience from the perspective of

¹ WALKER, B., SALT, D. (2006). *Resilient Thinking. Sustaining Ecosystems and People in a Changing World*. Washington, Island Press, p.14.

² PICKETT, S.T.A., McGRATH, B., CADENASSO, M.L. & FELSON, A. J., (2014). *Ecological resilience and resilient cities*. *Building Research & Information*, nr.42, vol.2, p.143.

³ *Ibidem*, p.143.

⁴ WALKER ET AL., (2006), *work cited*, p.9.

⁵ PICKETT ET AL., (2014), *work cited*, p.146.

⁶ PICKETT ET AL., (2014), *work cited*, p.143.

⁷ PICKETT, ET AL., (2014), *work cited* p.146.

⁸ NAP is the level between average high and low tides and it relates to the standard to which all water levels in the country are measured. The city centre of Amsterdam lies 2 meters above the NAP, while Schiphol airport lies 10 meters below, making it the world's lowest-lying airport.

⁹ PBL (2012) *Climate adaptation in the Dutch Delta*; available at: <http://www.pbl.nl/en/publications/2012/climate-adaptation-in-the-dutch-delta> p.16, retrieved on March 20, 2013.

¹⁰ Government of the Netherlands, *National Water Plan 2016-2021*. Available at: <https://www.government.nl/documents/policy-notes/2015/12/14/national-water-plan-2016-2021>; retrieved on September 03, 2016; p.9.

¹¹ PBL (2012) *Climate adaptation in the Dutch Delta*; available at: <http://www.pbl.nl/en/publications/2012/climate-adaptation-in-the-dutch-delta> p.1, retrieved on March 20, 2013.

The Dutch Delta area. Dots indicate the location of shipyards in the area.

contemporary ecological science that highlights the dynamism, historical contingency and multiple pathways of change within ecosystems.⁵ Thus, ecological resilience includes continual or periodic evolution (or shifts of ecological systems) and it emphasizes the capacity of a site to adjust to external shocks and changes in controlling interactions⁶ and continuing to develop. Therefore, the equilibrium view (as the return to the same stable point or level after some disturbance, named engineering resilience and as in the more classical definition of resilience) is replaced by a more inclusive, non-equilibrium set of assumptions.⁷ Thus, the term expresses an open-ended nature of changes that is also the main characteristic of the urban system, making ecological resilience particularly appropriate in exploring urban-adaptive strategies.

Concerning the issue of urban riverfronts and water level rise, The Netherlands's relationship with water is unlike that of any other country in the world. Water has shaped the Dutch landscape, culture and lifestyle. Moreover, in light of the climate change, resilience thinking is more than a strategic option for a climate-proof development of the country. We should remember that one third of the Dutch territory (26%) is actually below sea level (up to 7 meters), while another one third is very close to the official zero-measuring (NAP) level⁸. In terms of risk, 60% of the

country is susceptible to flooding, either from the sea or from the rivers, and moreover new urbanisation is expected over the coming decades primarily in flood-sensitive areas.⁹ Finally, the KNMI (Royal Netherlands Meteorological Institute) has provided a pessimistic forecast of the new climate scenario that will see more and heavier rainfall in the country, a 25-80 cm rise in sea levels by 2085, drier summers and more regional variations.¹⁰

Building 'unbreachable dikes' and managing new development in the Rhine-Meuse floodplain will make the Netherlands safer and more climate-resilient, according to the PBL Netherlands Environmental Assessment Agency¹¹. Most probably this action will structurally reduce the flood risk in the country even though it is not enough.

In this chapter, I will discuss the current approaches to cope with water in the Dutch Delta area and I will show how strategies of ecological resilience, including industrial heritage, can highly contribute to providing a new scenario for living along the water.

I will start with a historical overview of the floods occurred in the Delta region, and then I will focus on the specific area along the Noord River, where large and historical shipyards characterise the riverfront. Two site-specific projects will be our case studies and their analysis will help to demonstrate the above-mentioned strategies of resilience. The paper will conclude with the evaluation of these strategies and it will highlight the need of a structured integration of (water) natural events when shaping the contemporary urban landscape.

The Dutch Delta area and a brief history of floods

The so-called Delta area is the large territory formed by the deposition of sediments carried by four European river basins that meet here and flow into the North Sea. They are: the Rhine, Meuse and Scheldt. There are several cross-border catchment areas and the land use and water management in the upstream countries Germany, Switzerland, Austria, Belgium, Luxembourg and France heavily influences the quantity and quality of the Dutch



national waters. As such, the flood risk management plans for the country are made of both of an international and national component. Moreover, on the estuaries of these rivers are located large cities as Rotterdam, Nijmegen, Dordrecht and many others.

Considering the division of the Dutch water system into three areas, namely sea dominated, river dominated and transitional areas, the Dutch Delta occupies the latter where both the sea and the rivers have influence on the water level of the rivers.¹²

The Dutch Delta area has been subject to river flooding over the centuries and in the future, flood risks are expected to increase further as sea levels rise, as consequence of higher temperature, and river discharges increase due to heavy rain or snow-melt upstream. Therefore, valuable land will be submerged and consequently it will raise the level of vulnerability of the country.

This vulnerability is illustrated by a rich flood history occurred in the area, from which we can recall three main flood events, respectively dated 1421, 1809 and 1953.

During the first flood, known as the St. Elizabeth's flood, severe storms broke the Zeeland dykes in several parts, causing the death of thousands people and profound changes into the landscape. Firstly, the Biesbosch, a large natural area that currently serves as a national park and as a large sweet water tidal area, resulted from this flood. Secondly, the flooding of the Groote Waard polder, located between two regions of the southwest of the country, reshaped the setting of the city of Dordrecht into an island. In the years following the storm, inhabitants were unable to reclaim the lost land and eventually most people left the area.

The period between the first and second flood was not without risks. In fact, between 1740 and 1860 the overflow of the rivers of the Delta area caused multiple and large floods due to the disposal of river silt on the flood plains, thus reducing their storing capacity. Risks increased also during the winter periods when the distribution of water among the rivers branches was fluctuating due to icing effects.

Between 19th and early 20th Century floods were part of everyday life. 'Each generation living in the Delta has experienced during its lifespan at least three to four major floods.'¹³

The second destructive flood in the history of the country occurred in 1809 and it was caused by the overflow of the Rhine and it led to enormous damage and numerous dike breaks.

Usually, river floods penetrated far inland because of the high water pressure on the dyke and the constant flow of water. Therefore in order to stabilize the water distribution, next to the obvious clearing of the winter bed, overflows areas were created. These were intentionally low dikes where the excess water could be diverted downstream. The land in such diversion channel (called green rivers) was kept empty and used only for grazing cattle. Results of these works were the Bergsche Maas, the Nieuwe Merwede and the Nieuwe Waterweg, realised in the 19th century, aiming at the optimization of river flows by allowing the rapid discharge of water.

The third extreme floods in the Dutch history took place in 1953. A combination of a high tide and a severe wind-storm overwhelmed the sea defence structures on the North Sea coast: the dykes in Zeeland, West-Brabant and the islands of Zuid- Holland broke and 1800 people died, 72,000 lost their homes and 200,000 hectares of land was flooded, the damage to infrastructure was enormous.

To protect the Netherlands from such disastrous floods the Delta works were build some years later. In principle, all of the sea arms between the islands were dammed, while sea-and river dykes were strengthened: the goal was to shorten the Dutch coastline, thus reducing the number of dikes that had to be raised. However, some variations were applied to the rule, as for the well-known sea barrier of Oosterschelde that had some openings, which could be closed in emergency situations.

Water / Climate Adaptation Programs

More recently, flooding on the Rhine and Meuse rivers in 1993 and 1995 caused hundreds of thousands of people to

¹² Government of the Netherlands, National Water Plan 2016-2021. Available at: <https://www.government.nl/documents/policy-notes/2015/12/14/national-water-plan-2016-2021>; retrieved on September 03, 2016; p.4.

¹³ NIENHUIS, P. H., (2008). *Environmental History of the Rhine-Meuse Delta: An ecological story on evolving human-environmental relations coping with climate change and sea-level rise*. Dordrecht, Springer Science + Business Media B.V, p.252.

¹⁴ UNESCO (2009). *Water in the Netherlands: Case Studies in Europe and North America. Companion volume to the third edition of the World Water Development Report*. Available at: http://webworld.unesco.org/water/wwap/wwdr/wwdr3/case_studies/pdf/Case_Studies_EuropeNorthAmerica.pdf#page=9; retrieved on May 23, 2015, p.57.

¹⁵ PBL (2012) *Climate adaptation in the Dutch Delta*; available at: <http://www.pbl.nl/sites/default/files/cms/publicaties/PBL-2012-Climate-Adaptation-in-the-Dutch-Delt-500193002.pdf> p.5, retrieved on March 20, 2013.

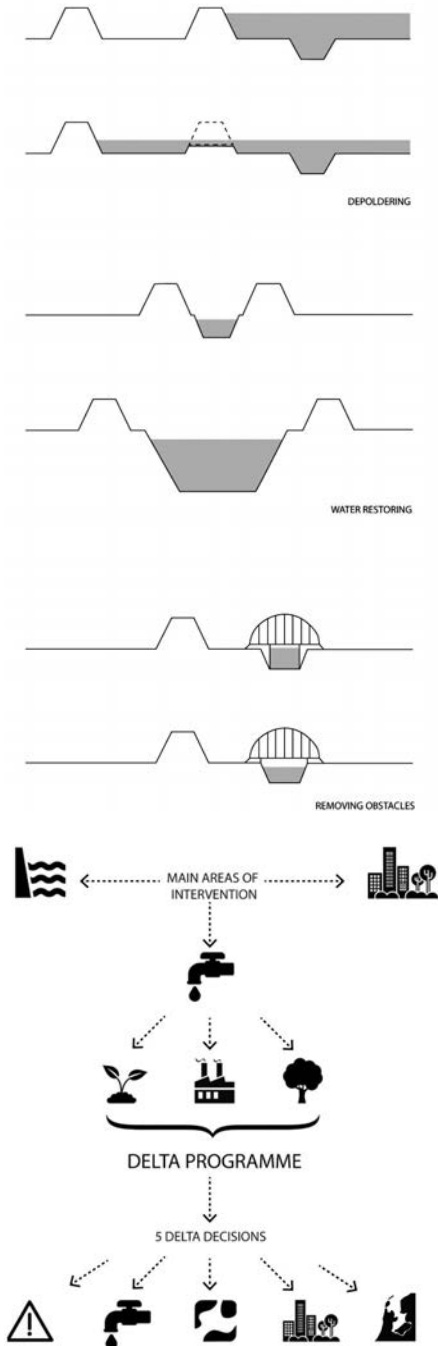
¹⁶ *Deltacommissaris (2016). Deltaprogramme - Rijnmond-Drechtsteden, Advies Deltaprogramme Rijnmond-Drechtsteden, Stuurgroep Rijnmond-Drechtsteden*, available at: www.deltacommissaris.nl; retrieved on March 12, 2016.

¹⁷ Government of the Netherlands, National Water Plan 2016-2021. Available at: <https://www.government.nl/documents/policy-notes/2015/12/14/national-water-plan-2016-2021>; retrieved on September 03, 2016; p.6.

¹⁸ BEEK (VAN) E., ENGEL, H., GOOIJER (DE) G. C., (2009) *Integrated water planning in the Netherlands*. In UN World Water Development Report 3. *Water in a changing world*. Unesco Press p.245.

Room for the River: measures and techniques to create more available room for the rivers.
 Source: Adapted drawings from the official website of Room for the River.

The Delta Program: structure and strategic decision.



evacuate homes in low lying areas. Similarly, excessive rainfall in 1998, 2001 and 2002 caused problems in certain areas. These events served as a warning that future floods could have even more disastrous results due to their increasing frequency, magnitude and intensity combined with the very dense land use and population behind the embankments.¹⁴ Such considerations led the government to take a new approach and make spatial planning an integral part of water management. Two significant results followed from this new approach: the program 'Room for the River' (2006) and the Delta Program (starting from 2012).

The first one, aims at increasing bed lateral spaces, which rivers can occupy when a flood occurs: a sort of 'comfort zone' for the river that also improves the quality of the immediate surroundings. By doing so, the space for water storage and the capacity to discharge it are implemented through a set of measures and techniques, such as: deepening the flood plains, dyke strengthening, dyke relocation, water re-storage, obstacles removal and de-poldering. The latter three methods are most applied in the case-study area of the Noord River. During the past years, all these measures have been applied in about 30 locations in the delta area and the program has been completed in 2016.

The second one, the Delta Program, is a national program involving the Dutch Government, provinces, water boards and municipalities. Social organizations, knowledge institutes and the business community are actively involved, as well.

The program resulted from the first report 'Roadmap to a Climate-Proof Netherlands' from the PBL Netherlands Environmental Assessment Agency, in 2009. That report set out the main challenges for adapting to climate change and indicated the types of policies needed to tackle these challenges. Therefore, the first Delta Programme focused on analysing the main national and regional bottlenecks with respect to safety against flooding and freshwater availability.¹⁵

It must be kept in mind that there is not a fixed way of dealing with flood problems but solutions must be able to work with new and changing scenarios.

Therefore, flexibility and a variety of strategies, together with investment in spatial planning, natural environment and water safety, are considered to be key elements of the program.

The Delta Program¹⁶ is drawn up every year and it is structured around three main issues: the setting of new flood protection standards that ensure freshwater for agriculture; industry and nature; and climate-proof/ water-robust spatial planning.

The practical interventions follow the strategies of the so-called "five decisions", which are:

- *Flood Risk Management*: it aims at protecting people and the economy, reducing flood probability and improving safety. It defines necessary standard heights of dykes, estimates the probability of flooding and the impact severity.
- *Freshwater strategy*: it aims at increasing the supplies of freshwater for specific regions of the Netherlands.
- *Spatial adaptation*: it aims at designing a climate-resilient environment considering potential impact of flooding.
- *IJsselmeer Region*: it aims at installing water pumps before 2050 in the discharge sluices in the Afsluitdijk to discharge water into the Wadden Sea.
- *Rhine-Maas Delta*: it concerns the flood risk management of the Delta area.

Nine sub-programmes, divided into three national and six regional parts, support the "five decisions". The national segments take care of safety, freshwater and new urban development; the regional ones regard the coast, Wadden region, rivers, IJsselmeer, Rijnmond, Drechtsteden and the Southwest Delta.

In general terms and as specified in the National Waterplan 2016-2012, the national goal is to adopt a comprehensive approach by developing nature, shipping, agriculture, energy, housing, recreation, cultural heritage and the economy (including earning potential), as much as possible in conjunction with water tasking.¹⁷ Moreover, The Netherlands makes use of scenario-based planning to help make decisions on water management options and country is preparing its fifth integrated water management plan¹⁸, where the possible consequences of climate change are high on the agenda.

The challenges of the present: the Noord River waterfront

Located in the transitional region of the Delta Area, the Noord River is a tidal river between the cities of Dordrecht and Rotterdam. In the near future, the banks of the river will undergo to spatial adaptations according to the implementation of the measures required by the National Delta Program.

Ever since the 17th century, the region was known for the ship building industry. Thus, the river was a busy shipping route connecting the greater part of the inland water transport 'binnenvaart' (inland water route) of Europe to the harbors of Rotterdam. Due to the increase in demand for water transport, the outer dike areas along the riverbanks were purposefully used for water related industry; which used the river, with its tide, to their full advantage.

The former shipyards provided jobs for the residents of the adjacent villages and cities, determining their growth. In fact adjacent cities started to grow rapidly and provided the industry with an adequate level of employees. In turn, the amount of employees grew in order to fulfill the increasing demand of ship supplies. Moreover, close by villages grew rapidly and new ones were built. In short, the ever-increasing water related industry assured an economic impulse to the region and determined its rapid and large development.

