

Artemis Rovoli

6085423

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*What if Power becomes Force?*







*Exploring Madrid's paradoxical relationship with its water.*

## *Problem Statement*

Even though Madrid is built on and around water, the element is barely there, (visibly) based on philosophy of experience. However, Madrid is dissected into **natural upstream and downstream territories** along with architectural and/or infrastructural elements and interventions. Infrastructure like dams, reservoirs, and drainage systems become active agents in reconfiguring the landscape and urban form, markers of water's influence on the production of space within the city, sometimes **visible**, other times **hidden** (Gandy, 2004).

Simultaneously, Spain is experiencing water scarcity, the desertification phenomenon and torrential rain (Cyrielle Cabot, 2023). The Spanish government invests in highly sophisticated water management systems and water infrastructure in order for the system to be interconnected on a national level (Council of Ministers, 2023). It is understood that solutions on water management in **moments of crisis** are to build and engineer more. This reliance on technicity—the technical knowledge and systems embedded in infrastructure generate questions regarding the effect of this approach on the **landscape**, the **city** and **water territories**.

Water holds political and societal power due to its essential value to humans. This inherent **power** can be transformed into **force** and vice versa and enable architecture which affords the implementation of infrastructure and public space for the generation of energy, culture and values.





## *Introduction*

Situated in the heart of Spain, built in between the rivers of Manzanares and Abronigal, legend has it that Madrid took the name Maÿrit, meaning 'waterways' inspired by the river flows all around it (Stewart, 2015). Historically, rituals and traditions of the city have been established around water, touching upon religion with the San Isidro celebrations to the creation of professions like the water carriers and the laundry washers. These cultural themes are found in a prominent position in the societal evolution of Madrileños, and their spatial leftovers can be traced in prominent positions in the city.

The water management company for the Metropolitan Area of Madrid, Canal de Isabel II, began to build a highly engineered infrastructural network in the mid-19th century. Starting with the canalization of the Lozoya river, underground water tanks and distribution fountains, the water cycle not only facilitated the city's expansion but also played a vital role in establishing a complex urban transport network like the M30 motorway that moves both people and resources. The flows of water gave away to vehicle and monetary flows where streams have been turned into important commercial axes in the urban fabric, like P. de la Direccion, C. de Bravo Murillo, San Bernardo and C. de Fuencarral to name a few.

This research is set to explore Madrid's relationship with water, whether close or distant, through the interdependencies of the city's morphology with its water bodies. The study of water management could reveal metaphorical and literal areas where architecture could harness technicity, creating a dialogue between water as a resource and as an element of civic life.

*'Water is not simply a material element in the production of cities but is also a critical dimension to the social production of space. Water implies a series of connectivity between the body and the city, between social and biophysical systems, between the evolution of water networks and capital flows, and between the visible and invisible dimensions to urban space. But water is at the same time a brutal delineator of social power which has at various times worked to either foster greater urban cohesion or generate new forms of political conflict.'*

- Gandy, M. (2004).

## *Fascinations*

My fascinations started from energy and materials and have articulated to the **morphological analysis of the city through energy flows**. Influenced by Gerhard Schmitt's theory on the Future City Lab I am interested in **responsive city planning**, along with **infrastructure and public space** when considering urban growth and environmental parameters within our cities. These themes are also analysed in the 'Locking in Cities' essay where Stern and Zenghelis (2018) discuss how cities face challenges of adaptability due to the long-term permanence of infrastructure and how sustainable approaches to urban design to accommodate evolving needs, particularly in the context of climate change and social inequality, could be the key to solve technicity reliance and constraints. Lastly, an interest of mine is to try to comprehend the dynamic of ever-growing infrastructure and **generative territories** within the city and their impact on public life.

