

Symbiotic Thames

Rethinking the riparian condition towards a more symbiotic relationship between the river and the city



Pilbeam, Ian. (2020). *The foreshore at low tide on the river Thames near Gabriel's wharf on Southbank with people and dogs on the beach.* Image: <https://www.picfair.com/pics/09958900-the-foreshore-at-low-tide-on-the-river-thames>

I have always been very interested in the play and interaction between landscape, natural forces and human interaction. My interest lies in things that move and things that appear to be still and understanding their relationship. The connection between form and flow, permanence and impermanence, and fluidity. The immense power of water, characterized by its flux, formed by countless quite powerless drops creating power when part of a stream. This force shapes the landscape, shoreline, but also society.

Perhaps architecture has a similar power. Could it enhance a more symbiotic relationship between water and the public, while situated in the mids of a complex and fluid system called the Thames riparian? I am interested in the mediating power of architecture to change the current situation for the better of London.

keywords

Thames, riparian, waterfront, symbiosis, fluidity, tamed, untamed, public, water, ecology

Water is the elixir of life for London, the river Thames is the heart powering its growth. It has been the foundation of the city's development and influenced socioeconomic structure, policies, urban form and cultures. Although it has created the existence of London, it has mainly been the city that influenced the river in route, form and function aligning with their needs. Although the identity and value of the Thames are captured in many paintings, landmarks and postcard views, this identity and connection between water and people is far from noticeable in real-life.

The first inhabitants settled along the banks of the Thames and interacted closely with it. It was their front, back, and potential for travel and trade. As globalization and industrialization drove the waterfront growth and construction of London, a dominating patchwork of factories, furnaces, power stations and shipyards were created¹. All of them were polluting and neglecting the river. Over time industries and docks moved away too and the focus shifted towards 'taming' the river. Unintended side effects related to The Thames and urbanized collective were a product of neglect, denial, and arrogance of not recognizing the river and its ecology. The river has been engineered to provide specific services and functions to the city, but consequently without intention also out their daily lives and perception. This one-sided relationship has an impact on the economic, ecological and functional totality of London causing underrepresented issues to become serious concerns and demand to be urgently recognized². The city protects and distances itself from the water, causing linear, mono-functional waterfront design conditions that resulted in river edges of permanence, fixity and immutability. This is contrasting with the dynamic and fluctuating character of the Thames. Combined with examples of many other waterfront cities it becomes clear that the Thames has an undiscovered potential for London³. Creating closer interactions with the water, a more extensive ecosystem and a vibrant and publicly accessible waterfront. Rethinking how the city and river could benefit from each other by creating a more symbiotic relationship has therefore become crucial.

Along the river, but mainly at its waterfronts is where these changes and relations unfold and are noticed best. It is the psycho-geographical condition that marks the zone between land and water. The mediating area between city and nature, between open and built, between estrangement and belonging. A condition acting as a hybrid of flux (water) and fixity (urban structures). The research will focus on the things that move and things that appear to be still, the changing conditions, of form and flow, and their internal relations. As the Thames waterfront has evolved into a line of mono-functional grounds, with neglected buildings, controlled conditions, uncontrolled and overtaken brownfields and almost no cultural integration, an uncertain future emerges. It is an unconnected necklace of loose elements. As we rediscovered the river as a place for recuperation and contemplation tensions between collective memory, ecology and riparian environments have been posed. An urgent need for symbiosis along the riparian rises as we shift towards a new waterfront paradigm as a multi-functional place for flora, fauna and people⁴. Here

waterfront

A space where water (i.e.: river, lake, sea, ocean) meets with urbanized land, creating a unique spatial interface.

¹Hein, Carola. *Adaptive strategies for water heritage: Past, present and future*. Springer Nature, 2020.

²ZSL (2021). *The State of the Thames 2021: Environmental trends of the Tidal Thames*. McCormick, H., Cox, T., Pecorelli, J., and Debney, A.J. (Eds). ZSL, Regent's Park, London, UK.

immutability

The state of not changing, or being unable to be changed.

³Publica & BOP. "The case for a river Thames cultural vision". Greater London Authority (2019). PDF file. Accessed October 12, 2022. https://www.london.gov.uk/sites/default/files/the_case_for_a_river_thames_cultural_vision_2019.pdf

psycho-geographical zone

Geographical area that emphasizes interpersonal connections to places through specific effects and precise laws.

flux

The action or process of flowing.

fixity

The state of being unchanging or permanent.