The Noord River is enclosed by two completely different types of land: the

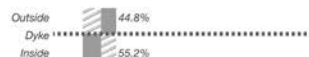
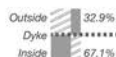
Alblasserwaard on the east side of the bank and the IJsselmonde, on the west. The first one, the Alblasserwaard, is a region that struggled through time with the water that entered the land. Land was not fertile enough to provide vegetables and meat for the inhabitants and people were directly dependent from trade, which was mainly carried on the river. Many of the inhabitants worked in the ship industry or in the related activities.

The second one, the IJsselmonde, has almost opposite characteristics from the Alblasserwaard. This region started relatively small and it grew as people poldered the land that was connected to the island. The soil was fertile, due to all the sludge of the river that covered the land, and fruits and vegetables were sold and transported with ships to other places, resulting in a large and thriving market. This region is still well known for the rich productivity of agriculture. Although the ship industry had minor presence on this side of the bank, it also had an impact on the architecture of the riverfront and in the economy of this region.

Nowadays, the difference between the two sides of the riverbanks is still noticeable.

Lastly, at a close distance from the Noord River is Kinderdijk, a small village where the polder system started in the 13th Century. Canals and 19 windmills, dating from 1500s, still exist in the area, which is an open-air museum and listed UNESCO Worlds Heritage Site in 1976.

As previously mentioned, the shipyards played a major role in the definition



Kinderdijk, Unesco World Heritage area.
(photo by I. Curulli)

Depth of the land, recreational areas and location of current shipyards and water-related industry.

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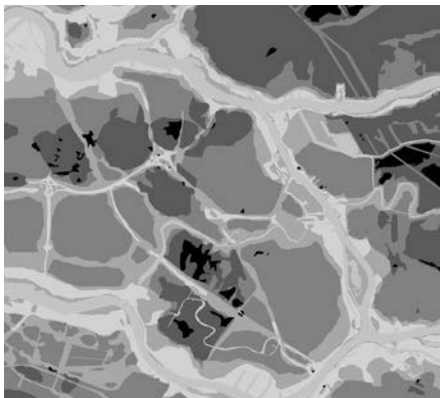
The Noord River at the confluence with the Meuse and Rhine rivers.

View of some shipyards along the riverfront.

Houses behind the dike.

(photos by I. Curulli)

Land use of the areas along the Noord River.



of the landscape along the riverbanks of the Noord. The Smit family was the main protagonist in the field (since the 17th Century) and four generations of it succeeded in the management of this large business that marked the Dutch shipbuilding history.

The shipyards dominated the skyline of the riverfront but also the activities inside the yards were heard far into their surroundings. Therefore, their scale, sound and smell jointly confirmed that the shipyards were clearly perceptible from afar. Visually, they took the role of churches in the villages, with a 'strange' orientation twist towards the water, which was essential for their existence.

The activities of these shipyards ranged from building new ships, their demolition or repair of existing ones. In the shipyards combined mobile activities (ships and related trade and traffic) and static-spatial elements (shipyards, docks, quays, warehouses, cranes, etc.) These two elements formed the characteristic maritime landscape of the Noord River banks, and which elements alternated with tidal nature and occasionally with residential areas.

Originally, the tidal nature areas along the Noord were man made in order to cultivate willows, as there was a high demand for their branches for numerous applications.

However, this maritime landscape was not only fascinating and making prosperous the region. Its downside was the self-seclusion from the inhabited areas due to the vast scale of the industrial structures and activities within the shipyards. Consequently the riverfront became a privatized area.



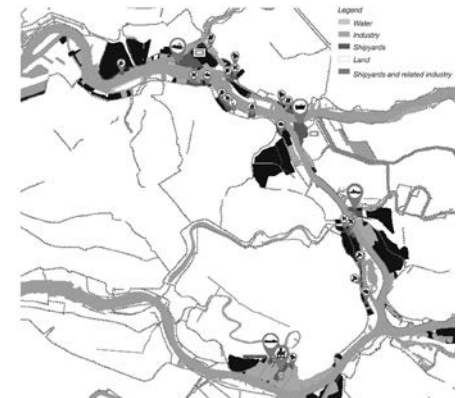
A landscape of events

Over the past 30 years the riverfront has undergone to large changes. Shipyards had to adapt to changing conditions and had to specialize to survive. The production of 'regular' vessels moved to competitors in low-wage countries as Asia, China and Vietnam. Nowadays, the current shipbuilding industry along river the Noord consists of companies that focus in niche markets and build custom-made vessels to the very specific needs of their clients.

The effect of this change is the abandonment of many shipyards and the consequent fading of the identity of the area.

Accordingly, the current landscape of the Noord River is dotted by many dismissed shipyards and is characterized by unique riverine wetland areas. In the near future, some dikes will be partially removed to receive the excess of water from the river, while offering opportunities for new and alternative developments. Therefore, the reuse of the shipyard areas has multiple roles: firstly, to connect the existing urban areas to the river, as they are now sitting back from it; secondly, to preserve the historical heritage values of the riverfront; and finally, to become stopovers of a cultural and naturalistic route that offers the experience of a unique riverfront Dutch landscape to local citizens and tourists that daily take the water route to reach their work or to visit the UNESCO site.

How to design this landscape of events along the Noord River? Which ecological resilient strategies should be adopted in the transformation of the riverfront?



Which new activities can be implemented so as to highlight the shipbuilding history of the area? What can we learn from the resilient characteristics of the riverfront?

These questions formed the basis for the elaboration of the landscape of events along the Noord River, carried out by the graduation design studio 'Resilient Architecture' at the Eindhoven University of Technology, in The Netherlands.

Based on the specific case on the Noord River and on the relevant ecological, engineering and social paradigms of resilience, 5 maxims were formulated:

- *Being durable and robust to withstand the threats over time*
- *Absorb and re-direct the energy of the threat into utility/benefit*
- *Being able to foresee and adapt to possible scenarios*
- *Redundancy in order to distribute the threat*
- *Social cooperation and awareness to deal with changing conditions.*

Each maxim represented a different strategy within the topic of resilience. The maxims served as design guidelines and were used to test design decisions during the entire design process. It was possible to simply follow one of the

maxims or to incorporate several maxims in the design.

The two following projects tackle two of the main problems of the area, namely its fading shipping history and the disappearing of the delta/tidal nature. Therefore, the first project revolves around the transformation of a dismissed shipyard, one of the oldest, which stands on a strategic site that is destined to new development. The second one, focus on a tidal area that will partially disappear in the future, due to the removal of a section of an existing dike in order to create more space for the river to flow in.

Both sites of design are outside the dyke area, thus open to possible flooding, and are not listed as heritage locations. However, they should be both considered cultural heritage that stand for the identity of the area and its historical value. They are expression of the development of shipyards industrial architecture and its relationship with the landscape that it impacted and from which both benefitted of.

These areas are still fairly inaccessible today and consequently they create a gap in the relationship between the existing cities/villages and the waterfront. Local inhabitants consider these areas as 'non-spaces'.

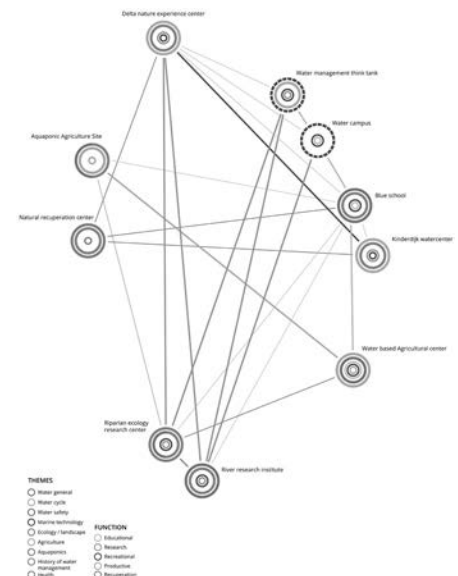
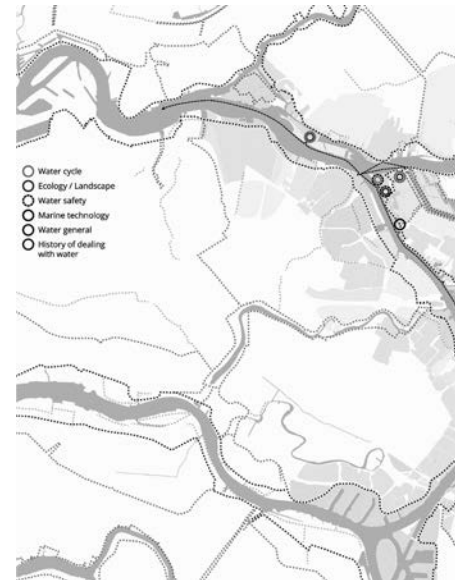
Aerial view of the IHC shipyard in Kinderdijk, dated 1964. The company belonged to the J&K Smit family.

(Source: <http://www.willemsmithistorie.nl/images/Kinderdijkzondercentrale.jpg> provided by the Historische Vereniging West-Ablasserwaard).

The cultural and naturalistic route and program of the different stopovers.

NEXT PAGE

Design proposal for the Water Campus, which reuses a former shipyard area along the Noord River. Design by Marije Kortekaas.



and many architectural tools make the students aware of the many possibilities of experiencing and using water. The water campus will provide space for students to experiment with water.

If the project might sound a triumph of water, it should not be underestimated how water serves as an instrument of mediation. Water helps to mediate the huge size of the shipyard and human scale and by considering water not as constraints and threatening element, water also contributes in creating a design of continuity between the old existing building and its unique structure with the new design, including the surrounding landscape. Symbiosis is than not only an ecological/nature term, but also it can be translated into an architectural fact, a pertinent reality.

Therefore, the ecological resilient strategy adopted in this project aims at '*absorbing and re-directing the energy of the threat into utility/benefit*' as stated in the third maxim of resilience. It is about resilience in the non-equilibrium context, which is able to adjust to changing, locally unstable conditions.¹⁹ External disturbances, such as those that can result from storms and floods, and that can have major structuring effects, are integrated components of an architectural and landscape design and are part of the livelihood of the place and its surroundings.

Similarly, these principles apply to the second project which context is very different from the previous one. In fact, the site is mainly formed by tidal nature, with water flowing in and out twice per day, and that is characterized by a rich biodiversity due to the changing water tide that develops scattered mud flats and salt marshes.

Compared to the past, these tidal nature areas are scarce nowadays along the Noord riverbanks. This is due to the diminished demand of willow plantations leading to the repurposing or abandonment of the previously cultivated areas.

Consequently, the riverbanks of the Noord River show a mixed and fragmented landscape composition where tidal natural areas alternate with (abandoned) maritime industry sites. The design project takes advantage of this 'negative' condition by proposing a specialized health care facility

where contact with nature and natural elements are key factors in the healing process. The project introduces a fresh impulse to the area, and while respecting the cultural heritage of the riverbanks, it fulfills an economical demand, which has a spatial attachment to the water and to the unique natural environment it creates along the riverbanks.

Conceived as scattered system of pavilions into the natural landscape, the design deals with the contingent and unpredictable, but challenging, future purposes. It is contemporary revision of the Dutch structuralism of Aldo van Eyck (Orphanage in Amsterdam, 1960) that strives for the creation of both a *home* and small *city*, paraphrasing Van Eyck statement on the architectural discipline.²⁰

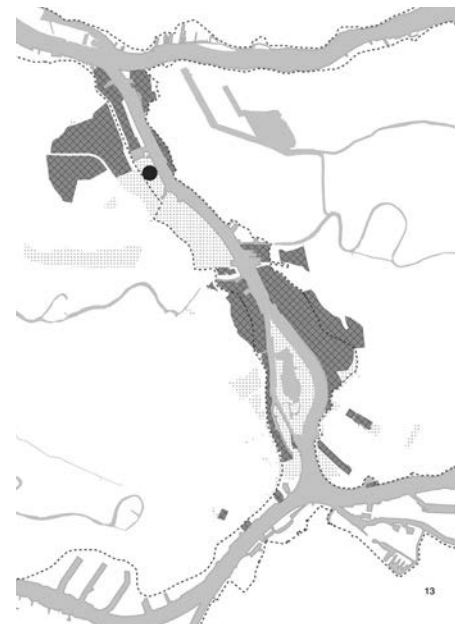
The modules form decentralized nodes or open clusters around courtyards that are not hierarchical spaces, but offer many moments of interaction with nature: each individual unit is then neighbored by its own outdoor space. Within the tidal nature of the site, the health facility is a place to discover and the fluidity of connection among all spaces allows and ensures that the building works in harmony with the site. The design is a continuous place-making process that works *with* the environment ('being durable and robust to withstand the threats over time' as in the maxim 1). It uses the changing natural environment as energy for the patients to enhance / stimulate the recuperation process ('absorb and re-direct the energy of the threat into utility / benefits' as in the maxim 2). The design conceives the health facility center as a distributed network of buildings where parts can be replaced over time, according to locally changing needs ('redundancy in order to distribute the threat' as in the maxim 4).

This ecological resilience strategy originates from a deep understanding of natural processes, and while enhancing an alternative healthcare-therapeutic relationship, it creates a balanced environment where humans and nature are strongly coupled and are almost conceived as one social-ecological system. This makes the design proposal not a simply vision of a 'balanced' community, but it is also aware of 'direct effects of interactions'

Diagram of the existing natural areas and industries along the Noord River.

¹⁹ PICKETT ET AL., (2014), work cited, p.147.

²⁰ EYCK, (VAN) A., (1962). Steps towards a configurative discipline. In Forum, August 1962, p.328.



Design proposal for the Health Care Center, located on a tidal landscape along the Noord River. Design by Remco van den Heuvel.

RESILIENCE

RESILIENT STRATEGIES

1. BEING DURABLE AND ROBUST TO WITHSTAND THE THREATS OVER TIME. DESIGN WITH THE ENVIRONMENT, ENSURE THAT THE BUILDING WORKS IN HARMONY WITH THE SITE. [PROGRAM IS TEMPORARY, BUILDING IS PERMANENT]
2. ABSORB AND REDIRECT THE ENERGY OF THE THREAT INTO UTILITY / BENEFIT. USE THE CHANGING NATURAL ENVIRONMENT AS ENERGY FOR THE PATIENTS TO ENHANCE / STIMULATE THE REHABILITATION PROCESS.
3. REDUNDANCY IN ORDER TO DISTRIBUTE THE THREAT. DESIGN THE REHABILITATION AS A DISTRIBUTED NETWORK OF BUILDINGS, SPECIFIC TO THE NEEDS OF THE FUNCTION.

MOSS BEDUM ROOF.
BLEND THE BUILDING IN WITH THE EXISTING NATURAL ENVIRONMENT & PROVIDE A THRESHOLD FOR RAINWATER.

WOODEN CLUSTERS.
TO COPE WITH THE CHANGES OF THE SITE AND TREATMENT, THE CLING IS DESIGNED USING CLUSTERS. EACH CLUSTER HAS A DIFFERENT SPATIAL EXPERIENCE WITH A VIEW TO OR INTERACTION WITH THE NATURE.

ENTRANCE BUILDING.
A SOLID ENTRANCE BUILDING IS DESIGNED TO ACT AS A THRESHOLD WITH ITS SURROUNDINGS. ONCE THIS THRESHOLD IS CROSSED AN OPEN VIEW TO THE NATURAL ENVIRONMENT IS EXPERIENCED.

SITE PLAN

High Vegetation Med High Vegetation Low Vegetation Tidal Water

GROUND FLOOR PLAN

BUILDING DIAGRAMS

Activity Program Recreational Services Treatment Cluster in line 11100 Cluster in line 11100

Long term treatment / Ambulatory treatment Public space / Recreational space Reception space Daycare

that take time to ramify through the system and drive its instability. Therefore this adopted design strategy is inclusive of those unexpected 'disruptions' that may destabilize an otherwise sustainable system. Accordingly, 'the ability to adjust to such shifting condition is the very essence of resilience, under the contemporary non-equilibrium paradigm.'²¹

Conclusion

Over the past few hundred years, the Dutch Delta has undergone continual change and adaptation, both in terms of demands made by the geographical system and demands and capacities of the society.