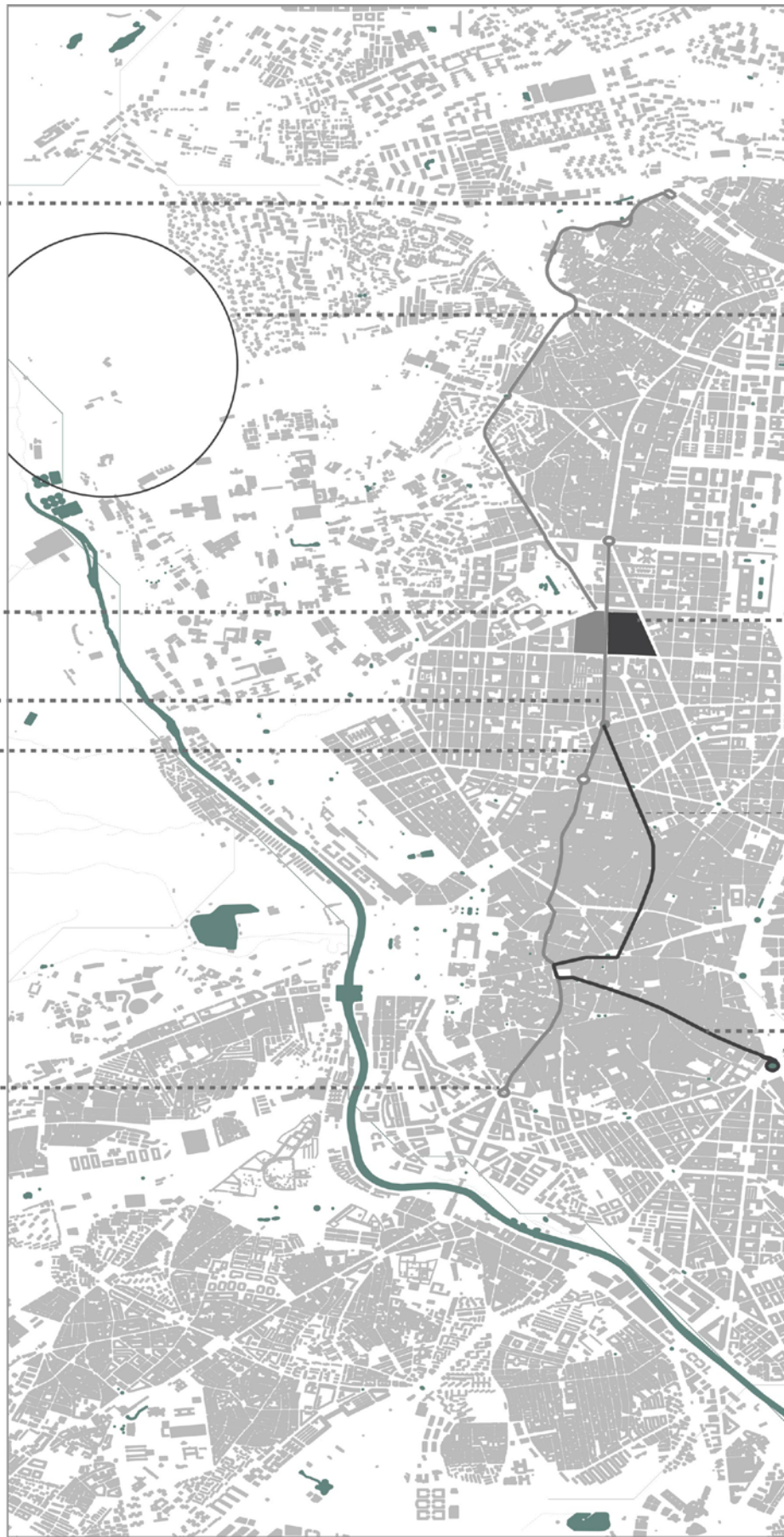
*P.º de la Dirección*

*1st Water Tank*

*C. de Bravo Murillo*

*C. de San Bernardo*

*Puerta de Toledo*







*3rd Water Tank*

*2nd Water Tank*

*Calle de Fuencarral*

*C. de Atocha*

# Bodies of Water, Human Rights and the Hydrocommons

Astrida Neimanis

## 1. Onto-logic of Amniotics

A template to understand **how, where, when and thanks to whom.**

**What sort** of ethical and political relations are inaugurated among specifically human bodies of water, between human and non-human bodies of water?

**How** is the natural expressed through the cultural and how the cultural indebted to the natural?

## 2. Difference and Repetition

Open/ closed system of water: Our planet does not produce 'more' water but differentiation and gestational potential is always present within its materiality. **What** sort of social and political responses to other watery bodies are demanded of us?