⁴Martin, Prominski, Stokman Antje, Stimberg Daniel, Voermanek Hinnerk, and Zeller Susanne. *River.space. design: Planning Strategies, Methods and Projects for Urban Rivers*. Basel: Birkhäuser, 2012.

surfaces the potential of a spatial intervention as a mediating tool between the conditions found in the waterfront landscape. Exploring the past and present sets the precedent for a new, safer and more symbiotic focus in the future. For that to happen culture should transcend their activity beyond the urban collective into the riparian zone, therewith inviting the public to the water. And in return, the urban collective should embrace the water in its territory by allowing and connecting with it, seen as the act of 'untaming' and therewith questioning the past predominant strategy in London. A restored relationship opens up opportunities for a redefined and more embedded river and waterfront identity in London. This new symbiotic paradigm of ecology and city creates a more resilient ecosystem and urban collective allowing both to improve and connect.

Research questions

- 0 |** How could an architectural intervention along the waterfront emerge as potential resource for a hybridized cultural and ecological space in London enhancing a more symbiotic relationship between the city and the river?
- 1 |** What role has water played in the daily perception and interaction with the urban collective of London throughout its development, and what should it become?
- 2 |** What are the waterfront conditions along the Thames, and where and why do they occur?
- 3 |** What is the potential of the waterfront condition in London and where could it most purposefully act as a symbiosis between the public and water?
- 4 |** How could an architectural intervention create a more symbiotic relationship between the public and the river by focusing on materiality, form and program?

The theoretical framework used for this research has the aim to provide a better understanding of the waterfront conditions along The Thames, defining its architectural components and conditions, but also to what extent a more symbiotic relationship between water and city can be achieved. The framework is based upon two state-of-the-art theories operating on two scales, territory and site. This guides the thematic understanding of waterfronts by adding the conceptual understanding of fluidity/form and tamed/untamed. This will be the base for further design research. In addition, readings related to the history, site and context will be considered part of the theoretical framework too.

The **waterfront** is seen as a psycho-geographical condition derived from the area between the water edge and the urban collective. It can be called a **riparian** or riverine, the area between the aquatic and the upland zone, as mentioned by Thomas and Oakley^{5,6}. Although both focus more on the ecological aspect and definition, the riparian character can also be applied to more urban conditions in which the urban fabric marks the end. Through its change over time and to a spatial extent, combined with the heterogeneous condition of the city the waterfronts should be considered spatiotemporal zones as mentioned by Prominski⁷. This flux is also seen by Naiman, who perceives this area as a mediator as it operates transitional between two elements⁸. The edge is not static and is changing through the notion of time and perception. It is the area in-between open and built, between estrangement and belonging. Characterized by its vulnerable and contrasting nature. The fluid and mediating character of this zone offers great potential to embed a symbiosis and thus will be subject to research.

Uncovering the waterfront is challenging with its intangible context and flows. The concepts of **fluidity** and **form** will guide the riparian understanding. Focusing on the internal relations on a more abstract level, rather than specific elements, will uncover the behaviour, as described by Allen^{9,10}. The river and the riparian might seem static and permanent, but must be understood as a process ruled by tides, changing seasons, erosion, additions, use and occupancy through the notion of time, occurrence and space, as elaborated upon by Manning¹¹. This study, however, sees the intersection between flux and form, or ecology and man-made, as a tool for uncovering perspectives of, and connection between, water and urban collective. Lefebvre provides an important addition to this with his perception of a social sphere, acting as a passive ground of social interaction, which can be applied to the mediating riparian. It is found at the centre of his conceptual triad of the lived, conceived and perceived space¹². For a focus on the role of water, this study will continue with the phenomenological component as a means to understand the lived experience of the riparian, as a requirement for creating social space. By considering both social and (urban/ecologic) conditional fluidity and form, the internal and external relations and uncovered parameters can be shown and put into a narrative.

Complementary is the concept of **tamed** and **untamed**. It embodies the controlled and uncontrolled dimensions of the river as written by Yao¹³.

⁵Thomas, Jack Ward, Chris Maser, and Jon E. Rodiek. "Riparian zones." *Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. Agriculture Handbook 553* (1979): 40-47.

⁶Oakley, Art L., and Larry B. Everson. "Riparian Zones." *Management of wildlife and fish habitats in forest of western Oregon and Washington. USDA, For. Ser., Pac. NW Region No. R6-F&WL-192* (1985): 57-80.