Although surrounded by many uncertainties, the expected changes in the climate make it necessary to reconsider the future spatial development of the Delta Area in combination with the expected economic and social developments and also to investigate how to reduce its vulnerability.

'Resilience thinking' seems to be a necessary step to take in order to deal with unexpected events, the stress caused by climate change and other aspects of global change. In fact, 'resilience thinking presents an approach to managing natural resources that embraces human and natural systems as complex systems continually adapting through cycles of change.'²² Thus, resilience approaches systems are to be regarded as complex, potentially adaptive and self-organizing. 'Resilience thinking' is not normative but a scientific tool, whose greatest value is to promote sustainability by allowing us to understand how systems adjust to radical and sudden change. Thus, resilience is complementary to sustainability.

Therefore, the basis for the achievement of sustainable goals and their active engagement lies in the identification of the mechanisms of resilience.

The abandoned industrial shipyards along the Noord River, expression of an historical industrial past and of an historical memory that is slowly fading away, offer an opportunity to safeguard their heritage value for the future; but also a chance to undertake

resilient strategies to explore adaptive processes and contribute to achieving successful adaptive cycles that are suited to urban transformations.

The two open-end projects I have previously discussed show how the dynamics of water and living nature can be the creative sources that inform the design. Through ecological resilient approach it is possible to understand contingencies and overcome unexpected changes.

To put it simply, this teaches us that ecological resilient strategies must start from the basic idea that internal and external drivers of system structure and activities is a changing template to which successful systems must adjust. This is of critical importance considering future uncertainty and limited understanding of the vulnerability generated by human-induced change. It also means that the problem lies in the 'lack of recognition that ecosystems and social systems are dynamic and inextricably linked',²³ which is the core matter of resilient thinking.

To conclude, ecological resilient strategies that nurture (water) adaptive transformations can act as a life support system and allow cities not only to survive in a harsh environment, but also to create productive and beautiful human habitats along riverfronts

Acknowledgements

This chapter shows the results of a work-in progress research titled 'Industrial water landscapes' that I am developing at the Department of the Built Environment at the Eindhoven University of Technology that also involves students at their final stage of studies.

I want to express my deep gratitude to the following graduating students: Geordy van Bussel, Joyce Fisscher, Remco van Heuvel, Renee van Kemenade, Marije Kortekaas, Bianca Laurence, Twan Lavrijssen, Alexandra Shilova, Andrea Somma, Iris van Weersch that participated in the graduation atelier 'Resilient Architecture. The reuse of dismissed shipyards and water dynamics in the Dutch Delta Area.'

I want to thank them for their hard work, enthusiasm and interest in the design studio and for patiently making the innumerable drawings of the research, some of which are part of this chapter.

²¹ PICKETT ET AL., (2014), work cited, p.147.

²² WALKER, (2006), work quoted, p.10.

²³ MOBERG F., SIMONSEN, S.H., (2014). *What is resilience? An introduction to social-ecological research*. Stockholm Resilience Centre, Stockholm University. p. 6. Available at: http://www.stockholmresilience.org/download/18.10119fc11455d3c557d6d21/1459560242299/SU_SRC_what_is_resilience_sidaApril2014.pdf; retrieved on March 10, 2016.

Finally, I am also grateful to my colleague Jacob Voorthuis, with whom I have been co-teaching the graduation atelier. I appreciated his sharp criticism, the pleasant and inspiring time I spent with him while reviewing student's ideas during the one-year graduation course.

pdf#page=9; retrieved on May 23, 2015, p.55-57.

RIJKSWATERSTAAT, (2012), *Ruimtelijke ontwikkelingen in het rivierbed van grote rivieren*. Compendium voor Leefomgeving.

WALKER, B., SALT, D., (2006), *Resilient Thinking. Sustaining Ecosystems and People in a Changing World*. Washington, Island Press.

References

BRUGGE, (ter) J., (2009), *Scheepsbouw in perspectief: werven in Nederland 1870-2009*. Zutphen, WalburgPers.

DELTA COMMISSARIS, (2016), *Deltaprogramme - Rijnmond-Drechtsteden, Advies Deltaprogramma Rijnmond-Drechtsteden, Stuurgroep Rijnmond-Drechtsteden*, available at: www.deltacommissaris.nl; retrieved on March 12, 2016.

GOVERNMENT OF THE NETHERLANDS, (2015), *Delta Program*, available at: <https://www.government.nl/topics/deltaprogramme>; retrieved on December 12, 2015.

GOVERNMENT OF THE NETHERLANDS, (2015), *National Water Plan 2016-2021*. Ministry of Infrastructure and the Environment, Ministry of Economic Affairs (2015) available at: <https://www.government.nl/documents/policy-notes/2015/12/14/national-water-plan-2016-2021>; retrieved on September 03, 2016.

GRAAF, (DE) R., (2012). *Adaptive Urban Development: A symbiosis between cities on land and water in the 21st century*. Rotterdam: The Netherlands.

MOBERG F., SIMONSEN, S.H., (...), *What is resilience? An introduction to social-ecological research*. Stockholm Resilience Centre, Stockholm University. Available at: http://www.stockholmresilience.org/download/18.10119fc11455d3c557d6d21/1459560242299/SU_SRC_whatresilience_sidaApril2014.pdf; retrieved on March 10, 2016.

NIENHUIS, P. H., (2008), *Environmental History of the Rhine-Meuse Delta: An ecological story on evolving human-environmental relations coping with climate change and sea-level rise*. Dordrecht, Springer Science + Business Media B.V, p.252.

PBL NETHERLANDS, ENVIRONMENTAL ASSESSMENT AGENCY, (2011), *Climate Adaptation in the Dutch Delta. Strategic options for a climate-proof development of the Netherlands*, PBL Publication, The Hague.

PICKETT, S.T.A., MCGRATH, B., CADENASSO, M.L. & FELSON, A. J., (2014), *Ecological resilience and resilient cities*. Building Research & Information, nr. 42, vol. 2, pp.143-157.

UNESCO, (2009), *Water in the Netherlands: Case Studies in Europe and North America*. Companion volume to the third edition of the World Water Development Report. Available at: http://webworld.unesco.org/water/wwap/wwdr/wwdr3/case_studies/pdf/Case_Studies_EuropeNorthAmerica.

PART 2

Outlining Blu-Green Opportunities

The Waterfront Urban Space of the Argolic Gulf in Greece. Functional and Aesthetic Upgrade and Sustainable Development.

Eleni Maistrou

The aim of this chapter is to present a part of a study about the functional and aesthetic upgrade for the waterfront zone of Nafplio – Nea Kios, which lies at the tip of the Argolic gulf in the Eastern Peloponnese.

Nafplio is a very well-known historic city, whose existence dates to the Pre-historic era. Nea Kios, which is a small city adjacent to Nafplio, was established in 1933 by refugees who had arrived from Kios in Asia Minor.

The waterfront zone connecting the two cities runs for approximately 6 km. and it disposes some interesting features, but also some substantial problems.

It offers an exceptional view towards the historic fortifications Palamidi, Akronafplia, Bourtzi and the broader Argolic gulf and it presents the features of a seaside wetland which concentrates rare flora and fauna species, mainly avifauna. Important historic and archaeological sites lie in immediate vicinity to that part of the coastal zone, as well as historic rivers which flow into the Argolic gulf, all of which offer the occasion to take a cultural route in the outdoors.

As the waterfront zone is characterized by problems a special study was held, aiming to formulate proposals for the protection of the natural environment, for the promotion of the region's historic features, for the connection of the coastal zone with the functions of the urban space of the adjacent areas and

for the region's sustainable economic development.

The waterfront zone of Nafplio – Nea Kios with its strong features, can become an important cultural axis, as it combines elements having environmental, historic and regional value. This zone can contribute on one hand to the sensitization of the local population in matters of cultural heritage and environmental protection, and on the other to the reinforcement of specialized tourism.

In order to achieve the aforementioned goals, this study documented:

- the special features of the natural environment and the areas of historic interest in the region directly connected to the coastal zone
- the geomorphology of the coastline and the soil quality features of the coastal zone, where an important wetland is also developed
- the features of the adjacent areas and the uses of the existing buildings in the broader area, aiming to examine their compatibility or/and complementarity with the uses desired for the seaside
- the features of the route between Nafplio and Nea Kios and of the road network which is vertical to it, aiming to delve into the possibility for pedestrian access towards the seaside, as well as for safe pedestrian movement alongside the beach
- the constraints emanating from the existing legislative framework, aiming

to delve into the allowed uses for the beach and how these uses can contribute to the function of the adjacent urban space

- the views expressed by the local administrative bodies and the implicated municipalities.

Finally, the study proceeded with a pilot design for a sensitive part of the area; light-frame constructions were proposed, so as to cover the need for movement and pause and allow for bird watching without causing any disturbance.

The region's topography. Geological features. Ecosystem of special interest

The waterfront zone between Nafplio and Nea Kios which is the subject-matter of the present study constitutes the outflow of the Argolic plain towards the sea, which is surrounded by hills and mountain ranges. Torrents and rivers traverse the plain. They are sometimes dry and at other times they overflow, thus turning the ground which is open towards the sea into a marsh, as the city's topography does not allow for the rainwater to drain. Inachos and Erasinos are the main rivers, flowing into the Argolic gulf. The soil features on the waterfront zone of Nafplion under the route between Nafplio and Nea Kios are characterized geologically as having an increased risk from possible soil liquefactions.

The wetlands of the Argolic gulf sea ecosystem in the studied area are extensive for Greek givens, and they have a particular financial importance for the production cycle of food, as well as for the broader balance of the region's ecology.

This ecosystem includes the following wetlands:

- Coastal water: This zone is approximately 600 meters wide, 0 – 6 meters deep and approximately 11 kilometers long and it offers appropriate conditions for fish nesting and reproduction.
- Alipeda in the Nafplio area: It is an area which floods periodically with sandy-mire or mire soil – the continuity and organic unity with the wetland of the coastal waters.
- Roumani – marsh of Argos: This is a marshy region spreading on both

sides of the Erasinos riverbed, presenting a high underwater level. This ecosystem is strongly dependent on the sea ecosystem of the Argolic gulf. It is characterized by a hydrophilous and emerging vegetation, by water fauna and avifauna, including mostly migrating birds passing by.

The aforementioned ecosystems have not benefitted from legislative protection, although their importance has been stressed by studies elaborated for the region. Subsequently, they are today degraded and their balance has been perturbed by the expansion of housing, the filling of the coasts with earth, the industrial waste and the installation of agricultural units, by urban waste, etc. An important problem was also caused by the construction of the seaside route between Nafplio and Nea Kios, which interrupted the continuity between the sea and its foreshores and Roumani – Valto, through the rise in the coastline's altitude.

Despite these obstacles, the region continues to host an important number of avifauna species and it was deemed necessary for them to be protected immediately through legislation as well as through specific measures and actions, given their considerable environmental and financial value.

The region's strong points and the areas of historical interest

The studied zone and the region immediately adjacent to it presents spots and areas of increased historic and archaeological interest, which can and should be highlighted and which, combined with the strong points of the landscape and the environment, will contribute to the creation of a 'cultural axis'.

These points are the following:

- *The Mycenaean fortification of Tiryns* built on a rocky hill at a height of 18 m. overlooking the plain of the Argolic gulf. Today, it stands at a distance of 1.5 km from the sea. The Mycenaean fortification wall, built in cyclopean masonry, is older than that of Mycenae and it is the most imposing of all Mycenaean acropolises. The oldest part of this fortification was built circa 1400 B.C., while the acropolis took its final form, according to the part which still remains visible, around 1200 B.C.

- *Ancient Timenio* in the Agios Panteleimon-Dalamanara region, being the location of the ancient port of Timenio at Argos. At a distance of 70 m. from the public road, dispersed stones are still visible submerged into the sea. They belong to the pier or the breakwater of the ancient port of Timenio. The excavations undertaken in the region also revealed installations belonging to a bath complex of the late Roman – early Byzantine era at ancient Timenio.

- *The old stud farm of King Otto* on the beach of Nea Kios, which housed from 1930 the Company of Canned Tomato juice. Today the building is abandoned. The industry was created by Gerasimos Karamelis who was installed at Nafplio in 1922, coming from Kios in Asia Minor. With the support of the President of the Committee for the Rehabilitation of Refugees, he contributed to bringing his fellow countrymen who were living in Athens and elsewhere, and to the creation of the Nea Kios settlement.

- *Inachos and Erasinos*, which are the main rivers in the Argolic plain, connected to mythological references.

The attributes of the use of the coastal zone and of the broader built space

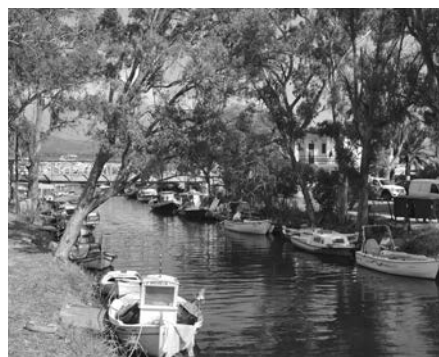
The coastal zone between Nafplio and Nea Kios constitutes an important wetland with rare flora and fauna, a natural basin for the outflow of water within the Argolic gulf. It extends alongside a 5 km-long coastline, starting from the northern end of the city of Nafplio and

reaching the eastern boundary of the settlement of Nea Kios. The coastal route between Nafplio and Nea Kios runs throughout its length and at a small distance from the sea. It functions as a boundary, cutting out its southern coastal part from its northern one, with its scarce constructions and its numerous cultivable plots. This route is actually a rather ‘rough’, impenetrable boundary, as it is characterized by the intense traffic of vehicles in both directions.

Apart from the two main rivers, the entire length of the waterfront zone – per 400m-intervals or more closely – is run by streams, which go underground at the level of the coastal route. The largest ones are, by order of size, the ‘Xerias’ or ‘Panitza’ stream at the eastern end of Nea Kios, the ‘Ramadani’ stream and further to its north, the stream connecting it to Tiryns. Long lines of eucalypti and other tall trees can be seen alongside the rivers and the great streams.

The boundary between the route and the shoreline is divided through the use of a protective barrier running alongside the larger part of the waterfront. However, this barrier is interrupted at certain intervals, allowing for vehicles to enter the coastline, especially at the points where the height difference between the street and the shore is not important. For the most part, the route does not dispose a sidewalk, with the exception of a small patch in the direction of Nea Kios.

Regarding its use, the entire waterfront zone of Nafplio – Nea Kios presents a



Argolic gulf and the study area.

BOTTOM OF THE TWO PAGES
Waterfront zone between Nafplio and Nea Kios.

OPPOSITE PAGE
Wetland of the coastal waters.

Erasinos riverside.

The coastal zone.

fusion of commercial, industrial, touristic uses, of residence and recreation. Residences are particularly dense in the part of the route leading to Nea Kios, where small conglomerations are formed at certain parts. These are mostly secondary residences, built outside the construction plan and they are conventionally constructed, often in poor quality. Some large, recently constructed residences, which often combine a commercial use on their ground floor, can be seen at certain points on the coastal zone in the part of the route leading towards Nafplio. Close to the stream leading towards Tiryns, there lies an installation of vulnerable population groups, forming a camp.