## 3. NHTs

**Who** has access to water and at what cost? (financial etc). Hydrotechnologies support our onto-logic or interpermeation, gestation, repetition and differentiation. NHTs choreograph our planet's geophysical bodies of water, e.g. corporatized water, industrial irrigation.

**Commodification** of water leads to inadequate access to water.

## 4. Human rights and Commons

Our water needs are not only physiological but naturacultural. Our implication within the hydrological cycle is not only biological, but social, ethical, political and cultural.

Bodies of water are not stable or discrete bodies, but bodies that move, flow, become, evaporate, while also interpermeating all other bodies of water.

**Ontology of leaks and flows.**

Is there another ecopolitical approach we might look to that could extend an amniotic relation between all bodies of water, rather than circumscribing it?

**Commons:** any creations of nature or culture that we inherit jointly or freely. (common responsibility).

**water commons:** the management of the water supply that comes from our wells or taps etc. but also common decision-making on the best use of

## *Theoretical Framework*

geophysical bodies of water that we may not need for our personal use. Water commons management is about making decisions about the further proliferation of NHTs in all their forms and about allowing certain bodies of water their own rights—the right to proliferate, flow, gestate, differentiate.

### **Construction of Values**

- **In what way** does Madrid's urban development's position towards its bodies of water reflect the city's relationship with water?
- **What** is the hierarchy (priority system) of water usage in Madrid?
- Water as not the product but as the element through which....
- What if our lands and infrastructures be made more productive while at the same time more permeable to flows?

Water is a large term and contains various meanings. In order for me to contextualize its importance for this research I read Astrida Neimanis' *Bodies of Water, Human Rights and the Hydrocommons*. Neimanis introduces the 'Ontologic of Amniotics', a framework to explore what kinds of ethical and political relationships are established between **human bodies of water and non-human**. How natural processes manifest in cultural contexts, and in turn, how culture relies on and responds to the natural world. The text discusses the inequities of water access, shaped by financial and technological factors asking questions like '*who has access to water and at what cost?*' (Neimanis, 2009). Hydrotechnologies, such as corporatized water and industrial irrigation, alter natural water systems, commodifying water and limiting access. Hence an argument is made about how water's importance goes beyond physical needs to include social, cultural, and political dimensions. Hydrocommons is explained as water creations of **nature** or **culture** that we inherit jointly, along with the **responsibility** of their **sustainable** and **collective** management. Even though my interest does not directly lie on accessibility to water and social divisions as such, this reading enriched my research about water in terms of **construction of values** on a large urban scale.

of Key terms and subjects discussed in *Bodies of Water, Human Rights and the Hydrocommons*.