⁷Martin, Prominski, Stokman Antje, Stimberg Daniel, Voermanek Hinnerk, and Zeller Susanne. *River.space. design: Planning Strategies, Methods and Projects for Urban Rivers. Basel: Birkhäuser, 2012.*

⁸Naiman, Robert J., and Henri Decamps. "The Ecology of Interfaces: Riparian Zones." *Annual Review of Ecology and Systematics* 28 (1997): 621-58. <http://www.jstor.org/stable/2952507>.

⁹Allen, S. (1999) *From object to field in Points and Lines: Diagrams and Projects for the City. Princeton Architectural Press, 92-103.*

¹⁰Allen, S. (2000) "Mapping the Unmappable: On Notation" in *Practice: Architecture, Technique and Representation* (Amsterdam: G+B Arts International), 31-46.

¹¹Manning, Adrian D., Joern Fischer, Adam Felton, Barry Newell, Will Steffen, and David B. Lindenmayer. "Landscape fluidity—a unifying perspective for understanding and adapting to global change." *Journal of Biogeography* 36, no. 2 (2009): 193-199.

¹²Lefebvre, Henri. *The Production Of Space. 1st ed. New Jersey: Wiley-Blackwell (1991). pg. 38.*

¹³Yao, Joanne. "History is a river: The taming of nature into the twenty-first century." In *The ideal river*, pp. 186-210. Manchester University Press, 2022.

Often characterized by its man-made nature derived from urban needs. The control of and protection from water caused mono-functional waterfront conditions to emerge. Shifting this paradigm, which is in this research being questioned as the past predominant strategy in London, towards a more untamed and allowing approach, is believed to enhance the riparian as a better functioning mediator between city and river. Including this conceptual understanding helps dissect the waterfront conditions.

The framework will be situated in and related to the ideas from two state-of-the-art theories. Starting with the **Third Generation City** of Casagrande, the city is learning from its environment, followed by restoring it. Restoring brings the potential of connecting humans and the natural environment, seen as the culmination of his theory¹⁴. He thereby argues that surgical and selective intervention should be made right at the nodes that have the most potential to regenerate the bigger system. The theory operates predominantly on a territorial/system scale but opens the window to a local scale. Therefore, it makes sense to add **Fourth Nature**, as introduced by Kowarik, but further elaborated upon by Bakshi & Gallagher. They challenge the existing methods of waterfront designs by establishing new territories between ecology, urban and inhabitable learning spaces^{15 16}. The static design frames shouldn't be implemented upon the dynamics of species movement and adaption to adjusting conditions like rivers. Designers should be open to the unpredictability of emerging forms and processes, allowing and untamed, for the better of fluidity. This can be complemented by the idea mentioned by Speranza; "architects should design with time in mind"¹⁷. This position will not only guide the understanding of London and its waterfronts within this study but also sets precedence for a new architectural riparian paradigm.

¹⁴Casagrande, Marco. "From urban acupuncture to the third generation city." In *Nature driven urbanism*, pp. 131-153. Springer, Cham, 2020.

¹⁵Kowarik, I. (2005). *Wild urban woodlands: Towards a conceptual framework*. In *Wild urban woodlands* (pp. 1-32). Springer, Berlin, Heidelberg.

¹⁶Bakshi, A. & Gallagher, F. (2020). Design with Fourth Nature. *Journal of Landscape Architecture* 15, no. 2 (2020): 24–35.

¹⁷Speranza, Philip. "Time as a medium: Early work of Miralles." *Architectural Design* 86, no. 1 (2016): 60-65.