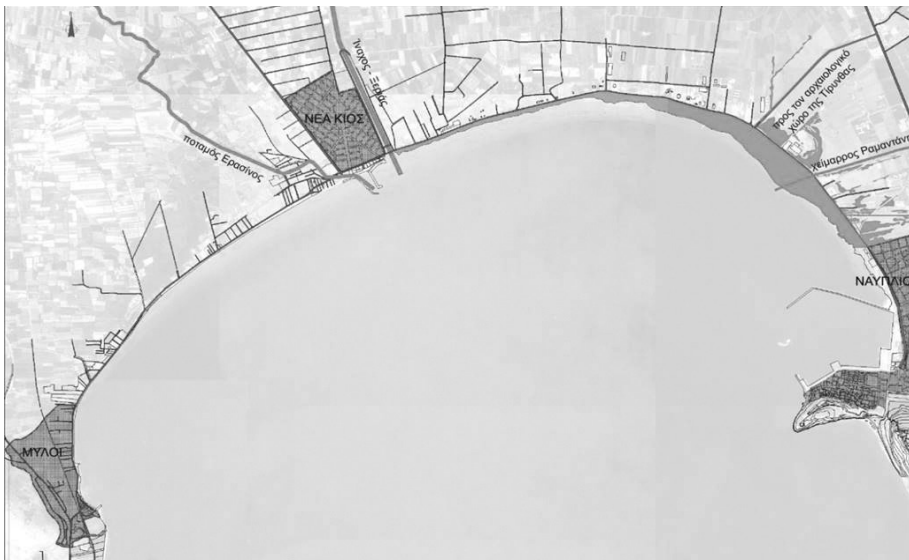
The most intense presence on the waterfront belongs undoubtedly to the nightclubs. Most are functioning and in some cases they are also using the adjacent free spaces as parking lots.

The problems

- A basic problem in the waterfront zone is represented by the complete disassociation of the beach from the residential zone. *The high-speed circulation road* which intervenes in the middle constitutes the most important cause for the seclusion of the beach zone. At the same time, the lack of sidewalks for the most part of the road deprives the area of pedestrian use throughout the length of the coastal zone.

- In the *wetland* developed in the coastal zone, an important problem is the placement of debris and garbage. Considerable levels of pollution also occur due to industrial waste, to the pollution of the aquifer by pesticides and to the incomplete function of the adjacent biological treatment installation. Another problem is that the entrance of cars is allowed in the wetland, as well as its use as pasture. The uses in the area alongside the entire wetland must also be controlled: the night lights and noise coming from the nightclubs and the speed of passing vehicles are driving the birds away.

- There is *no formed beach space* at numerous parts of the studied zone. It is



also noted that the touristic infrastructure works of the existing beach are limited, with questionable aesthetics. Moreover, there is a total lack of care and planning for planting, which leads to vegetation springing up randomly and often at the wrong spot, while at other points the roots of the trees are destroying the pavement.

- The important archaeological sites of *Tiryns and ancient Timenio* are not recognizable and utilizable. They lack the necessary means for their protection and promotion within the context of their archaeological and historical importance.
- The historic rivers *Inachos and Erasinós*, both linked to mythological references, are equally cut off. More specifically, the Erasinós waterfront zone, which is also an important wetland, is threatened by the illegal construction activity and by the lack of the appropriate measures and works for its protection from the sea water coming towards it, through technical works of drainage.
- Finally, one must mention the *abandonment* of the substantial industrial complex which once housed the 'Pelargos' industry.

General proposals

- In order to improve the connection of the beach with the residential zone, one must initially reexamine the metric features of the route between Nafplio and Nea Kios, with the aim to reduce vehicle speed. The road must be redesigned in order to acquire pedestrian and bicycle lanes, as well as to ensure the necessary access towards the beach. Special design must also take place in order to connect the waterfront zone with the route alongside the banks of rivers Erasinós and Inachos, as well as to highlight the location of ancient Timenio.
- The wetland developing at the Nafplio – Nea Kios waterfront zone is in immediate need for protection, upgrade and promotion. It must be protected legislatively and liberated from garbage and debris. This operation must take place during the appropriate

season, in order not to disturb the avifauna, which is so typical of the region. At the same time, measures must be taken to control the pollution caused by industrial waste, by pesticides and by biological treatment. Entrance to this area must only be allowed for pedestrians. All uses taking place on the route alongside the wetland must be controlled through legislation, as well as the night lights, the noise caused by nightclubs and the vehicles' speed.

- The protection and promotion of the river Erasinós demands the control of illegal constructions on the waterfront zone as well as around the banks, the delimitation and protection of the wetland and a study for the area's rehabilitation, with the creation of a pedestrian route alongside the riverbank and its connection to the beach.
- It is proposed the reuse of the abandoned buildings and installations which are directly linked to the coastal zone, in ways compatible and reinforcing to the uses taking place on the beach.
- Moreover, it is proposed to design a space with light-frame constructions enabling bird watching without disturbing these species. With the advice of an ornithologist, a typology design research was conducted for the creation of light-frame constructions

The high speed road and the Pelargos industry.



Accessibility for pedestrians, observation of the avifauna and recreation.

Entrance shelter.

Watching tower.

in the wetland, and were determined their construction specifications.

Light-frame constructions cover the need for:

- accessibility for pedestrians, bicycles and people with limited mobility,
- marking, information and update,
- observation of the avifauna
- respite and recreation.

Light-frame constructions will also be marking the beginning and ending points of the route within the wetland, they will formulate the necessary access points towards the coastal zone, they will resolve circulation above the streams, organize as much as possible parking spots outside the waterfront zone. The necessary auxiliary and technological equipment for the area's proper functioning was also suggested.

Details of the proposal for the installation of light-frame constructions

Light-frame constructions are placed at the points marked with an E on the plan of the study area, accompanied by the following observations.

Point E1 which will constitute the route's future Reception and Entrance point.

Point E2 is to be the temporary entrance point to the area. It welcomes the visitors-walkers and it is also connected to the Parking anticipated to be built at the opposite side. It includes an entrance shelter, lounges and general information boards, as it will constitute today the first entrance point to the area. At the same time, it hosts the special theme 'Agricultural land' with special educational information, highlighting man's relationship to this land, given that Point E2 lies at the end of the 'Ramadani' stream, which is important feature of the wetland.

Point E3 includes a tall bird watching tower and an exhibition kiosk hosting the theme 'Local production'. It lies across the warehouses and offices of the Union of Agricultural Associations of Argolis. An illegal construction used to lie here; it has been removed, but its traces are still visible today.

Point E4 can be seen at the road axis connecting the archaeological site of Tiryns with the wetland and it includes an information board entitled 'Tiryns and fortifications'. It alludes to the ancient fortifications and to their relationship with the environment. Like in Point E3, an illegal construction was also present here; it has been removed and its traces still stand. A natural playground is formed at this spot, free of ready-made equipment, only with small modifications of the existing natural elements.

Point E5 includes a short bird watch tower and an exhibition kiosk on 'Man and environment'. This spot, almost half-way across the route, disposes a large flat surface at the height of the road, due to illegal and extensive earth filling. An entrance kiosk is placed at that very spot, in order to welcome visitors arriving by tourist buses, and a bus stop is also anticipated.

Point E6 includes an information board themed 'Environment and development' as well as a rest area with a plant-covered shelter. Some public agricultural properties are available above the road, next to the public Center for Vehicles Technical Control (KTEO). The theme which was selected is directly linked to the proposal for the future creation of creative workshops across the public area.

Point E7 includes an information board entitled 'Timenio and ancient ports'. It draws on the traces of the ancient port which are still visible in the sea. Alongside the information material on ancient Timenio, it is proposed to construct a small wooden platform inside the water, leading the visitor close to the traces of the ancient harbor.

Point E8 includes an information board on the 'Pelargos' company. The open-air area at the abandoned industrial complex of the 'Pelargos' industry is designed to receive a parking space with added plants. One has to note the need to redesign the old Pelargos factory, in order to house activities pertaining to the center of environmental information and education, which will also support the function of the seaside zone.



In addition to the above:

- 3 types of bridges are being designed for the points where the route converges with the streams which flow out into the sea
- rest areas are placed at select points, as well as fountains and garbage bins
- passages from across the street towards the wetland are marked with a change in material at all points where parking will be allowed, while efforts must be made to reduce the allowed speed limit
- the studied area's phytotechnical characteristics and vegetation are documented and evaluated and suggestions are being made for their remediation, cleaning and maintenance, as well as for their enrichment with plantations at certain points
- low lights are also suggested along this route, as well as the installation of a wireless wifi network.

Moreover, a water supply network is also proposed, as well as lighting for the parking spaces above road level. Electric power and free wireless internet connection will be also available for the information kiosks – this will allow visitors to electronically visit the premises and digital educational programs can also be developed within the area of the wetland.

Conclusion

In closing, the waterfront zone of Nafplio – Nea Kios, with its powerful characteristics, can constitute an important cultural axis and a specialized park, unique in the region.

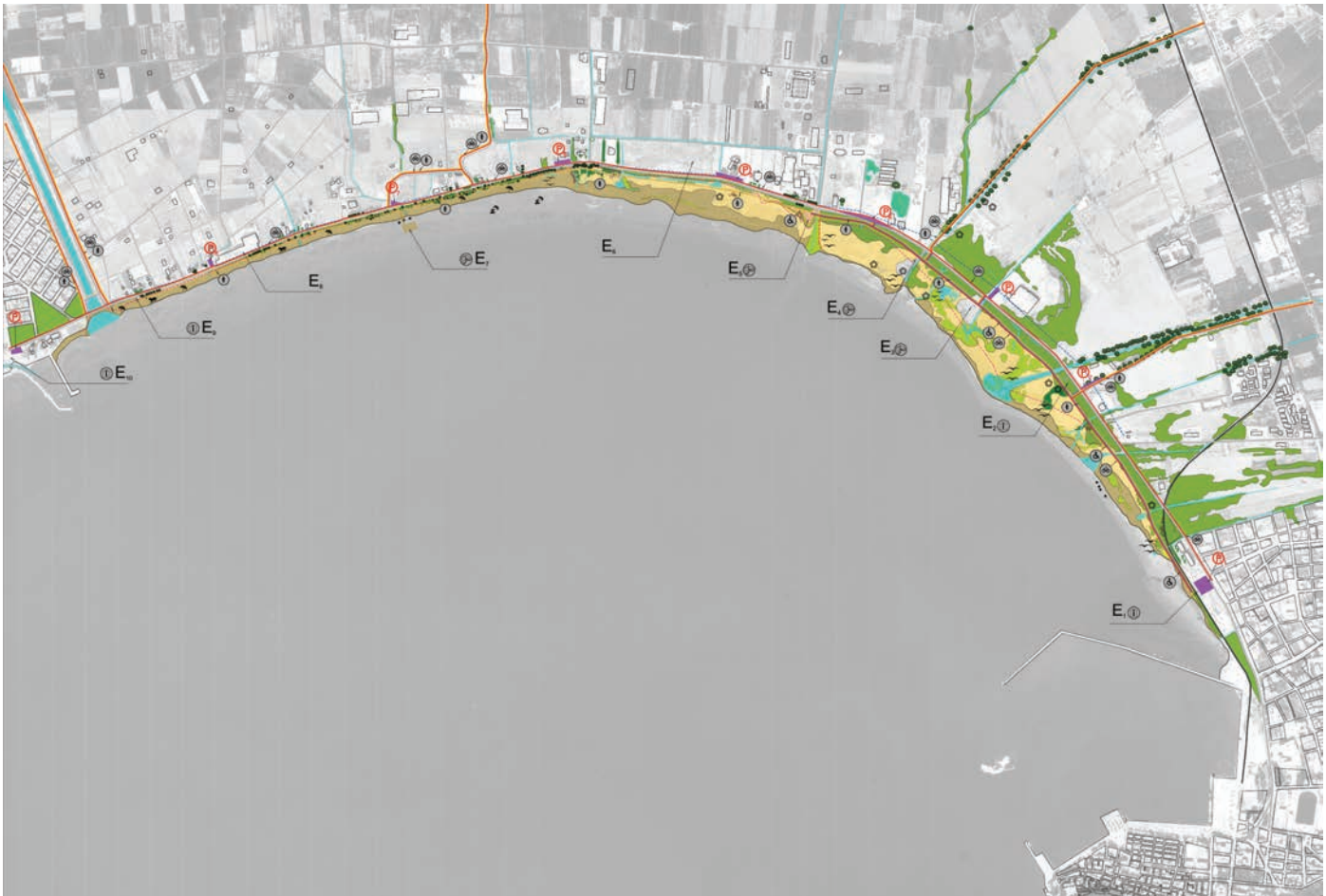
Combining elements of environmental, historic and local value, it will regain its relationship with the residential areas it crosses and it will contribute to the

Plan of the study area.

NEXT PAGE

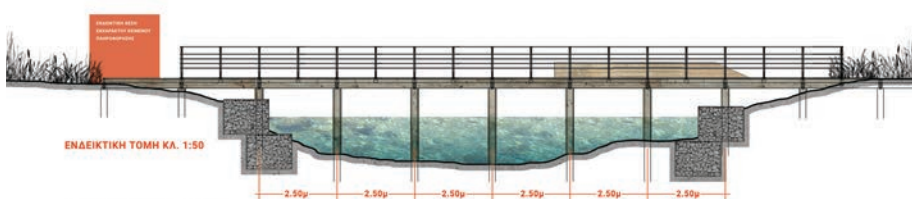
A part of the study area.

A bridge over a stream.





ΤΥΠΙΚΕΣ ΛΕΠΤΟΜΕΡΙΕΙΣ ΓΕΦΥΡΑΣ
(ΕΠΑΝΑΛΑΜΒΑΝΟΝΤΑΙ ΜΕ ΔΙΑΦΟΡΕΤΙΚΕΣ ΔΙΑΣΤΑΣΕΙΣ ΑΝΑ ΠΕΡΙΠΤΩΣΗ)



ΕΝΔΕΙΚΤΙΚΗ ΤΟΜΗ ΚΑ. 1:50



ΕΝΔΕΙΚΤΙΚΗ ΚΑΤΩΨΗ ΚΑ. 1:50

sensitization of the local population for cultural heritage and environmental protection, as well as to the reinforcement of specialized tourism.

Note

The study took place at two stages, by an interdisciplinary team, composed of:

1st stage:

Research team: prof. MAISTROU ELENI, scientific responsible, DIMITRIS PSYCHOGIOS, M.Arch and PhD, man researcher, MARINA KYMPOURI, M.Sc, ELENI MALAMATENIOU, M.Sc, EIRINI OIKONOMOPOULOU, M.Sc

Collaborators: prof. KOSTAS MORAITIS, associate prof. GEORGIA MARINOU, CHRYSANTHI KARPANOU, M. Arch.

2nd stage:

Research team: prof. MAISTROU ELENI, scientific responsible, prof. KOSTAS MORAITIS, DIMITRIS PSYCHOGIOS, M. Arch and PhD, assistant professors: ELENA KONSTANTINIDOU, VALENTINI KARVOUTZI, STAVROS GYFTOPOULOS, MARIA MARLANTI AND DIMITRIS SAGONAS, M. Arch.

Collaborators: MARIA PAPAIOANNOU, architect, environmental scientist, FRAN VARGAS and NIKOS TSOPELAS, Greek Ornithological Society, A.D. MAISTROS, mechanical engineer.