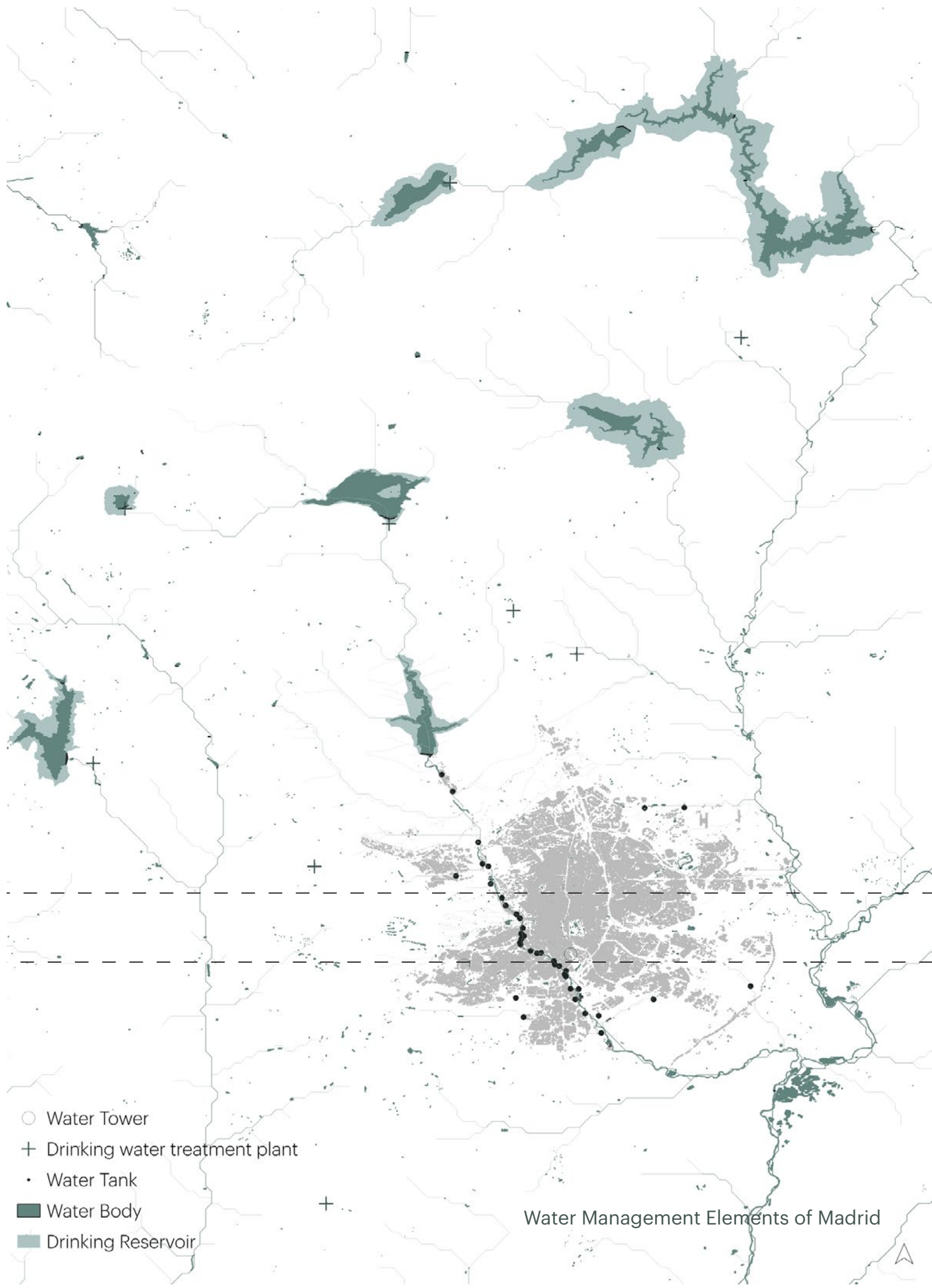


## Production of Space

Following the theme of Hydrocommons from a spatial lens I delved into Matthew Gandy's '*Rethinking urban metabolism: water, space and the modern city*'. The concepts consists of how **water infrastructure** fundamentally contributes to the **production of urban space**, creating a symbiotic relationship between **technology**, **nature**, and **society**. The relationship is both material and symbolic—water systems serve the physical needs of cities, while also influencing cultural and social dynamics. The production of space through water is explored through the lens of '*dialectics*': urban space emerges from a hybridization of nature and culture, where water infrastructure helps transform the natural landscape into the modern cityscape (Gandy, 2004).

Historically, the shift from viewing nature as a material necessity to a source of leisure marked a cultural transformation in urban spaces, reorienting the design and use of private and public spaces around water features, such as fountains and parks. This is also the case in Madrid, where in 1851, under Prime Minister Juan Bravo Murillo, construction began on the Canal de Isabel II, providing Madrid with a proper water supply that remains its main source today (Stewart, 2015). Furthermore, the fountains were a meeting place for the community according to historian Álvaro París Martín who studied the fountains in the Lavapiés neighbourhood in the 19th century, along with the history of the watercarriers (de la Cruz, 2017).

The development of water infrastructure like dams and aqueducts tied cities to broader state policies and capital markets, reflecting the interconnection between capital, space, and power (Gandy, 2004). This reveals how water plays a key role not only in the city's physical development but also in shaping its political and economic governance, becoming a focal point for both the **flow of capital** and the **exercise of municipal and state power**.