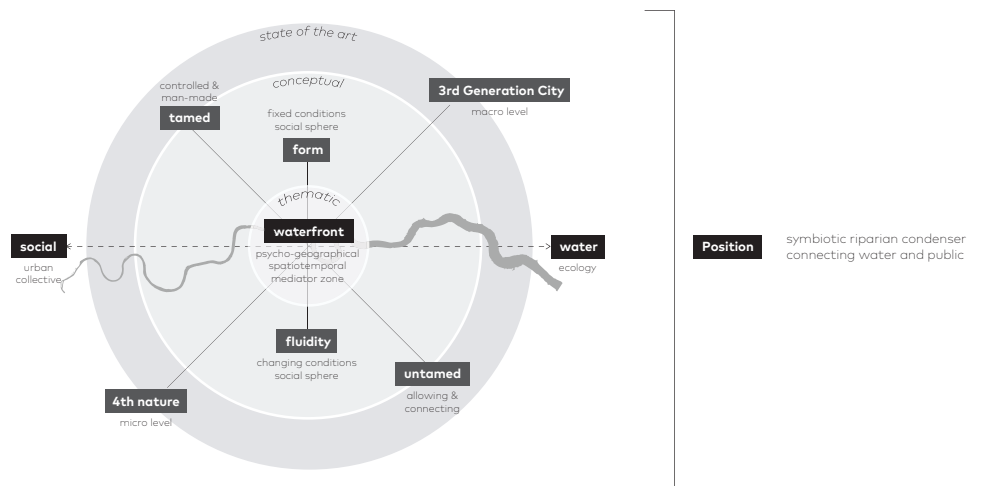


Figure 2 | Theoretical understanding of *The symbiotic riparian*, by Author

This research aims to rethink the riparian condition along The Thames by understanding the riverfront and the role of water at first and based upon that evolve towards a more symbiotic relationship between water and the city through architecture. The methodological approach can be split into several elements. A theoretical and conceptual understanding, a contextual approach and a design strategy (see research matrix p.10). Simultaneously these operate respectively from macro to meso, to micro level, as a means to first understand the bigger territory before uncovering the influence and flows on micro level. Found knowledge from the literature, including reflection upon new findings, becomes a filtering lens for the contextual approach and selecting design strategies.

theoretical and conceptual approach

The literature review establishes a starting point for the developing role of water in London. A visual representation will be provided through a series of historic and present images, paintings, postcards, etc. stretching along the waterfront of the Thames within Greater London. In addition, the Actor-Network Theory by Latour will be utilized to establish a diagram giving insight into human and non-human actors and will uncover the cross-disciplinary actor layers of the waterfront¹⁸. These methods uncover the social role of water and initiate an understanding of the synergy between ecology and the city. After that, a thematic literature review from an ecological and urban perspective, combined with an understanding of the geomorphological condition, will be consulted to define the meaning of waterfronts within this study. This will be followed by related literature about their fluidity, processes and limits. A fundamental theoretical understanding of waterfronts can now be established.

As the literature review progresses, a set of existing spatial waterfront appearances will be uncovered and presented as the riparian atlas. It initiates an understanding of various occurrences and will be followed by selective cartography mappings bounded by the Greater London zone. These mappings allow uncovering elements and relations to understand the occurrence and placement of certain spatial conditions. The waterfront will be dissected through the social-urban, ecological, fluidity and tamed layers. Fluidity and tamed are essential for a comprehensive understanding in this study as the riparian is ruled by tides, seasons, erosion, man-made additions, uses and occupancy through the notion of time, occurrence and space¹⁹. It functions as a synthesis of information on past and current conditions and therewith aims to uncover internal and external relations. Using data from GIS and historic maps, the waterfront condition and its public role can be established. This will be further argued by transecting the waterfront equally at 12 places, showcasing its sectional rhythm, variety in use, fluidity and condition. Including this new dimension will create a more comprehensive understanding. All found knowledge will be combined to simulate the waterfront conditions based on a skeleton understanding of local occurrences, conditions, relations and fluidity. By layering and dissecting, pressure points and nodes of potential can be conducted, suggesting a set of possible sites for architectural intervention^{20 21}.

¹⁸Latour, Bruno. *Reassembling the social: An introduction to actor-network-theory*. Oup Oxford, 2007.

¹⁹Speranza, Philip. "Time as a medium: Early work of Miralles." *Architectural Design* 86, no. 1 (2016): 60-65.

²⁰Lynch, Kevin. 2008. *The Image of the City*. 33. print. Publication of the Joint Center for Urban Studies. Cambridge, Mass.: M.I.T. Press.

