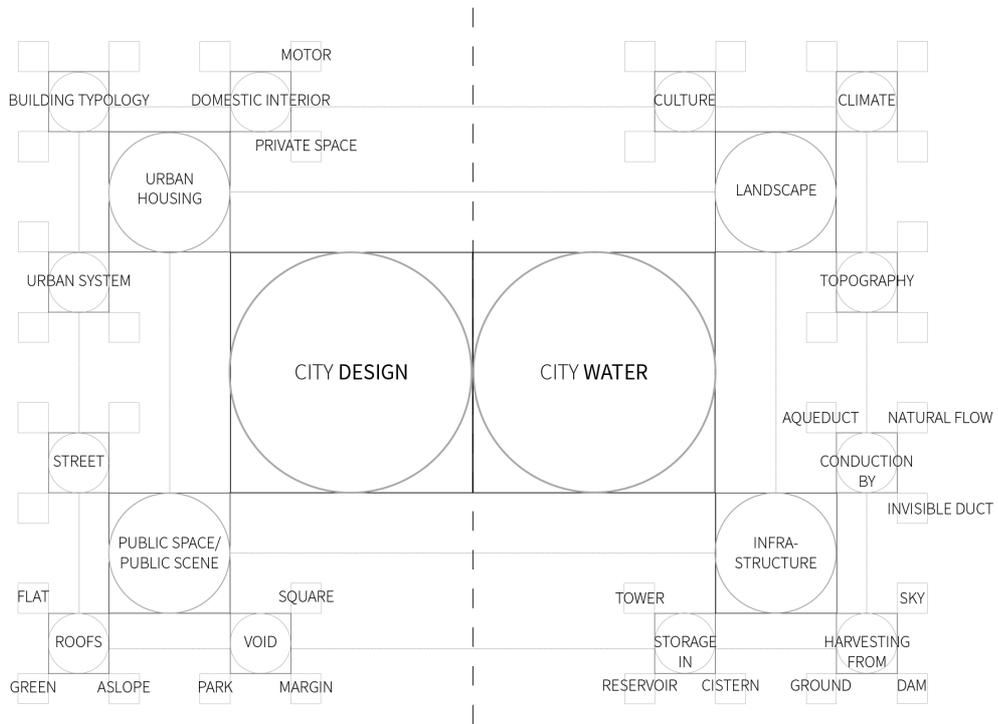


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The design of a continuous flow: mapping water in city's solid topography

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The present research focuses on the evolution of the urban form and its relationship with water.

Worldwide, the limits of accessibility and availability of this resource are being pressed - rupture events in contemporary cities lead to questioning the infrastructure model in current city design.

Pursuing a theoretical systematisation, evidence of the progressive participation of water in the city and in housing is revisited, through a historical and (cartho)graphical framework.

Departing from a community distribution system in public places, to the rationalisation of the street and the emergence of infrastructural logic in the sec. XIX, the sec. XX appears as a period of important formal and conceptual syntheses for the production of housing. The mastery of residential infrastructure - the housing machine - produces a domestic lexicon that translates into served and server spaces.

From architectures of water celebration to its condition of utilitarian invisibility in the contemporary urban landscape, the challenge of the sec. XXI will oppose the rationalisation of design and water consumption to a more integrated vision between urban environment and natural dynamics. It is intended to defend that the design of architecture oriented to this purpose can contribute to this achievement.

The city of Lisbon will be approached as a central case study; research may be supported by complementary case studies.

Often the spatiality and narrative of a secular urban agglomerate can be understood from its relationship with the presence of a natural movement of water, through the integration of a space design capable of using and, if possible, manipulating that same movement. The resulting technological sophistication produced the modern infrastructure that characterizes contemporary developed cities and allowed to disconnect two universes: the water cycle and the design of cities and buildings. The realization that the model practiced - based on the exploitation, consumption and disposal of this resource on a territorial scale - may be exhausted in itself, not ensuring sustainability in the medium term motivates the construction of a perspective on the evolution of cities and their design in function of water, in its movement - free and programmed - as a way of contextualizing and calling for future innovations.