Water Management Elements of Madrid

Production of Space

*heritage, nature, infrastructure*

collection

*water flow*

treatment

*upstream*

distribution

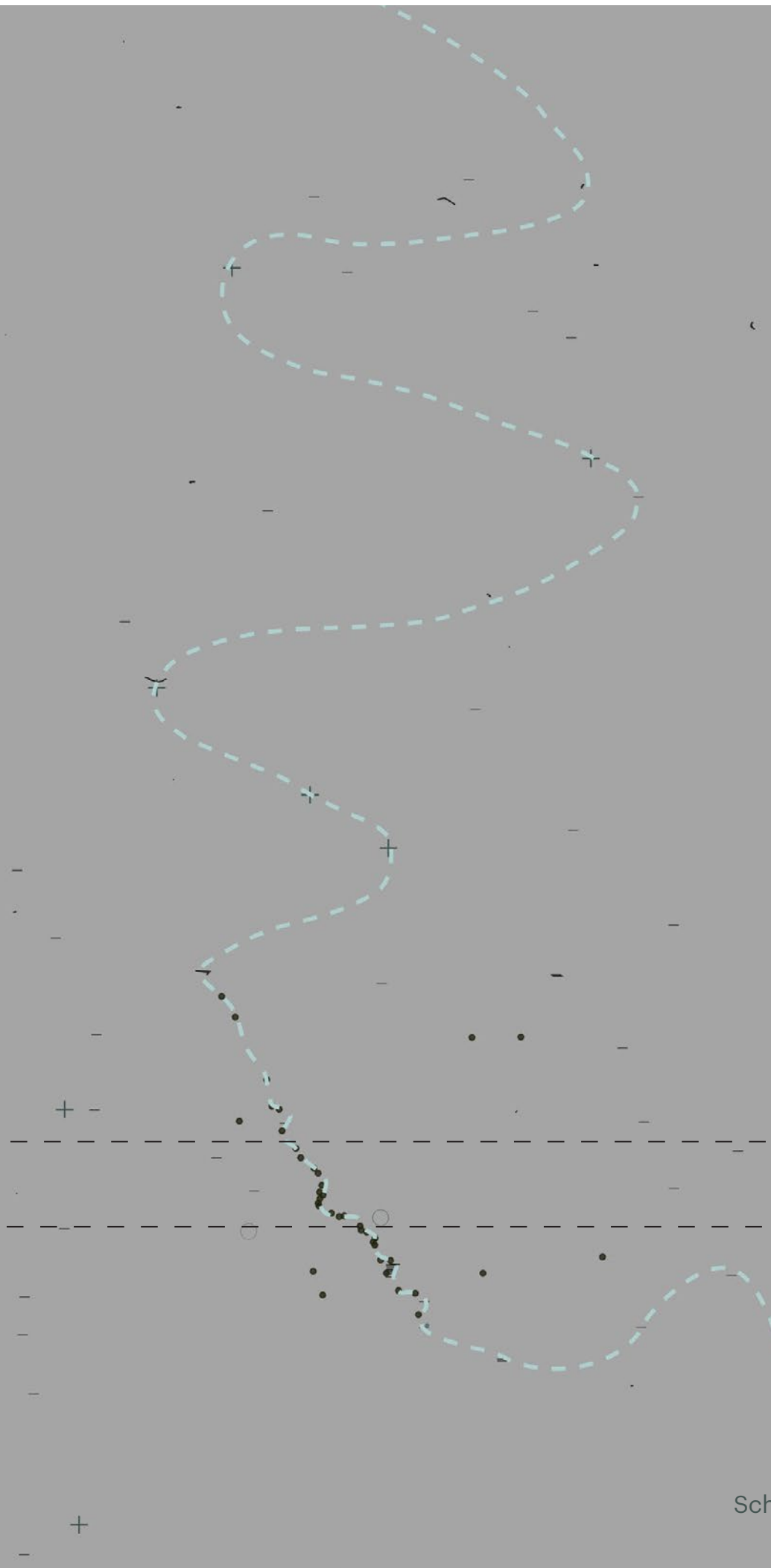
*downstream*

sanitation

*water/urban regeneration development*



After reading this article, I started looking into the map of Madrid in a different way, understanding the division between **upstream** and **downstream** areas, the commercial and logistic axes within the city and how the whole morphology of the city has been shaped by the streams and flows of water.



Schematic Mapping of Man-made Water Cycle in Madrid.