²¹Lefebvre, Henri. 1991. *The Production of Space*. Oxford, OX, UK ; Cambridge, Mass., USA: Blackwell.

contextual approach

The found potential locations will be abducted to uncover their influence on the water and urban collective on the meso level. The meso level is characterized by an zone of about 500 x 500 meters. The layer system (social-urban, ecological, fluidity and tamed) will be similar to the macro level. The maps, backed by GIS data, will be combined with findings from the site visit in London. It will be the third step in understanding local fluidity and conditions, and has thereby a higher chance of uncovering needs and potential. The sites will then be ordered and presented in a riparian catalogue showing their location, type, fluidity, ecology, social/public aspect, tamed conditions, pressure and potential. Hereafter, filtrating sites will lead to the most potential symbiotic riparian condition(s) for surgical and selective intervention to regenerate the bigger system.

design approach

The tools and mechanisms for a mediating architectural intervention will be initiated by the focus on the architectural elements of materiality, form and program. All of them cover both fluid and fixed conditions, essential to understand the impact and relation between the two. This will start with literature readings on waterfront architecture and how architecture and landscape interventions can bridge water and the public. Next, case studies will be included as a method to create a tangible idea guiding the found knowledge. As the intervention is acting as a symbiotic condition, both the landscape and architectural approach should be included²². The two directions will focus on three case studies, each of them with a focus on a different element, as mentioned above. Found knowledge and ideas help uncover the fluid, fixed, connecting and intangible elements of mediating architectural and landscape works related to the water. Design strategies for a symbiotic riparian architectural intervention can now be formulated.

²²Balmori, Diana, and Joel Sanders. *Groundwork : Between Landscape and Architecture*. 1st ed. New York: Monacelli, 2011.

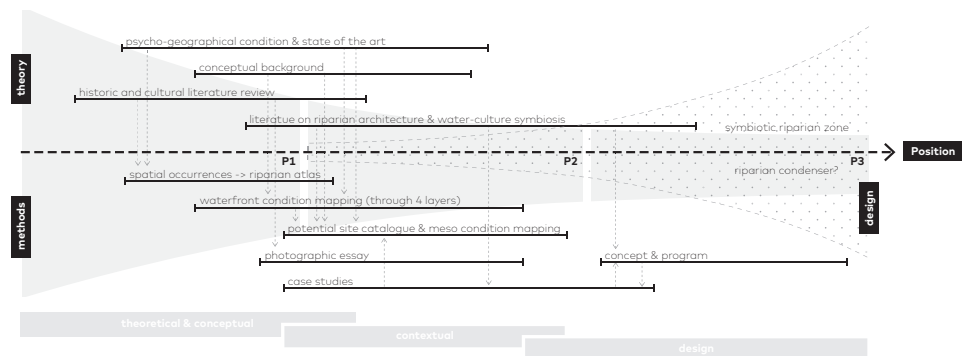


Figure 3 | Theory, methodology, methods and design through notion of time, by Author



Fascination

What is The Thames & its relation with London?

The river has been tamed/engineered to provide specific services and functions to the city, but consequently without intention also out their daily life's and perception

Causes

neglect, denial, and arrogance of not recognizing the river and its ecology

The research

How could an architectural intervention along the waterfront emerge as potential resource for a hybridized cultural and ecological space in London enhancing a more symbiotic relationship between the city and the river?

Challenges

- impact on economical, functional and ecological totality of London
- pollution (plastic)
- excessive rainfall & sewage overflow
- flood risk & drought

Potential

The Thames has an undiscovered potential for London

sub-questions

SQ 1

What role has water played in the daily perception and interaction with the urban collective of London throughout its development, and what should it become?

SQ 2

What are the waterfront conditions along the Thames, and where and why do they occur?

SQ 3

What is the potential of the waterfront condition in London and where could it most purposefully act as a symbiosis between the public and water?

SQ 4

How could an architectural intervention create a more symbiotic relationship between the public and the river by focusing on materiality, form and program?

Theoretical framework

(historic) literature

history of Thames and riverfront
Defining relation and role of Thames in London
Butler, T & Tinsley, D. & Adler, G. & Manola, G.

thematical background

Waterfront as psycho-geographic, spatiotemporal and mediating condition
Thomas, J. & Oakley, A. & Prominski, M. & Naiman, R.

state of the art

Third Generation City
Fourth nature
Casagrande, M. & Bakshi, A. & Gallagher, F.

conceptual background

Fluidity & form
Riparian as social sphere
Tamed (controlled) & untamed (allowing)
Manning, A. & Lefebvre, H. & Yao, J.