References

<http://arcadia.ceid.upatras.gr/pausanias/argolida.php>. The tour of Pausanias in the ancient Argolida

DOROVINIS B., (1990), *Timenio, the port of Ancient Argos*, in Argos et l'Argolide : topographie et urbanisme. Actes de la Table Ronde internationale, Athènes-Argos, 28/4-1/5/1990

LARMOU C., (2013), *The ancient rivers of the Argolid*, in Argolikos archival library history and culture www.argolikivivliothiki.gr

PITTEROS CHR., (1994, 2000), *Ancient Timenio*, in Archaeological Bulletin volume 49/1994 and 55/2000

ZALIDIS G., CRISMAN T., GERAKIS P., (2002), *Mediterranean wetlands restoration*

ZANGGER E., (1993), *The Geoarchaeology of the Argolid*. Berlin 1993

Law for the Protection of the Environment 1650/1986

Law for the seashore protection 2971/2001 and 3201/2003

Surface Water Flows Management and Change of Urban Landscape in Thiva

Ismini Kourouni

This chapter deals with the management of the rivers and the streams of Thiva's urban landscape. Although the water element is necessary for the human survival and the preservation of the ecosystem, in recent decades, societies have not treated it properly. They underestimated the water bodies, contaminated them, diverted them and confined them into pipes. The state of Thiva, as many other cities of Greece, took decisions for coverage of surface waters and their incorporation into the sewer network. The negative effects were quickly noticed. In recent years, innovative rehabilitation programs are applied abroad and their outcomes are monitored and evaluated. The data so far are promising and relate both to the ecological improvement of water sources and to revitalization of waterfronts.

The urban aquatic network

The aquatic network of the urban area of Thiva consists of two culverted rivers and a culverted creek. Once, the Dirce River was flowing on the west side of city's hill, Cadmeia. Its springs were to the ancient Potnies, currently named Tahy. The waters were flowing near the walls of the hill and after crossing Pyri district were joining with the Ismenos River. To the east side, in periods of high rainfall a small creek was forming along an elongated hollow bearing the name

Koili Odos. Its recent name is Cryssoroa Stream. In the east, at a short distance from the hill the Ismenos River was flowing, which later renamed to stream of St. John, in memory of Saint John Kalohtenis who implemented hydraulic engineering so as waters to move over twenty five mills (VASILEIOU ANT., 1967). Its springs were on the hill of Ismenius Apollo. After crossing Saints Theodoroi district, it is merged with Dirce River. They both flow into the Iliki Lake.

The importance of water element for the city

For the residents of Thiva, surface waters were until recently the main water source and important agricultural and wealth factor. They contributed to the continuity of habitation and determined significantly the local culture.

The water paths formed the natural background of the city. The confluence and linear motion of water formed the pear-shaped hill Cadmeia that constituted an ideal site for the establishment of the acropolis. At the same time, the catchment area created the fertile ground for the cultivation of agricultural products.

According to Apollodorus, *the foundation of Thiva by Cadmus was based on ensuring drinking water* from the spring which was guarded by the Dragon of God Mars. Pausanias identifies it as

The aquatic network of ancient Thiva in comparison with the underground storm water network and sewer network of the General Urban Plan of Thiva, 1987. (Source: Ismeni Kourouni. The first diagram is based on topographical map designed by M. Chrysochoos, published in book of G. Sotiriadis, *Peri tis topographias ton arhaion Thivon, apospasma ek tis Epetyrydos tou Parnasou*. The second diagram is based on map P 2.32/2.42 of the General Urban Plan of Thiva, 1987, Greek Government Gazette D 1011 - 13/10/1987).

the Ismenos River but recent studies indicate the fountain of Dirce River (PAPAHATZIS N., 1981). Those two rivers supplied the city with water for many centuries. With aqueducts, underground tubular or aboveground arched, water was distributed to municipal fountains. Some of them gradually pushed aside and ceased to be used. However, in the early decades of the twentieth century, that scarcity problems occurred, they were cleaned and operated again providing sufficient amount of water (ANAGNOSTOPOULOS N. & D., 1939).

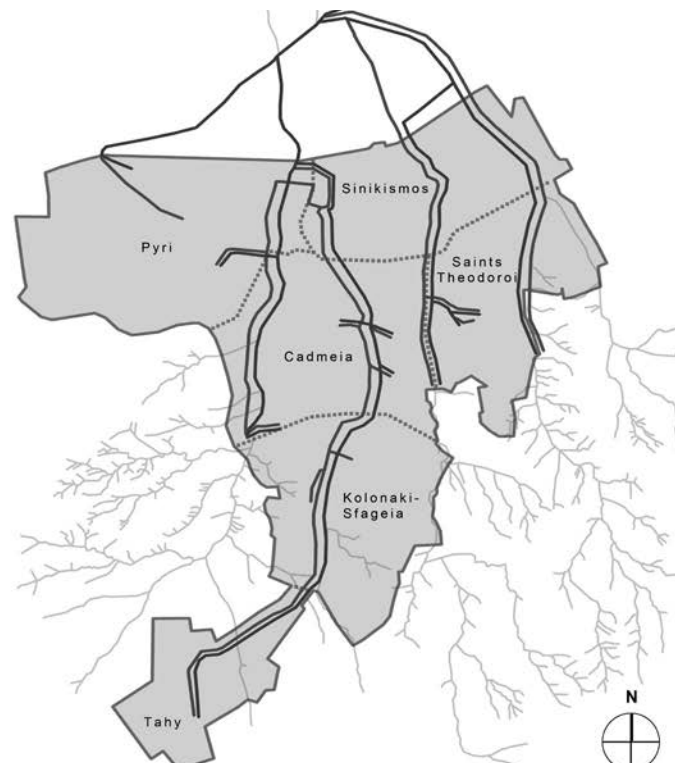
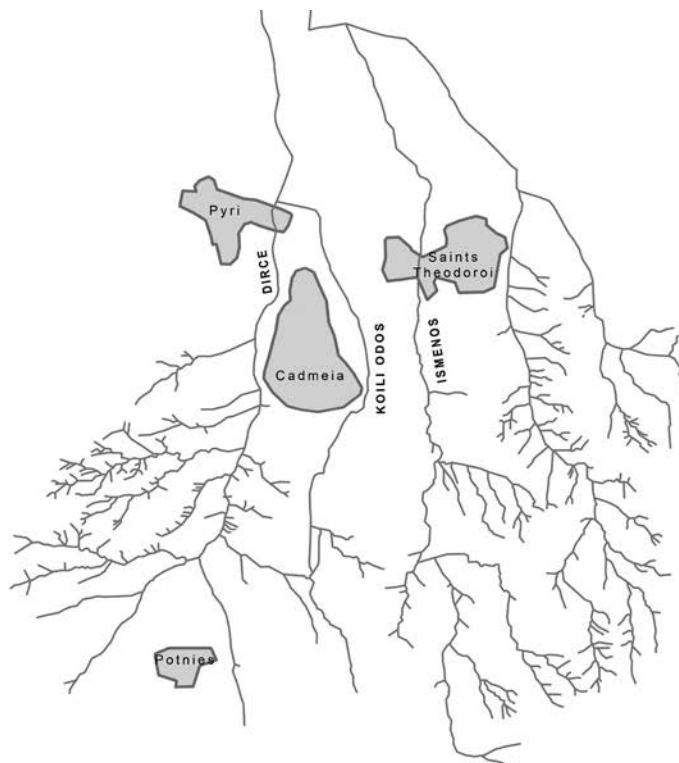
From the same or different aqueducts and open channels water was transported to the plain for the irrigation of fields. The rural character of the city is maintained until today. In fact, agriculture is one of the main employment sectors. The residents rapidly took advantage of the kinetic energy of the river flow for the operation of craft industry. At least from the Byzantine times watermills and silk dyeing workshops were located along Ismenos and Dirce (KOILAKOU CH. 1991, 1999). These activities significantly strengthened the economy and the power of the city.

For residents and visitors, wetlands of Thiva constituted places of recreation. The riparian zones were forming a pleasant microclimate that was attracting many walkers.

Rivers and streams were contributing to conservation of the ecological balance. These were channeling rainwater in basins and were protecting the city from floods. Moreover, aquatic and riparian plants were operating like natural filters for cleaning waters of pollutants and for retention of nutrients.

Rivers along with other site elements composed the cultural landscape of the city. Within this environment, people paved their way, formed their memory and evolved. All structures that arose from it express its genius loci and have uniqueness.

Many human creations derived from the need for crossing the rivers or for water exploitation. These, in addition to their utilitarian function had an artistic intention and improved aesthetically the landscape. For example, the arches of the aqueduct in Kolonaki and many fountains and bridges were the main themes of depiction and description of travelers (STACKELBERG 1834, SKENE



1838-1845, LERCHENFELD 1887, PERILLA 1929). Furthermore, scenes of human activity around the rivers have been rescued from mythology and ancient dramas and are still heard in poems, songs and local stories.

Reasons that led to the covering of surface water flows in urban area

During the 20th century, the quantity and quality of surface water have been deteriorated and as a consequence its importance to the operation and development of the city has been underestimated. Permanent removal of rivers and streams occurred in 1980 after the decision on integrating them into the sewer network.

The main reason for water reduction was the imprudent drilling of boreholes in the plain. John Koumantakis, in his study, reported that in 1980 aquifers were in negative balance, hydrostatic level and underground supplies had decreased. In the 1950s, the problem was already evident. Newspapers of that period refer to constant interruptions of water supply and discontentment of residents (THIVAIKOS TACHYDROMOS, 15/07/1933). *The exploitation of water from water mills, the train station and the camp, along with the irrigation requirements were impossible to meet only from the sources of the rivers.* Even before, the travelers of the 18th century who visited Thiva describe Ismenos and Dirce with scarce water, due to its utilization for the motion of water mills and for watering the fields (HOBHOUSE 1813, GELL 1819, HUGHES 1830, STANFORD – FINOPOULOS 1984).

The problem of drinking water was solved by six boreholes drilled from the Municipal Enterprise for Water Supply and Sewerage. The mills were reconstructed and operated by electricity. New boreholes covered also the needs of industry. After those, rivers and streams with scarce supply had to be settled. What role would they play in the new reality of the city?

The cessation of traditional activities connected with the natural flow of water led to the devaluation of conservation of rivers. Since they were not necessary for the supply of municipal fountains or for the industries, there was no reason for their maintenance.

The perception of their one-dimensional use, determined their future evolution. The community had not realized their contribution to environmental, aesthetic, social and economic improvement of the city.

The lack of knowledge and exemplary applications were key factors for the decisions taken in recent decades. In periods of low flow and amount of water, there was no plan for the support and cleansing of riverbed.

Furthermore, *standing water combined with litter gave to the issue a negative connotation and turned it into a problem.* The removal of rivers and streams was presented from indifferent to beneficial to the good image and sanitation of the city.

As a common practice, *the General Urban Plan of 1987 proposed the integration of Ismenos', Dirce's and Cryssorroa's waters in the sewer network of the city.* This decision, without research on the negative implications marked the final alteration of landscape.

Moreover, *the conversion of land into building sites* to Sinikismos quarter, after the arrival of refugees from Asia Minor, and to Pyri quarter without concern for protection of the sites of rivers, interrupted the continuity of the water line to the Iliki Lake. Respectively, *the establishment of highways near rivers* altered the buffer zones, such as the Oplarchigou Vogli Street in Ismenos River and Elefsina - Thiva National Street in Dirce.

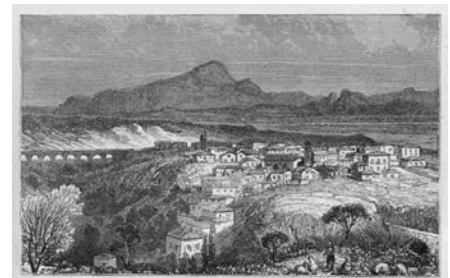
Impacts of the integration of rivers and streams in underground sewage network

Ismenos, Dirce and Cryssorroa were dominant elements of Thiva's landscape for centuries. Alterations made by their removal were rapid and influenced all aspects of everyday life. Nowadays, visitors hardly identify their remnants in the area.

The main impacts refer to environmental and ecological aspects. The relevant studies refer to them using the term of an "urban stream syndrome" (WALSH ET AL., 2005). In Thiva, flora and fauna have been particularly affected and biodiversity has declined. The reeds and poplars presented in old engravings are absent from the current landscape.

Depiction of Amand Schweiger Lerchenfeld (edition 1887). On the left the arched aqueduct of Kolonaki and on the right a bridge of Ismenos River. Nowadays, they are both destroyed (Source: Amand Schweiger Lerchenfeld (Freiherr von), Griechenland in Wort und Bild, Eine Schilderung des hellenischen Königreiches, Leipzig, Heinrich Schmidt & Carl Günther, 1887/Kettwig, Phaidon, 1992).

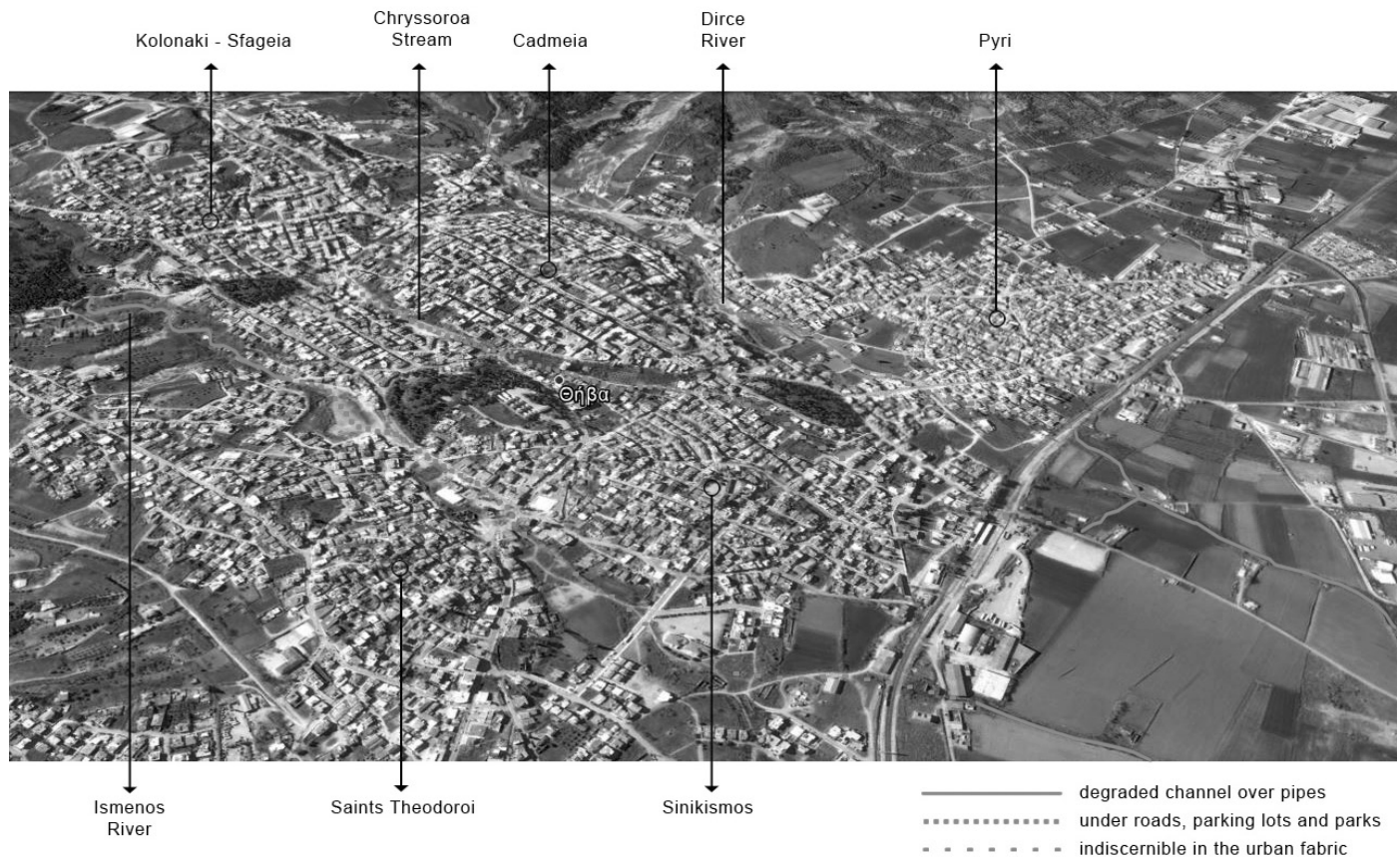
Depiction of Thiva by Oto Magnus von Stackelberg, 1834. View from Saints Theodoroi. In front, Ismenos River with scarce water (Source: Otto Magnus von Stackelberg, La Grèce, Vues pittoresques et topographiques, Paris, Chez I. F. D'Ostervald, 1834).