**Infrastructure** is also a vast theme within my research, which could take me into various paths. However, for this project, I am focusing on its impact on people's lives and on the land and the spatial opportunities it affords to its context. After reading *'When Infrastructure Fails'* by Stephen Graham I became aware of the importance of infrastructural breakdowns and how they offer opportunities to rethink urban life. Normally, infrastructure becomes **invisible** as it integrates seamlessly into daily routines—this is the **"black boxing"** process, where systems function unnoticed. When they fail, however, they become visible, and their complexity is revealed—this is called **"un-black boxing"** (Graham, 2010, pp. 1–26). Such moments expose the social, economic, and environmental dependencies of cities on fragile networks like water systems. Simultaneously they shed light on possible new proposals for infrastructure integration within the urban fabric, which is something I would like to explore further in my project.

#### Moments of Crises and Alternative Solutions

I would like to experiment with pushing the boundaries of where infrastructure ends, and architecture begins and vice versa. I would like to refrain from focusing on the neglected urban spaces around large infrastructure works but rather merge the categories into a form of **'generative architecture'**. The article *"Hybrid Morphologies: Infrastructure, Architecture, Landscape"* by Klingmann and Angelil (1999) discusses the **dissolution** of traditional categories separating architecture, infrastructure, and landscape. It argues that contemporary urbanism requires a shift away from rigid distinctions between these domains. Their integration allows for **hybrid morphologies**. This fluidity accommodates diverse processes and changing forces, offering new opportunities for urban development and design, innovative forms and **spatial organizations** (Klingmann & Angelil, 1999).

An assumption of mine after my readings is that the dichotomy of architecture vs infrastructure could be a false one.

## Operative Questions

*What is the hierarchy (priority system) of water usage in Madrid?*

*Where is the water use visible and where is it hidden?*

*How is the river and the water bodies of Madrid viewed by the public?*

*In what way does Madrid's urban development's position towards its bodies of water reflect the city's relationship with water?*

*What if infrastructure was not invisible but also non-invasive?*

*What if we converged architecture and infrastructure?*

*What if our lands and infrastructures were made more productive while at the same time more permeable to flows?*

*What if the combination of architecture and infrastructure creates a generative building (the generator) which contributes to water management and the creation of public space, while altering Madrid's relationship with water?*

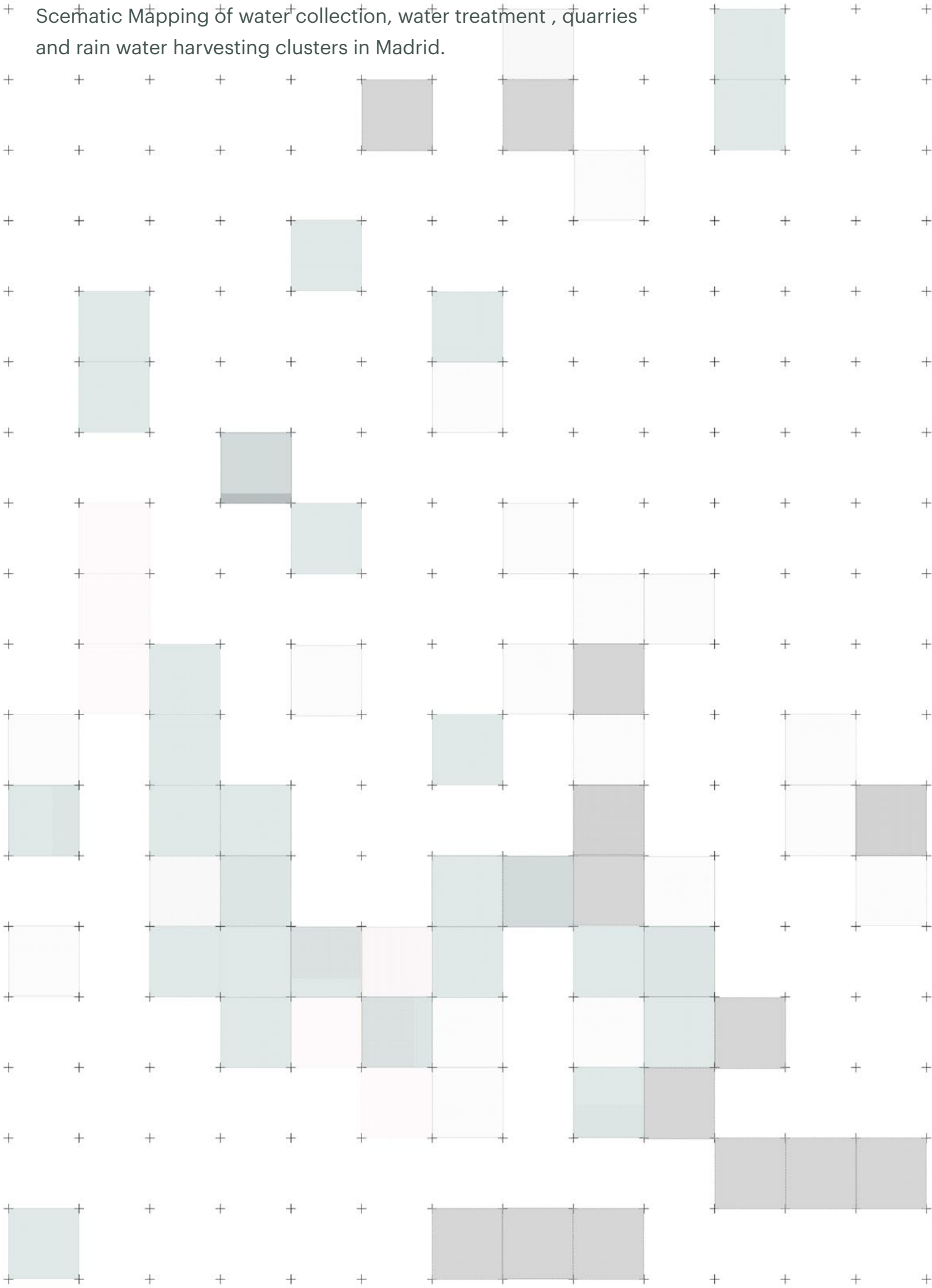
*In what way can the generator alter Madrid's relationship with water in response to the city's hidden hydrological layers?*