Methodology - methods

Visualizing role of water in public life of London

(historic) literature - relation public and water
historic images, paintings, site photographs along Thames

What is the waterfront zone?

thematic and literature readings & elaborative glossary

Changing waterfront conditions (MACRO)

Atlas of Thames Riparian
3D diagrams of various spatial conditions along waterfront

Territorial maps (dissected in layers)
tamed - *sewege, flood protection, walls, water quality*
fluidity - *marp, riparian patterns, flood area, tides*
ecology - *biodiversity, erosion, pollution, current, tide*
social - *use, program, access, social nodes, culture*

Transsecting the Thames (sectional diagrams)
12 sectional diagrams - (from up- to downstream)

combine found data & simulate condition on final map

The riparian condition of The Thames

pressure points & potential

Selecting potential ground (MESO)

1 Site suggestions from pressure points and potentials
2 Abducting the micro riparian for chosen sites
3 Riparian catalogue - ordered by location, type, fluidity, eco, social, political, pressure and potential
selection by proces of elimination

most potential symbiotic riparian condition

symbiotic waterfront tools and mechanisms (MICRO)

Literature - *symbiotic architecture focused on fluidity, materialization and form & program*

Case studies - 3 landscape & 3 architectural cases
selecting a case study for each mechanism (fluid, mat, form)

design strategies for symbiotic riparian architecture

Design strategy

understanding & demarcation

theoretical & conceptual

contextual

design

The Thames has a weakened relationship with the city of London through its tamed and tidal conditions. Despite its importance for the development of the city, the river is far from embedded in the public mind. Emerging unintended side effects related to water and the city are a product of neglect, denial, and arrogance of not recognizing the river and its ecology. This has an impact on the economical, ecological and functional totality of London. The ignorance does not limit itself to London but can be noticed worldwide. As we rediscovered the river as a place for recuperation and contemplation tensions between collective memory, ecology and riparian environments have been posed. An urgent need for symbiosis along the riparian rises as we shift towards a new waterfront paradigm as a multi-functional place for flora, fauna and people. Here surfaces the potential of a spatial intervention as a mediating tool between the conditions found in the waterfront landscape. This research, therefore, becomes critical. By gathering knowledge from the theoretical framework, literature, concrete data and the understanding of the information obtained through various techniques as elaborated in the methodology, I foresee being able to start answering why and how the waterfront conditions have evolved, and what influence it has had on the synergy between water and public. This will establish an understanding of a purposeful site for intervention. In doing so, I express my intention of activating (a certain part of) the waterfront along the Thames, with architecture as a mediating riparian condenser allowing a synergy between urban collective and water to emerge. Understanding the potential, application, and tools along the Thames will create a narrative that can be adjusted and merged into any other city with similar waterfront conditions.

The research aims to transform a purposeful part of the riparian zone by giving clear attention to the relevance it should have in the current society of London while embedding its cultural and historic values in a prominent position. The outcome will provide a new perspective on the possibilities for waterfront development.

Allen, S. (1999) From object to field in Points and Lines: Diagrams and Projects for the City. Princeton Architectural Press, 92-103.

Architectural theorist Stan Allen writes in this article about mapping complex relations by focusing on the in-between space and the rhythm instead of the elements. Helps grasping and mapping the somewhat intangible waterfront conditions.

Mapping

Allen, S. (2000) "Mapping the Unmappable: On Notation" in Practice: Architecture, Technique and Representation (Amsterdam: G+B Arts International), 31-46.

In this second article Stan Allen discusses the specific meaning and ideas behind different drawing techniques being used as a set of instructions for an object. Has contributed in representing the intangible conditions of the waterfront.

Mapping

Adler, Gerald, and Manolo Guerci, eds. Riverine: Architecture and Rivers. Routledge, 2018.

This book shows a sophisticated understanding of history, space, culture, and ecology, and through use of various case studies reveals the culture of human interaction with rivers and its urban topography. Focused on how architecture and urbanism have embedded cultural landscapes with ritual and structural meaning, and therefore useful as well for design strategies.

Fourth nature

Arhitekturni muzej v Ljubljani, and International Architectural Exhibition (16th : 2018 : Venice, Italy). Living with Water : Slovenian Pavilion at the 16th International Architecture Exhibition, La Biennale Di Venezia. Edited by Nina Granda and Granda Matevž. Translated by Škoberne Tina and Benja Pavlin. Ljubljana: Museum of Architecture and Design (MAO), 2018.

Exploring and elaboration on the relation between water and architecture, both past and present, and how this symbiosis should be in future. Rethinking anthropocentric water systems and questioning possibility of developing alternative models allowing a safer and less invasive urban environment.