Current situation. Signs of rivers and streams over the storm water network and the sewer network. View from NE to SW. (Source: I. Kourouni. The diagram is designed over the image of Google Earth 20/02/2014).

Furthermore, the topography is different since the riverbeds have been flattened and in many parts channels are indistinguishable. Moreover, the decrease of plants along rivers has fragmented the green areas of the town. In the past, from south to north, the vegetation of the hills was connected with that of the rivers and was expanding into the plain. Besides natural, built environment has been affected as well. Since the surface waters transported in underground pipelines, new public spaces were generated and consequently new paths that cross them. In the past, only bridges were linking the regions on both sides of rivers. Moreover, in certain parts roads and buildings were constructed. Some areas were abandoned and became spots of waste disposal. Thus, the city lost considerable natural promenade routes. In particular, above the Dirce River the Elefsina - Thiva Highway has been constructed. This excludes pedestrian traffic and blocks access to the archaeological site of acropolis walls and gates.

In Pyri quarter, the river traces are indiscernible among the buildings. At the northern region of Chryssorroa Stream, before the recent restoration works, an outdoor market was operating and the remaining space was used arbitrarily as a parking area. In Ismenos River no configuration performed a part of it has been covered by Oplarchigos Voglis street. As a result, many utilitarian elements of the built environment related to water were destroyed. For example, bridges, municipal fountains, aqueducts and many water mills were gradually ruined, either because of their uselessness or because they hindered redevelopment projects. The loss of these structures undermines the longstanding connection of city with water. Furthermore, it is responsible for the aesthetic degradation of the landscape, since all manmade structures attach a value to the natural environment and reflect the culture of inhabitants. Younger generations have lost a piece of historic memory of the site. Their contact with rivers and streams is accomplished



only through the oral and written testimonies. This means greater effort for citizens' awareness and sensitization on issues related to the protection of the environment and cultural heritage.

Moreover, the places of communication and socialization have been mutated. The fountains and the mills constituted meeting places. In the outdoor area, people were getting in contact and were participating in public debate on their common issues.

Finally, the areas around the rivers receive a significant financial blow. Once, they were privileged because of their natural landscape and the energy source. They were attracting many land uses. Currently, discredited, are missing a major opportunity for economic revitalization.

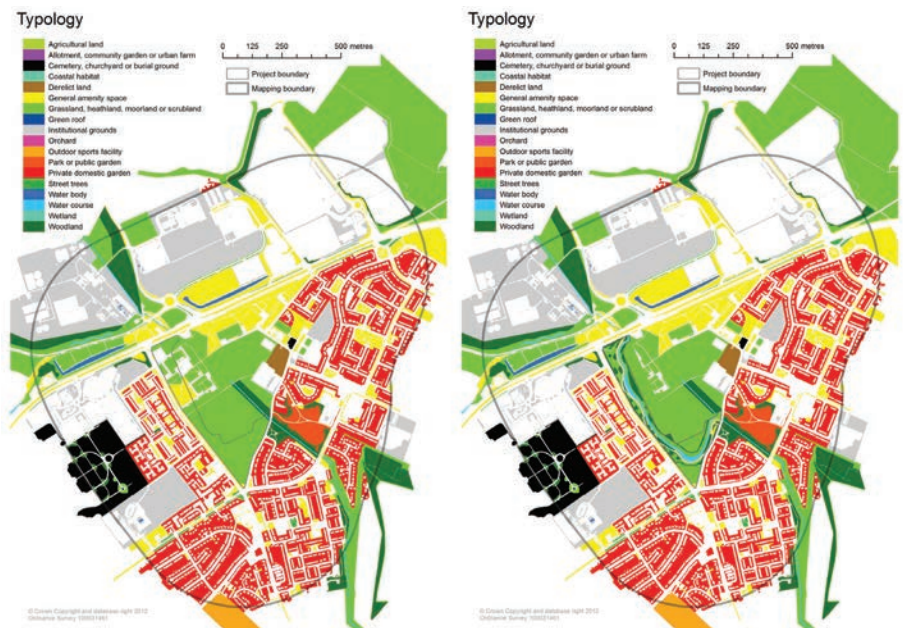
Contemporary management methods and restoration processes of degraded rivers and streams

Current attitude on sustainable management of water resources (Directive 2000/60/EC), has formed a promising framework for the restoration of streams in the urban landscape. Many applied projects abroad (Europe: restorerivers.eu, America: www.americanrivers.org, Australia: arrc.com.au, Asia: www.a-rr.net), demonstrate their feasibility and provide useful data on the effectiveness of the methods and the rate of success in reintegration of these areas in the daily life of citizens. The natural hydrological network of a

city constitutes a complex ecosystem (PAUL AND MEYER, 2001) and key factor for urban development (GUL SIMSEK, 2012). Thus, the decisions concerning its treatment should be supported by various scientific disciplines (RESTORE AND ECRR, 2013). The stream restoration method, which is chosen as the most suitable in each case, is determined by many parameters and must be included in integrated strategy for spatial management (SHIELDS ET AL., 2003). Solutions that are rapidly effective can be overestimated, that is why the pros and cons should be weighed up and the restoration time should not be a dominant factor or a barrier.

River Alt and Croxteth Brook Restoration Project, Liverpool, England, 2012-2015. Plan of the project site before the daylighting and the proposed design case (Source: The Mersey Forest for Cass Foundation, April 2013, River Alt Restoration Project: Green Infrastructure Baseline Report).

River Alt and Croxteth Brook Restoration Project, Liverpool, England, 2012-2015. Before the excavation 01/03/2014 and after the daylighting, 02/07/2015 (Source: https://restorerivers.eu/wiki/images/a/a2/3_Before_March_14_1.JPG and https://restorerivers.eu/wiki/images/0/07/July_15_2.jpg).



Cheonggyecheon Stream restoration project, Seoul, South Korea, 2003 – 2005. The elevated highway over the stream, before 2003 and the new meandering channel in the limited urban space after daylighting (Source: <http://www.skyscrapercity.com/showthread.php?t=1410252&page=33> & <https://www.flickr.com/photos/fotoshane/2939003436/>).

Conceptual site plan presented in 2002 by the Research Center Director of the Seoul Development Institute (Source: <http://landscapeperformance.org/case-study-briefs/cheonggyecheon-stream-restoration>).

In cases where river or stream channels have been integrated into sewage networks and are later covered with streets, buildings or parks, extensive studies are conducted on the possibility of daylighting them. The *daylighting* is a practice quite interventional to the environment. It refers to projects that expose some or all of the flow of a previously buried river or stream (PINKHAM, 2000). The first projects have been held in Napa of California and Urbana of Illinois in the 1970s. However, that which is considered to be the archetype and has inspired many similar programs to be implemented is the daylighting of Strawberry Creek in 1984 in a park of Berkley, California (BERNHART AND PALMER, 2005).

The American Rivers Organization to its report *"Daylighting streams: breathing life into urban streams and communities"* refers to *cultural restoration* as a type of daylighting. This term describes the highlighting of a river or stream with signs and artifacts that inform the public about the historical waterway, as long as it remains covered. Despite the fact that it does not have the benefits of daylighting for flood mitigation, water quality improvement and storm water control it actively contributes to reconnecting people with the river sites.

Successively, *operations that follow the daylighting relate to the redesign of the river channel*. When waters were flowing into pipelines, the channel had to be aligned so as them to move rapidly in high flow rates. However this model was problematic because it was provoking high pressure downstream (The River Restoration Center, 2013). Thus, in most cases of daylighting, the created surface waterway is meandering and resembles to the historic or to a new design determined by specific models.

Then, *the bank shaping and stabilization can be achieved by either structural or bioengineering materials* (ALLEN AND

LEACH, 1997). The design concerns the bank angle and streambed geometry. Experts define the dimensions; the bed surface and the cross section according to suggested theoretical models by various classification systems (ROSGEN, 1994) or according to similar unaffected reference sites (NEWBURY AND GABOURY, 1993) or according to other composite methods (SHIELDS ET AL., 2003). Bioengineering treatments use tools such as root wads, willow stakes, brushwood mattresses, rocks, logs and many others. These can be combined with geotextile which hinders shore displacement and enable vegetation. Such treatments are quite successful in rural areas. However, in urban landscape, where high flows in combination with slight sediment transport create high corrosive potential, building materials with proper planning and implementation are more effective.

For the overall improvement of the aquatic network the restoration of storm sewer lines is essential (US Army Corps of Engineers, 2013). Daylighting projects can divert urban runoff from combined sewer systems before it mixes with sewage, reducing combined sewer overflows and burdens on treatment plants. Bioretention cells, vegetated swales, permeable pavements and other storm water management practices can be used to achieve flood control, channel protection, ground-water recharge, and pollutant removal.

Daylighting projects, in urban or rural landscapes, are completed usually by riparian planting. In most cases it is implemented in order to restore the areas affected by the intervention procedure or to form the buffer zones (FISCHER AND FISCHENICH, 2000). The selected plant species may have a reference to the previous natural state or adopt a new proposal. In dense cities the riparian



corridor is limited in extent and often comprises pedestrian walkways. The vegetation improves the bank stability and enhances biodiversity. Furthermore, it upgrades aesthetically the landscape.

The above operations are integrated in wider contexts - management methods that determine the way and the extent of their application. In bibliography various terms are used in order to distinguish intervention methods (BRADSHAW 1995, SHIELDS ET AL. 2003, SIMSEK 2012). Their diversity lies in the objective while depends on the current situation.

A.D. Bradshaw (1995) attempted to clarify the terms and created an explanatory diagram. His claim is that *restoration*, in literal meaning, which refers to the recovery of original state and operating conditions of the stream, before they are disturbed by human intervention, is practically difficult. On the contrary, *rehabilitation*, which resembles to restoration, does not include the requirement of perfection and it thus considered to be a more realistic target. *Remediation*, *replacement* and *reclamation* are placed in different axis. These methods are adopted when the stream changes are irreversible and restoration is not based on feasible basis. Their results are new improved ecosystems with their own value but differentiated compared to the original.

Remediation means recovery to good condition or operation. The focus is on the process rather than on the result. The objective is to improve the ecological status, but the endpoint does not necessarily resemble to the initial one (RUTHERFURD ET AL., 2000).

Replacement provides a substitute or equivalent place. As a process it is sometimes possible to offer greater results than rehabilitation, for example, higher levels of productivity.

Reclamation means returning to a good state that involves the concept of utility. The term is commonly used to explain the alteration of land so as to become capable of cultivation.

Bradshaw gives special importance to the choice of the appropriate method. The end point of full restoration, though it may seem morally more justified and therefore the most obvious choice to adopt, it may actually not be the most reasonable in practical or biological terms.

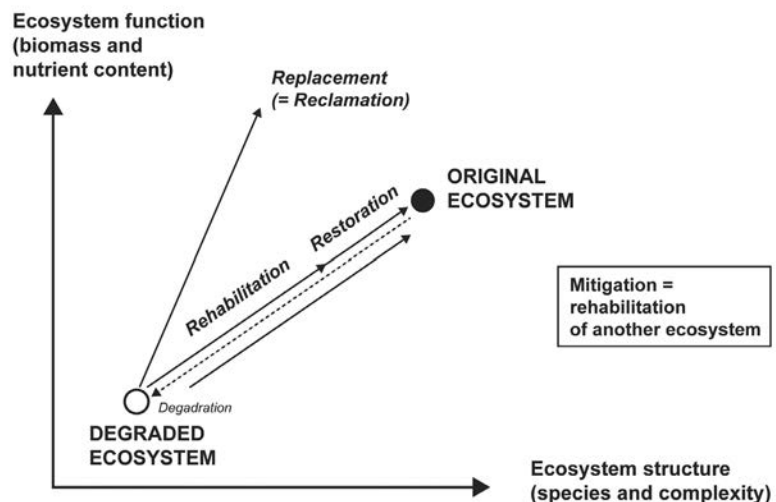
The case of cultural restoration of Chryssoroa stream

The township of Thiva in recent years actively attempts the sustainable development of the city and the quality improvement of residents' life. The objectives comprise the promotion and integration of archaeological and historical sites as well as the protection of topography and the natural landscape of ancient Cadmeia. As part of the above mentioned, studies are carried out for the rehabilitation of the regions of Ismenos, Dirce and Chryssoroa which are classified as public open spaces since the Town Plan of 1979.

The first implemented project relates to the area of the culverted Chryssoroa stream and its conversion into an architectural - bioclimatic promenade. This linear region is located in the eastern foothills of Cadmeia and on the west it includes archaeological relics and parts of the walls and gates of the ancient city.

The publications do not provide information on whether any investigation was conducted on the potential of daylighting the stream channel. The method chosen is that of "cultural restoration". The water path was signaled and the public space was converted into a pedestrian zone and bioclimatic park. The redesigned area has a total length of about 400 meters and a width ranging from 25 to 60 meters.

Bradshaw's diagram showing the differences among the various methods of intervention to degraded water bodies (Source: Bradshaw A. D. (1995) "Underlying principles of restoration", Can. J. Fish. Aquat. Sci. 53(Suppl. 1): 3-9).



Area of Chryssoroa Stream before the cultural restoration in 2014 and after the construction of bioclimatic park in 2016. View from NE to SW (Sources: Google Earth 20/02/2014, http://thivagr.blogspot.gr/2016/04/blog-post_13.html).

View from south. On the left the hillside of Cadmeia and the archaeological path, in the middle the straight pedestrian path and the central circular plaza (Source: I. Kourouni, 06/06/2016).

Before the restoration works the area was deprived. Many trees had been cut, the vegetation was neglected, the southern part was illegally used as a parking lot and in various places excavation materials were unloaded. To the north a street market was operating twice a week. The greater threats were the encroachments and the transformation of the side hill because of earth fills that would hinder rescue excavations and preservation of archaeological elements.

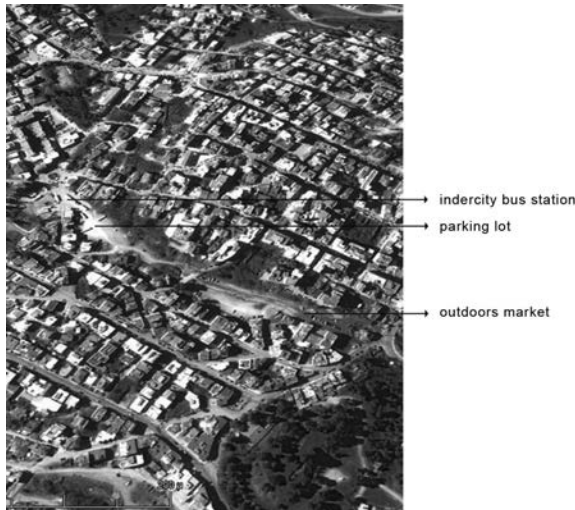
The project has implemented two courses, one main pedestrian - bicycle path almost straight and a second track of archaeological interest which follows the lowest contour line of the hill. Along the paths squares and playgrounds have been created. Tall trees have been

planted to the east, bushes and flowers to the remaining area and lawn to the slope of the hill. The covering materials that have been used were cold as paving blocks, permeable stabilized soil and cold photocatalytic asphalt. For lighting photovoltaic panels have been installed and for irrigation a water supply by the Municipal Water Supply Network has been used.