## *Methodology*

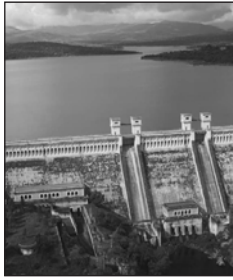
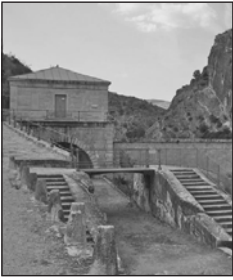
### Literature Review

For me, literature review is a method that I have turned to and let go multiple times while conducting research for the themes of water, infrastructure and urban commons. It has been the first point of departure after exploring my fascinations, so I could grasp the existing knowledge on the matters within the architectural discourse. I have organized it chronologically, i.e., history within the context of Madrid and water, from the establishment of the city and the water infrastructure and architecture development in terms of politics and social issues. At the same time, I am studying the current and future problems Madrid and Spain are facing with water management, to identify potential issues that could be addressed and dive into the cultural framework. Additionally, I am looking into a broader theoretical framework, to position myself in the dichotomies of my interests, them being architecture vs infrastructure, natural flows management and the notion of public space. This will help me articulate more precisely terms and issues that I would like to investigate further. This list will keep expanding as I expand my research and intensions for this project.

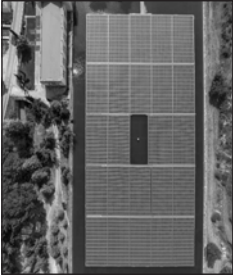


*Visible  
outside of the city*

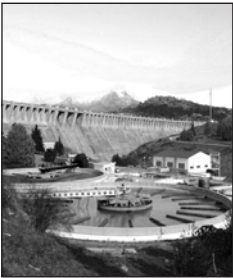
I1



I2



PW



PW/ A



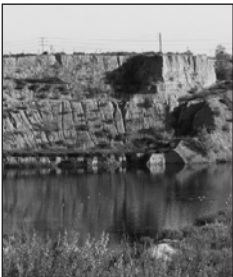








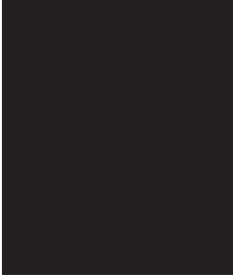




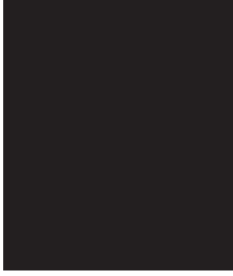
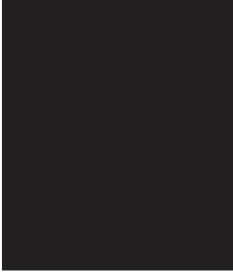