Water and architecture

Bakshi, A. & Gallagher, F. (2020). Design with Fourth Nature. Journal of Landscape Architecture 15, no. 2 (2020): 24-35.

Gives insight in how the post-anthropocentric characteristics of the landscape can be transformed into a restored ecology of the landscape. Current static design frames shouldn't be implemented upon the dynamics of species movement and adaptation to adjusting conditions like rivers. Designers should be open to the unpredictability of emerging forms and processes. Operating on micro scale.

Fourth nature

Balmori, Diana, and Joel Sanders. Groundwork : Between Landscape and Architecture. 1st ed. New York: Monacelli, 2011.

The book proposes an integration of landscape and architecture to heal the environment through analysis of 25 projects on international scale. Symbiosis of natural and synthetic, exterior and interior, is argued to enhance a more inclusive and alive conceptualization of the physical world. This research continues on this as base for design tools and strategies.

Waterfront strategies

Third Generation City

Casagrande, Marco. "From urban acupuncture to the third generation city." In Nature driven urbanism, pp. 131-153. Springer, Cham, 2020.

Marco Casagrande is a Finnish architect, bio-urbanist and social theorist. He researched the Third Generation City through the Ruin academy. Restoring brings the potential of connecting human and natural environment, seen as the culmination of his theory. He argues that an surgical and selective intervention should be made right at the nodes that have the most potential to regenerate the bigger system.

Water-culture

Gandy, Matthew. The fabric of space: Water, modernity, and the urban imagination. MIT Press, 2014.

His book discovers the cultural and material worlds of water in cities. Gandy's perspective is focused on the urban political ecology to reveal the origin, fabric, and course of urban nature-culture relations. Helpful for understanding water-public relations and for design strategies in research.

Water-social

Lefebvre, Henri. The Production Of Space. 1st ed. New Jersey: Wiley-Blackwell (1991). pg. 38.

His perception of the riparian as social sphere, acting as passive ground of social interaction is necessary for insight in water-public relation. It is found at the center of his conceptual triad of the lived, conceived and perceived space. My study will continue with the phenomenological component as a means to understand the lived experience of the riparian, as a requirement for creating social space.

Fluidity

Manning, Adrian D., Joern Fischer, Adam Felton, Barry Newell, Will Steffen, and David B. Lindenmayer. "Landscape fluidity—a unifying perspective for understanding and adapting to global change." *Journal of Biogeography* 36, no. 2 (2009): 193-199.

Using concept of fluidity as perspective to understand changing landscapes through notion of time and space. They argue that this thinking can bring a new focus on flux in landscapes and herewith help unify separate research themes. Therefore very applicable for researching The Thames and its riparian, as these can be considered zones of fluidity.

Water and architecture

Martin, Prominski, Stokman Antje, Stimberg Daniel, Voermanek Hinnerk, and Zeller Susanne. River.space.design: Planning Strategies, Methods and Projects for Urban Rivers. Basel: Birkhäuser, 2012.

This book reconsiders our relationship with natural systems, their dynamics and qualities. It offers strategies for architectural and urban interventions balancing between flood protection, stream ecology and public space. The book is divided in two parts; fundamentals and the design catalogue. Useful for applying strategies and analyzing case studies for research.

Thematic

Naiman, Robert J., and Henri Decamps. "The Ecology of Interfaces: Riparian Zones." *Annual Review of Ecology and Systematics* 28 (1997): 621–58. <http://www.jstor.org/stable/2952507>.

Extensive elaboration on definition, ecology and function of the riparian zone. Although written from a more ecological standpoint, essential to include in research for added ecological perspectives. Later on even tool for future riparian development are explored, which might be useful for design tools too.