In the first architectural treatise on record, dated two millennia ago (1st century BC), Vitruvius dedicated one of his ten books to the theme 'water', consecrating it as a fundamental theme of thought related to architecture and as humanization tool for the territory.

The book is dedicated to the explanation of techniques to locate water reserves existing in unknown territories, to evaluate the different qualities of the same, and also points out some constructive solutions with a relative degree of sophistication for a design of its artificial conduction over and under the natural territory, through exclusive circuits and the construction of specific support objects for this purpose.

In the present and young 21st century, the 17 Goals for Sustainable Development have defined since 2015 a common goal for the global population, regardless of their geographical condition, politics or level of prosperity, centering the issue of development on a common

agenda of well-being, sharing and responsible use of resources in the common house we inhabit.

Objective 6 “drinking water and sanitation” unambiguously isolates the urgency to guarantee accessibility to water, at least half of the global agenda is complementarily related to this idea, referring to “sustainable cities”, “responsible consumption”, “health and well-being”, “innovation and infrastructure”, among others.

The easy access to water motivates daily consumption and a lifestyle without guarantee of sustainability in the medium term. The natural imbalances are a reflection of the fact that the intensification of urban activity on the natural water cycle is approaching a point of aggravation that could, in a few generations, affect directly or indirectly half of the world population.

The challenge of the sec. XXI for the use of water in cities will be to maintain the quality of life that current technology allows, minimizing its consumption globally. Guarantee accessibility, through an efficient artificial infrastructure, and availability, through the good maintenance of the natural infrastructure - that promote small local water cycles in an urban environment.

The city is the physical support of the access systems to this property, and its architecture, individual and collective, a consequence of the technologies in force. It appears that the growing domain of water infrastructure promotes an urban design that is increasingly independent of the territorial base that gives rise to places - their own natural and social history. The water point forms a collective public space in the historic city. The linear water infrastructure is defined together with the street, and from it determines the constructions. The fully infrastructured building with private supply points, along with the domain of structural construction solutions, becomes quite free from a formal point of view, integrating spaces that are progressively more specialized in their interior composition. In the period of the twentieth century, various solutions are explored that articulate a sense of 'motor', which endows the house with functionality, and a sense of enjoying the habitable space.

The water element in its natural state was banned from the urban space, in which it does not participate as a visible element, its presence being highly domesticated and seen as a consumer good with easy access, or as a surplus to be forwarded in the case of rainwater.

There is a need for a typological moment capable of framing the presence and use of water in contemporary construction. Or perhaps a synthesis of knowledge currently dispersed, since the successful domestication of water use has led to the disposal of a set of design and construction processes dedicated to it and its present use is not optimized, having this potential. It will make sense to revisit some vernacular-based solutions and interpret how they can be integrated and combined in 21st century projects, making the most of technology and global knowledge in constant evolution, without losing the accumulated timeless knowledge linked to the local scale of proximity.

In the city, housing is the program that has the greatest expression, highest gross consumption and therefore the most urgency to be optimized. It is also the most effective.

For a more humanized view of water, it is important to be aware that it is not an abstract resource, and architecture can contribute to this integration.

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Design Driven Research

The methodological process of development of the proposed investigation follows a non-interventionist methodology, supported by qualitative, theoretical and documentary research, supported by a main study case (evolution of city of Lisbon), using primary and secondary sources of information, and critical analysis of the information collected.

The research will follow two main pathways:

- 1) historical synthesis and contemporary theoretical framework of the research question;
- 2) analysis of the case study, constituting approaches to the question at different scales.

Keywords_ water and architecture; mapping infrastructure; 21st century

Bio

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Master in Architecture since 2012 and Architect since 2013 after an internship focused on rehabilitation of Lisbon's historic center housing, with Carlos Valles Architects. From 2013 to 2017, worked at Roseta Vaz Monteiro Architects in rehabilitation of buildings with public programs such as municipal pool, local church and a school. Selected at national level for participating in the international governmental program of exporting young professionals (inov contacto), for a 6 months professional experience in São Paulo, Brazil, collaborating with Carvalho Araújo Architects and OODA studio. Currently working since 2017 in Cascais city council and researcher since 2019.

attached image:

universe of concepts and elements of the research; from the author