The restoration project has achieved its objectives about the creation of a pleasant bioclimatic promenade for pedestrians and cyclists. The air temperature has been lowered and the ventilation in the North-South axis has been favored. The photovoltaic panels that illuminate the park at night are an example for the ecological management of natural resources. Moreover, the archaeological path highlights the limits of the ancient city and all relics at the hillside. Finally, the neighborhood has been revived in all aspects and the everyday life of residents has been improved.

Restrictions and prospects of the intervention in the urban aquatic network

Summing up, water paths constitute an important factor for the development of Thiva. In the past, when rivers and streams were open, had an active role in the daily life of residents. Nowadays, that condition is different, experts have to decide on the new urban function of water element.



"We must act to include water policy objectives much more into other policies."

JANEZ POTOČNIK, EUROPEAN COMMISSIONER FOR THE ENVIRONMENT

The record of Strengths and Weaknesses of current situation is appropriate for its evaluation. The methods of natural or cultural restoration, as described above, should be investigated thoroughly. Potential Opportunities and Threats that may arise would determine the final choice (PINKHAM, 2000).

In particular, for the rivers and the streams of Thiva that are contaminated, daylighting would be beneficial. The exposure of water to sunlight and fresh air would improve its quality. The aquatic and riparian vegetation that restrain organic and inorganic pollutants would contribute to the cleanliness of the water. In addition, the flow of water in permeable bed would replenish groundwater and would enrich the soil with nutrients. However, before that kind of intervention the water level should be monitored and experts ought to estimate the amount of water that will gain or lose the channel.

As for the existing uses, which are above rivers and streams, such as roads and buildings, for the decision of their removal a counterbalance should be determined. Among the opportunities that can arise are the highlighting of archaeological sites and the configuration of a course that consolidate them. In the area of Dirce River, the historic boundary of Cadmeia hill could be restored. However, this is hard to be achieved as the national route Elefsina-Thiva should be removed. The region of Ismenos River is more favored, since a great part of it is away from the urban fabric.

The restoration of the aquatic network and the natural environment would be beneficial for reconnecting man with nature. New promenades would constitute alternative entertainment and exercise areas and would mediate so as residents to become more aware of the history of Thiva. Furthermore, the neighborhoods nearby would be revitalized, the property value would be increased, and businesses would be benefited by the new amenities.

Long-term objectives and assessment of developments could ensure greater durability and stability to the restoration project. Moreover, the contribu-

tion of scientists from various fields would be essential for the formulation of an integrated proposal. The public awareness in such cases is necessary. The community can participate in planning and implementation of the project and mainly to its protection and conservation.

Epilogue

In modern times, we have to deal with radical mistakes of natural resources management of the past. Thiva's state underestimated the value of the water element to the urban operation's sustainability. The covering of rivers and streams, although occasionally solved some problems – the storm water management and various sanitation issues- it effectively had negative impacts on the natural and built environment. The form and function of urban watercourses must be redefined, as the scientific community has previously noted. The proposed interventions should aim to improve water quality, increase the hydraulic capacity, revitalize waterfronts, improve functionality and aesthetics of the urban fabric, reconnect man with nature, improve the quality of life and create economic and employment opportunities.

The study and evaluation of foreign examples are useful in formulating proposals for Greek cities. These should be governed by interdisciplinarity, assess future developments, be included in wider policies of the site, pursue public participation in all stages of design and implementation and be available in the relevant collective databases.

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References

VASILEIOU ANT., (1967), *Ai Thivai tou Mesaionos - Agios Ioannis Kalohtenis kai i epohi tou*, Thivai
SOTIRIADIS G., (1900), *Peri tis topographias ton arhaion Thivon, apospasma ek tis Epetyrydos tou Parnasou*, Tipographio tis Estias, Athina

- Greek Government Gazette D 1011 – 13/10/1987.
- APOLLODORUS, APANTA 2, VIVLIOTHIKI, VIVLION C', EPITOME, (1992), *Archaia Elliniki Grammateia*, 620 "Oi Ellines", ekdotis Odysseas Xatzopoulos, eisagogi-metafrasi-sholia Filologiki Omada Kaktou, ekdoseis Kaktos, Athens.
- PAPAHATZIS N., (1981), *Pausanias Hellados Periiigisis, Voiotika kai Fokika, Eisagogi sta Voiotika kai Fokika, kritiko upomnima kai apokatastasi tou keimenou, metafrasi kai simeioseis, istorikes, archaiologikes, mythologikes*, Ekdotiki Athinon S.A., Athens.
- ANAGNOSTOPOULOS N. & D., (1939), *H periferia Thivon*, Archeio Georgooikonomikon Meleton, Athens, Agrotiki Trapeza Ellados.
- KOILAKOU CH., (1999), "Enas Byzantinos Hydromulos sti Thiva", journal Technology - enimerotiko deltio politistikou technologikou idrimatos ellinikis trapezas viomihanikis anaptikseos, issue 9.
- "Byzantina Ergastiria sti Thiva", (1991), journal Technology - enimerotiko deltio politistikou technologikou idrimatos ellinikis trapezas viomihanikis anaptikseos, issue 4.
- OTTO MAGNUS VON STACKELBERG, (1834), *La Grèce, Vues pittoresques et topographiques*, Paris, Chez I. F. D'Ostervald.
- SKENE J., (1985), *Monuments and Landscapes in Greece 1838-1845*, Athens, Historical and Ethnological Society of Greece.
- AMAND SCHWEIGER LERCHENFELD, (FREIHERR VON), (1992) *Griechenland in Wort und Bild, Eine Schilderung des hellenischen Königreiches*, Leipzig, Heinrich Schmidt & Carl Günther, 1887 / Kettwig, Phaidon.
- PERILLA F., (1929), *Mistra - Histoires franques-byzantines-catalanes en Grèce - notes d'art et de voyages*, Dessins-aquarelles-photographies de l'auteur, Athenes, Éditions Perilla.
- KOUMANTAKIS J., (1981), *Hydrogeologikes synthikes tis eurias periohis Thivon*, Digital Library "Theophrastus" - Department of Geology AUTH.
- THIVAİKOS TAHYDROMOS (1928-1934 & 1939).
- HOBHOUSE HOHN CAM, (1813), *Travels in Albania and Other Provinces of Turkey in 1809 and 1810*, Volume I, London.
- GELL SIR WILLIAM, (1819), *The itinerary of Greece containing one hundred routes in Attica, Beoetia, Phocis, Locris and Thessaly*, London.
- HUGHES THOMAS SMART, (1830), *Travels in Sicily, Greece and Albania*, volume 1, London.
- STANFORD – FINOPOULOS, (1984), *The travels of Lord Charlemont in Greece and Turkey 1749* from his own unpublished journals.
- WALSH ET AL., (2005), *The urban stream syndrome: current knowledge and the search for a cure*, Journal of The North American Benthological Society, 224.
- The EU Water Framework Directive, 2000.
- PAUL AND MEYER, (2001), *Streams in the urban landscape*, Annual Review of Ecology and Systematics, 32.
- SIMSEK GUL, (2012), *Urban River Rehabilitation as an Integrative Part of Sustainable Urban Water Systems*, 48th ISOCARP Congress
- RESTORE AND ECRR, (2013), *Rivers by design, Rethinking development and river restoration, a guide for planners, developers, architects and landscape architects on maximizing the benefits of river restoration*, Bristol: Environment Agency.
- SHIELDS ET AL., (2003), *Design for Stream Restoration*, Journal of Hydraulic engineering, 129.
- PINKHAM R., (2000), *Daylighting – new life for buried streams*, Snowmass, Colorado: Rocky Mountain Institute.
- BERNHARDT AND PALMER, (2007), *Restoring streams in an urbanizing world*, Freshwater Biology, 52.
- THE RIVER RESTORATION CENTER, *Manual of river restoration techniques*, <http://www.therrc.co.uk/manual-river-restoration-techniques>
- ALLEN AND LEACH, (1997), *Bioengineering for Stream bank Erosion Control - Report 1 – Guidelines, Environmental Impact Research Program*, US Army Corps of Engineers, Waterways Experiment Station
- ROSGEN D., (1994), *A classification of natural rivers*, Catena, 22.
- NEWBURY AND GABOURY, (1993), *Stream analysis and fishhabitat design: A field manual*, Newbury Hydraulics, Ltd., Gibsons.
- DEPARTMENT OF THE ARMY US ARMY CORPS OF ENGINEERS, (2013), *Storm water best management practices for low impact development (lid) infrastructure*, Public works technical bulletin 200-1-121.
- FISHER AND FISCHENICH, (2000), *Design recommendations for riparian corridors and vegetated buffer strips*, EMRRP Technical Notes Collection (ERDC TN-EMRRP-SR-24), U.S. Army Engineer Research and Development Center, Vicksburg.
- BRADSHAW A. D., (1991), *Underlying principles of restoration*, Can. J. Fish. Aquat. Sci. 53(Suppl. 1): 3–9.
- RUTHERFURD ET AL., (2000), *A rehabilitation Manual for Australian Streams, volume 1*, Monash University, Clayton, Cooperative Research Centre for Catchment Hydrology, Land and Water Resources Research and Development Corporation.
http://www.thiva.gr/portalthiva/upload-files/editor_files/TXNIKH%20PERIGRAFH.pdf.



Urban Bluespace for Human Flourishing

Tim G. Townshend

Urban waterfront development is an essential aspect of human history. Early cities located near water as a source of food and transportation, as well as for the water itself. In the era of the industrial city, waterfronts were centres of industrial development and commerce. Such waterfronts, however, became effectively disconnected from the cities they served, due to the security needed around port facilities and the pollution that accompanied industrial activity. Subsequently as ships increased in size - demanding deeper water and port facilities required greater areas of land - industry, transportation and port facilities increasingly relocated away from central locations and ageing 19th Century infrastructure. Historic waterfronts became abandoned, sites of dereliction and obsolescent buildings.

Commencing with a handful of well-known waterfront (re)development projects in the 1960s, such as Boston and Baltimore, the fortunes of waterfront areas have been turned around. Over recent decades waterfronts in cities across the globe have been transformed, reinvented, regenerated and rejuvenated. In many ways they have become the symbol *par excellence* of urban resilience, demonstrating the ability of cities to adapt and adjust to new economic realities and to reinvent historic quarters (BREEN AND RIGBY, 1996; TIESDELL ET AL., 1996).

In today's competitive property market, homes, offices and retail spaces near water (especially with views over water bodies) always command higher rental, or purchase values, from those of an equivalent standard located elsewhere (see for example LUTTIK, 2000). The transformation in waterfronts has in turn lead to a heightened interest in the role that waterfronts and urban 'bluespaces' more generally contribute to urban living in the 21st Century. Clearly those willing to pay a premium to live and work next to waterfronts derive a benefit from their locale, but what does that benefit consist of? There is a burgeoning academic literature on waterfronts from a whole range of perspectives, economic, environmental and social. However, only relatively recently have more direct links between water bodies and human health and wellbeing been examined.

Defining Urban 'Bluespace'

All urban water bodies are important for urban socio-ecological systems. They are natural components of the hydrological cycle, they provide habitats for flora and fauna and are valued as places of recreation and relaxation. However, in this paper we will primarily focus on the relationship of the built environment and larger waterbodies (rivers, canals, and so on) as

opposed to smaller water bodies (such as streams and ponds). Since it might be argued these places are of greatest significance to the cities they serve. There are various nomenclature used in relation to areas of water in urban settings (water-fronts, blue infrastructure and so on) and these also vary somewhat in precise meaning between disciplines. Since this chapter attempts to link evidence from across disciplines of built environment, public health and environmental psychology an all-encompassing term 'urban blue space' has been adopted. In so doing, the chapter envisions a concept that encompass all visible water¹ bodies that occur in urban areas, building upon a previous term 'urban blue' (VOLKER AND KISTEMANN, 2011) it also considers evidence pertaining to the contextual settings of urban water, in other words their immediate surroundings – promenades, riverside parks and so on, through to beaches.

Urban Lifestyle Health Concerns and Wellbeing

Modern urban lifestyles can be profoundly unhealthy. Exposure to air pollutants, for example from heavy traffic have been associated with an increasing range of health concerns from respiratory problems, heart disease and even increased risk of developing dementia. Moreover sedentary lifestyles, encouraged by over-reliance on private car ownership and other technological advances, for example, expose humans to risk of becoming overweight and/or obese with associated increased danger of developing type-II diabetes, heart disease and a range of cancers (LAKE AND TOWNSHEND, 2006). Our congested polluted cities cause heightened stress levels and mental health problems through psychological arousal and overload. Furthermore exposure to traffic raises levels of physical injury and even death, for example in the USE traffic accidents are the number one cause of mortality in 1-21 years olds. Moreover even though our urban areas are full of people, for some they are places of social isolation, loneliness and depression.

The health concerns that accompany modern urban living are also not

equally spread, the poorer in society almost always suffer a high level of exposure to risk – in the UK for example a child living in poorer areas suffer higher exposure to pollution, are more likely to be obese and are four times as likely to be involved in a traffic accident than children living in more affluent areas (MARMOT, 2010).

However, while our urban areas are settings for ill-health and harm, they can also provide places supportive of healthy lifestyles, conducive to allowing neighbours to interact, to take exercise and have spaces for much needed relaxation. Research for example has shown that neighbourhoods, designed in pre-automobile eras tend to be more supportive of walking as means of transport and for pleasure; and that urban parks in particular can be vitally important for mental restoration and as a setting for physical activity and socialisation (TOWNSHEND, 2014). When people enjoy good health, mental well-being and have a thriving social life, they lead rich fulfilling lives, in other words they 'flourish' – and so this chapter using this term to encapsulate a holistic concept of physical, mental and social wellbeing.

Therapeutic Landscapes and Bluespaces

There is in fact an extensive current literature on aspects of environment and human flourishing (see COOPER ET AL. (2014) as an example of a reference guide); though water is somewhat overlooked. This may seem surprising when the essential attribute of water as the life giving natural resource is considered. Moreover, the therapeutic properties of water sources also stretch back into human history. Many places of healing, for example, were founded on the existence of hot, or cold springs thought to have medicinal powers. There is also a long spiritual element with some water sources for example thought to be divine in nature. The Romans built such baths at Bath, England in the 1st Century AD, but these were based on a much more ancient shrine. More recently the shrine at Lourdes France, is good example where water is still thought to have divine power and in Ireland people bathe

¹ N.B. many urban areas contain water bodies (rivers, streams, canals etc.) which were historically culverted i.e. covered over – the motivation for this was varied but included health concerns when water sourced became polluted and a source of disease.

their children in holy wells as form of infant health promotion and spiritual protection (FOLEY, 2010).

Such a focus on healing was very much central to Gesler's development of the concept of 'therapeutic landscape' (1993; 2003). Gesler characterised the dimensions of therapeutic landscape as physical, spiritual and social – these combined to create a holistic notion of health. However while this early exploration focussed on specific sites and healing subsequently the proposition that many types of landscape are *salutogenic*, or 'health promoting' has been developed and the range included greatly broadened. Here early developmental work of Gesler's concept often focussed on natural landscapes, places of natural beauty that people seek out for relaxation and to 'get away from it all'. However many spheres of research have warned against excessive emphasis on the urban rural dichotomy – not least since many environments are to an extent manmade - and more recently some research has focussed on the potential of urban environments to be supportive of health and wellbeing (see WILLIAMS, 2007). Increasingly therapeutic landscape research has explored the benefits associated with commonplace sites that people experience in their everyday lives and so urban environments have become a focus.