- Bax, Judit, Bruno de Meulder, Jandirk Hoekstra, Martin Hulsebosch, Frédéric Rossano, Kelly Shannon, Dirk Sijmons, and Antje Stokman. *Rising Waters, Shifting Lands*. Zürich: gta Verlag, 2012. *Waterfront strategy*
- Butler, Toby. "'Memoryscape': Integrating Oral History, Memory and Landscape on the River Thames." In *People and their pasts*, pp. 223-239. Palgrave Macmillan, London, 2009. *history*
- Curtis, Simon. "The River Thames: London's Riparian Highway." In *Destination London: The Expansion of the Visitor Economy*, edited by Andrew Smith and Anne Graham, 165–82. University of Westminster Press, 2019. <http://www.jstor.org/stable/j.ctvhrd0t9.11>. *history*
- Davidson, Mark. "Urban geography: Waterfront development." Sydney: University of Western Sydney University of Western Sydney, Australia (2013). *Waterfront change*
- Den Besten, N., T. Brink, B. Broekhans, J. Calis, Q. Cao, F. Chen, A. Deshmukh et al. *Delta interventions: Design and engineering in urban water landscapes*. Delft University Publishers-TU Delft Library, 2016. *case studies*
- Environment Agency. "Thames Estuary 2100: Managing flood risk through London and the Thames estuary" (2012). <https://www.gov.uk/government/publications/thames-estuary-2100-te2100/thames-estuary-2100-te2100> *vision Thames estuary*
- Greater London Authority. "Expanding London's public Realm". PDF file. Accessed October 13, 2022. https://www.london.gov.uk/sites/default/files/exploring_londons_public_realm.pdf *design guide London culture*
- Fahmy, Ahmed, Amal Abdou, and Mahmoud Ghoneem. "Regenerative Architecture as a Paradigm for Enhancing the Urban Environment." *Port-Said Engineering Research Journal* 23, no. 2 (2019): 11-19. *regenerative architecture*
- Gandy, Matthew. "Rethinking Urban Metabolism: Water, Space and the Modern City." *City* 8, no. 3 (2004): 363–79. doi:10.1080/1360481042000313509. *water-culture*
- Hein, Carola. *Adaptive strategies for water heritage: Past, present and future*. Springer Nature, 2020. *Waterfront change*
- Kowarik, I. (2005). *Wild urban woodlands: Towards a conceptual framework*. In *Wild urban woodlands* (pp. 1-32). Springer, Berlin, Heidelberg. *Fourth Nature*
- Latour, Bruno. *Reassembling the social: An introduction to actor-network-theory*. Oup Oxford, 2007. *ANT*
- Lima, Manuel. *Visual Complexity : Mapping Patterns of Information* (version 1st ed.). 1st ed. New York: Princeton Architectural Press, 2011. <https://ebookcentral-proquest-com.tudelft.idm.oclc.org/lib/delft/reader.action?docID=3387539&ppg=18> *mapping*
- Oakley, Art L., and Larry B. Everson. "Riparian Zones." *Management of waterfront condition (eco) Architectural Crossovers Design*

	wildlife and fish habitats in forest of western Oregon and Washington. USDA, Fors. Ser., Pac. NW Region No. R6-F&WL-192 (1985): 57-80.
<i>vision Thames culture</i>	Publica & BOP. "The case for a river Thames cultural vision". Greater London Authority (2019). https://www.london.gov.uk/sites/default/files/the_case_for_a_river_thames_cultural_vision_2019.pdf
<i>notion of time</i>	Speranza, Philip. "Time as a medium: Early work of Miralles." <i>Architectural Design</i> 86, no. 1 (2016): 60-65.
<i>Waterfront strategy</i>	Stevens, Quentin. (2009). Artificial waterfronts. <i>Urban Design International</i> . 14. 3-21. 10.1057/udi.2009.5.
<i>history & taming</i>	Stuart Oliver, "The Thames Embankment and the Disciplining of Nature in Modernity", <i>The Geographical Journal</i> , Vol 166, No. 3, 2000, pp. 227-238
<i>waterfront condition (eco)</i>	Thomas, Jack Ward, Chris Maser, and Jon E. Rodiek. "Riparian zones." <i>Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. Agriculture Handbook 553</i> (1979): 40-47.
<i>history</i>	Tinsley, Derek. "The Thames estuary: a history of the impact of humans on the environment and a description of the current approach to environmental management." In <i>A rehabilitated estuarine ecosystem</i> , pp. 5-26. Springer, Boston, MA, 1998.
<i>ownership of riparian</i>	Vanessa Taylor, "London's River? The Thames as Contested Environmental Space", <i>The London Journal, A review of Metropolitan Society Past and Present</i> , Volume 40, 2015, pp. 183-195
<i>taming</i>	Yao, Joanne. "History is a river: The taming of nature into the twenty-first century." In <i>The ideal river</i> , pp. 186-210. Manchester University Press, 2022.
<i>Thames data</i>	ZSL (2021). <i>The State of the Thames 2021: Environmental trends of the Tidal Thames</i> . McCormick, H., Cox, T., Pecorelli, J., and Debney, A.J. (Eds). ZSL, Regent's Park, London, UK.