The Salutogenic properties of greenspace are now well-established. HARTIG ET AL. (2014) identify four key mechanisms, stress reduction and restoration; opportunities for increased physical activity; opportunities for greater socialisation; and improved environmental quality – for example cleaner air. It is possible that spaces that are primarily blue as opposed to green, including urban bluespaces possess these qualities. Moreover it is also possible that the presence of water may include added benefits. Water features for example have been a prominent element in healing gardens and similar therapeutic settings. They are well known to provide positive distraction for both visual, auditory and even olfactory senses). The calm sounds of water, for example, have been found to be restorative (WHITE ET AL., 2010) while the colour blue is associated with coolness and good water quality (BURMIL ET

AL., 1999); this latter study also found that waterbodies incorporated in high quality urban design schemes were particularly valued by observers. More generally blue spaces in both urban and rural settings are associated with stress-reduction, mood enhancement and enjoyment (KARNANONV AND HAMEL, 2008) and views of water have been identified as potentially beneficial for perceptions of personal health (BURMIL ET AL., 1999).

In the past many studies exploring the links between human wellbeing and greenspace in fact contained water bodies within the landscape (see for example HAN, 2003; LAUMANN ET AL., 2001) however the influence of the presence of water was not explicitly extracted for separate examination. Generally environmental psychologists have highlighted the human enthrallment with water bodies (see for example, HERZOG, 1985; KORPELA & HARTIG, 1996; WHITE ET AL. 2010). Research has also shown that people choose coastal locations for places to visit to reduce stress and feel relaxed (WHITE ET AL., 2013b), this latter work established that living near the coast was associated with visiting it more often (increasing exposure to positive impacts) and that the people associated coastal visits with greater stress reduction than with equivalent visit to other recreation settings such as urban parks. Research in the UK found

Notions of 'therapeutic landscape' – Ulswater, Cumbria, UK.



Water feature, Exchange Square, Manchester.

Grand Canal, Dublin, Eire.

Newcastle, UK, regenerated quayside.

that living near the coast was associated with increased levels of physical activity (WHITE ET AL., 2013); though not all studies have established a link between proximity to water and exercise (HALONEN ET AL., 2014). Based on the notion that people living near water seem to be happier and healthier in the UK a 'Blue Gym' initiative² has launched to assess the potential for water bodies to not only to enhance and promote health and wellbeing but in so doing increase protection of these vital environments (WHITE ET AL., 2016).

There are also a number of other tangential areas of research which may be important to the blue space and wellbeing debate. Environmental psychologists have for example highlighted the restorative effects on well-being from places of strong community attachment (KORPELA AND HARTIG, 1996) waterfronts have often become associated with strong sense of place attachment, particularly for cities that have reinvented themselves in the post-industrial era.

However, research explicitly into the potential of urban waterfronts to be supportive of healthful lifestyles and therefore important to community well-being is still in its infancy and studies remain limited; moreover while the broader social importance of waterfronts have been acknowledged by urban designers, these places are generally not recognised for their beneficial health qualities. There is of course no doubt that water environments are popular places. However in relation to designing for human flourishing, some research shows promising results for urban designers. An analysis of the health impact of two waterfront areas in Germany (Cologne and Dusseldorf) used a quadruplicate framework for investigation consisting of experienced space; symbolic space; social space and activity space. Each dimension was considered in relation to health-enhancing and health-limiting factors. The work concluded that overall health-enhancing aspects were dominant, these included indirect connection to the water – light and colour (blue), sound and smell - producing a feeling of freshness particularly on hot summer days; the fluidity and power of the rivers were also symbolically potent, encouraging a feeling of spirituality; the overall atmosphere that waterfronts created for socialising; and the vast array of active and passive engagement that waterfronts encouraged (VOLKER AND KISTEMANN, 2013).

² This builds on a previous 'Green Gym' initiative which encouraged people to exercise by volunteering in environmental work in green spaces such as parks and woodlands – The Green Gym Available at: <http://www.tcv.org.uk/greengym> (Accessed: 01.01.17).

³ BMI is a commonly adopted weight measure in overweight and obesity study. BMI = weight kg/height in m².



From a quite different health perspective a Finnish longitudinal study (2000-08) examined the proximity of urban green or blue space and reported Body Mass Index (BMI)³. The participants were public sector employees, employed in ten towns and six hospital districts. The study found that living at greater distance (>500m vs. <250m) from useable urban blue spaces was associated with being overweight in this group (though not with obesity). With regard to greenspace (>750m vs. <250m) greater distance was associated with both overweight and obesity. The study team concluded that urban blue and green features were beneficial in healthy weight maintenance, though the relationship between blue space and obesity levels was not explained (HALONEN ET AL., 2014).

This study was possibly unique in suggesting that living close to water is good for weight management. Although the relationship was not explained by the study the researchers also reported that physical activity levels alone did not explain the differences – it is therefore likely that the broader mechanisms of therapeutic landscape are at play here. Depression and other mental health issues have been linked to weight gain, the stress relieving, restorative nature of waterfront environments therefore may be crucial in this respect.

The Risks and Health Limitations of Water

While the evidence around the positive health impacts of blue spaces appears encouraging, it is also clear that blue spaces carry certain risk and limitations. Indeed it was work in the 19th Century by the English physician John Snow who mapped out the incidence of cholera outbreaks in London that led to the realisation that the urban environments in which people live and work are determinants of their health and well-being – in turn leading to the establishment of public health and modern town planning. Today waterborne diseases are largely a thing of the past in developed nations, but not entirely. Storm water runoff after heavy rain in particular can carry increased risks of contaminants which can lead to increases in bacterial levels. Studies in the US have shown, for example, that there is a direct link between heavy rainfall and outbreaks of waterborne disease such e.g. E-coli; and runoff can also reduce the effectiveness of some water treatments by increasing sediment in water which makes microbial contamination harder to treat. Moreover urban flooding appears to be an increasingly common event across the globe. Events associated with global climate change as well as increased building on areas associated with flood risk have contributed to the problem. Floods have been shown to have negative effects on mental health, increasing mental stress and depression (CURTIS, 2010) this can have broader impacts than just those

who have been directly affected, with whole communities concerned about future events. Individuals may face difficulties in obtaining insurance for buildings for example and within communities events that have happened several decades previously can still seem fresh in the mind, meaning that impacts may be long-lived and be a source of lingering anxiety and resentment.

Drowning in urban water courses is another concern. In the UK in recent years there have been a number of unexplained cases or urban drowning, particularly involving university students in cities with major rivers such as York, Bath and Durham. This has caused a national drowning prevention charity the Royal Life Saving Society to launch a 'Don't drink and drown'⁴ campaign (*Don't Drink and Drown* 2017). However while alcohol is implicated in around a quarter of all adult drownings in the UK, many deaths remain unexplained and while still uncommon the additional risk of drowning associated with urban water bodies does need to be acknowledged.

Skin cancer is associated with exposure of human skin to ultraviolet radiation (UVR) and while some UVR exposure is beneficial since it enables the body to synthesise Vitamin D (essential for bone, joint and muscle

Flooding, Carlisle, UK, 2016.

⁴ The slogan is inspired by a very famous 'Don't drink and Drive' campaign that has existed in the UK since the 1970s.



health as well as neurological function), excessive is responsible for around 90% of all skin cancer cases. The issue of skin cancer and other-wise therapeutic landscapes has been highlighted in the case of beaches, particularly in Australia and New Zealand (COLLINS AND KEARNS, 2007). This research suggests that exposure to risk many be an inescapable element of embodied engagement with landscape (ibid: p 29) moreover while waterbodies may increase people's temptation to expose themselves in urban areas to increased UVR whether this is to harmful levels has not been established.

While not an inherent issue with waterfronts themselves, the ways in which they have been developed in the recent past can be problematic. The areas can become expensive and exclusive enclaves, tourist 'honey-traps', simply orientated to commercial consumption (STEVENS AND DOVEY, 2004). It is conceivable that to those 'excluded' from this privileged world could be adversely impacted from not having opportunities to exercise to negative feelings of anger and resentment.

Implications for Urban Designers and Future Research

The need for urban designers to more fully appreciate the health and well-being impacts of interventions in the urban environment have been increasingly highlighted (see for example, BARTON ET AL., 2003; BARTON ET AL., 2015). Such work has focussed greatly on issues of urban form encouraging a return to more walkable neighbourhoods that integrate local shops, services, employment and educations opportunities with residential areas, provide high quality public realm and reduce reliance on private transport. Greenspace has been a major focus both in terms of quantity and quality as a location of physical activity, relaxation and socialisation. However such work has yet to fully engage with bluespace debates.

While the evidence is in its infancy, disparate and to some extent contradictory (for example in relation to whether bluespaces encourage

greater levels of physical activity or not) urban designers do need to be aware of this growing body of research. While waterside settings have long been appreciated by designers for their aesthetic qualities and generally as settings for both passive and active engagement the full importance of their health and well-being impacts have been largely over looked. While being aware of the risks that water bodies we need to maximise access – physical, visual and psychological. Thinking about how these benefits might be spread through society so that they have the potential to reduce health inequalities rather than reinforce them – for example with waterfronts only being available to those who can pay a premium - is also important. Working with communities is also important, particularly where flooding or other water related problems have been an issue – not all communities will necessarily be immediately embracing of the positive attributes of water.

However, while the current research provide some useful points and general points of principle, it lacks the depth and specificity that is really needed to be of use in practical design work. What is needed therefore is more research undertaken from a built environment/urban design perspective. More focus on the quality of bluespace and what attributes provide maximum benefit are needed. In-depth qualitative research on nature of bluespaces and perceived and measured benefits, as well as more longitudinal pre and post-occupancy studies of developments involving water bodies and those moving to and from waterside locations would be extremely useful.

Conclusions

Despite the existence of a large body of evidence that suggests urban waterfronts are beneficial to human health, wellbeing and flourishing, the field remains under-explored particularly from an urban design perspective. What evidence there is must be gleaned from other disciplines and in particular environmental psychology and more generally landscape preference research. Moreover while

therapeutic landscape research has increasingly recognised the value of 'everyday' environments, even here the role of blue space has not been adequately assessed.

Urban environments are the everyday environments for most people. Moreover our urban environments are increasingly implication in health and wellbeing problems, particularly lifestyle diseases. Water bodies are not without their own health concerns, flooding associated with climate change in particular is of concern. However there is inherent risk in all embodied engagement with environments. The research thus far would suggest that the benefits of urban blue far outweigh the dis-benefits and a healthier respect for our urban blue spaces in urban design is urgently needed.

References

- BARTON, H., GRANT, M. AND GUISE, R., (2003), *Shaping Neighbourhoods for Local Health and Global Sustainability*. London: Routledge.
- BARTON, H., THOMPSON, S., BURGESS, S. AND GRANT, M., (2015), *The Routeledge Handbook for Health and Well-being*. London: Routeledge.
- BREEN, A. AND RIGBY, D., (1996), *The New Waterfront*. London: Thames and Hudson.
- BURMIL, S., DANIEL, T.C. AND HETHERINGTON, J.D., (1999), 'Human values and perceptions of water in landscapes', *Landscape Urban Planning* 44, pp. 99-109.
- COLLINS, D. AND KEARNS, R., (2007), 'Ambiguous Landscapes: Sun, Risk and Recreation on New Zealand Beaches', in Williams, A. (ed.) *Therapeutic Landscapes* Aldershot: Ashgate.
- COOPER, R., BURTON, E. AND COOPER, C.L., (2014), *Wellbeing: A Complete Reference Guide Volume II Wellbeing and the Environment*. Chichester: Wiley-Blackwell.
- CURTIS, S., (2010), *Space, place and mental health*. Aldershot: Ashgate Publishing.
- Don't Drink and Drown*, (2017). Available at: <http://www.rlss.org.uk/news/mother-of-tragic-megan-roberts-leads-national-campaign-warning-students-not-to-drink-and-drown-2/> (Accessed: 01.01.17).
- FOLEY, R., (2010), *Healing Waters: Therapeutic Landscapes in Historic and Contemporary Ireland*. Aldershot Ashgate.
- GESLER, W., (1993), 'Therapeutic Landscapes: theory and a case study of Epidaurus, Greece', *Environment and Planning D: Society and Space* 11(2), pp. 171-189.
- GESLER, W., (2003), *Healing Places*. New York Rowman and Littlefield.
- The Green Gym* Available at: <http://www.tcv.org.uk/greengym> (Accessed: 01.01.17).
- HALONEN, J.I., KIVIMAKI, M., PENTI, J., STENHOLM, S., KAWACHI, I., SUBRAMANIAN, S.V. AND VAHTERA, J., (2014), 'Green and Blue Areas fo Predictors of Overweight and Obesity in an 8-Year Follow-Up study', *Obesity*, 22(8), pp. 1910-1917.
- HAN, K., (2003), 'A reliable and valid self-rating measure of the restorative quality of natural environments', *Landscape Urban Planning* 64, pp. 209-232.
- HERZOG, T.R., (1985), 'A cognitive analysis of preference for waterscapes', *Journal of Environmental Psychology*, 5(3), pp. 225-241.
- KARNANONV, D. AND HAMEL, R., (2008), 'Assessing the restorative potential of contemporary urban environment(s): beyond the nature versus urban dichotomy', *Landscape Urban Planning*, 86, pp. 115-125.
- KORPELA, K.M. AND HARTIG, T., (1996), 'Restorative qualities of favorite places', *Journal of Environmental Psychology*, 16(3), pp. 221-233.
- LAKE, A. AND TOWNSHEND, T., (2006), 'Obesogenic environments: exploring the built and food environments', *J R Soc Promot Health*, 126.
- LAUMANN, K., GARLING, T. AND STORMARK, K.M., (2001), 'Rating scale measures of restorative components of environments', *Journal of Environmental Psychology* 21, pp. 31-44.
- LUTTIK, J., (2000), 'The value of trees, water and open space as reflected by house prices in the Netherlands', *Landscape Urban Planning*, 48, pp. 161-167.
- MARMOT, M., (2010), *Fair Society, Healthy Lives: Strategic Review of Health Inequalities in England post 2010*.
- STEVENS, Q. AND DOVEY, K., (2004), 'Appropriating the spectacle: play and politics in a leisure landscape', *Journal of Urban Design*, 9(3), pp. 351-365.
- TIESDELL, S., OC, T. AND HEATH, T., (1996), *Revitalising Historic Urban Quarters*. Bodmin: Architectural Press.
- TOWNSHEND, T.G., (2014), 'Walkable Neighbourhoods Principles, Measures,

and Health Impacts', in COOPER, R., BURTON, E. AND COOPER, C.I. (eds.) *Wellbeing and the Environment: Wellbeing: A Complete Reference Guide, volume II*. Chichester: John Wiley & Sons.

VOLKER, S. AND KISTEMANN, T., (2011), '*The impact of blue space on human health and well-being - salutogenic health effects of inland surface waters: a review*', *International Journal of Hygiene and Environmental Health*, 214(6), pp. 449-460.

VOLKER, S. AND KISTEMANN, T., (2013), '*I'm always entirely happy when I'm here! Urban blue enhancing human health and wellbeing in Cologne and Dusseldorf, Germany*', *Social Science and Medicine*, 78, pp. 113-124.

WHITE, M., PAHL, S., WHEELER, B.W., FLEMING, L.E.F. AND DEPLEDGE, M., (2016), '*The 'Blue Gym': What can blue space do for you and what can you do for blue space?*', *Journal of the Marine Biological Association of the United Kingdom* 96(1), pp. 5-12.

WHITE, M., SMITH, A., HUMPHREYS, K., PAHL, S., SNELLING, D. AND DEPLEDGE, M., (2010), '*Blue space: the importance of water for preference, affect and restorativeness ratings of natural and built scenes*', *Journal of Environmental Psychology*, 30(4), pp. 482-493.

WHITE, M.P., ALCOCK, I., WHEELER, B.W. AND DEPLEDGE, M., (2013), '*Coastal proximity and health: a fixed effects analysis of longitudinal panel data*', *Health and Place*, 23, pp. 97-103.

WHITE, M.P., PAHL, S., ASHBULBY, K.J., HERBERT, S. AND DEPLEDGE, M.H., (2013), '*Feelings of restoration from recent nature visits*', *Journal of Environmental Psychology*, 35, pp. 40-51.

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