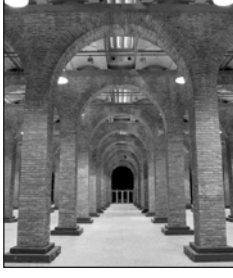
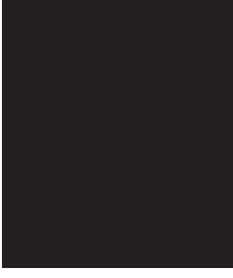




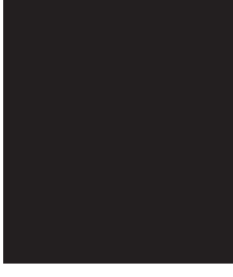
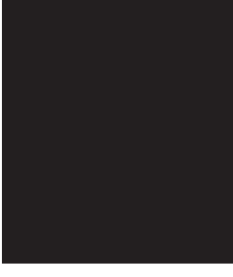

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## Topo-morphological Cataloguing

Cataloguing the water cycle and water management system of the metropolitan area of Madrid, will help me understand it and identify areas and/or sites of interest. This large and complex system can be categorized by using specific parameters. The parameters fall into three subject matters:



<i>inside the city</i>				<i>Hidden</i>		
						
						
						
						
						

1. Infrastructure/ Public Works/ Architecture
2. Outside/ Inside the city
3. Visible/ hidden

The cataloguing is informed by the plan of Canal de Isabel II and is illustrated in a matrix form, following the canal's water cycle from collection to regeneration.

Cartographic Mapping of water collection, water treatment, quarries and rain waterharvesting clusters in Madrid.



## Cartographic Mapping

A cartographic map of the water elements of Madrid complements the cataloguing of the water system because it reveals contextual properties of the catalogued elements and can assist in the search for a site. Additionally, it can indicate natural water areas that are not identified in the catalogue.

## Schematic Mapping

of

- man-made water flow into collection, distribution, regeneration and to be added production/consumption
- areas of interest where water related activities take place to reveal overlaps (clean water, waste water treatment, quarries, rain water harvesting areas)

In Madrid:

## Informal Conversations

about

the public's perception of Madrid's water bodies (lakes, reservoirs and rivers) and their relationship with it. Their attitude towards them and potential ideas or wishes about them.

## Archival Research

Visiting the Canal de Isabel II archives, Archivo Regional de la Comunidad de Madrid for maps and sites along the river.

## Cartographic Collage

Walking/ Cycling along the river Manzanares noting potential sites and their conditions taking into consideration accessibility, proximity to the river, condition of the river, context and phenomenological conclusions.

## Fascinations

Morphological analysis of the city through energy flows.  
Responsive city planning.  
Spatial combination of urban commons and generative territories.  
Public space and infrastructure.

## Theory

Marc Angelil & Anna Klingmann, 'Hybrid Morphologies'  
Matthew Gandy, 'Rethinking urban metabolism: Water, space and the modern city'  
Stephen Graham, 'When Infrastructure Fails'  
Neimanis, A. (2009). Bodies of Water, Human Rights and the Hydrocommons.

## Key Words

Generative Architecture

Public Space

Infrastructure Reliance

Water

through history

## Sub-topics

(in) visibility

architecture vs infrastructure

space reclamation

buildings as nodes

ownership and production of values

## Literature Review

### Past

- Madrid : the history. → for the value and role of water in Madrid's development.
- A Brief Historical Account of Madrid's Qanats → for the cultural and historical contextualization of the system

### Present/Future

- Articles about water scarcity and flood risks in Spain → relevance argument and understanding of political decisions.
- Stern, N., & Zenghelis, D. (2018, November). Locking in Cities .
- March, H. (2013). Taming, controlling and metabolizing flows: Water and the urbanization process of Barcelona and Madrid (1850–2012).

## Problem Statement

Even though Madrid is built on and around water, the element is barely there, (visibly) based on philosophy of experience. However, Madrid is dissected into **natural upstream and downstream territories** along with architectural and/or infrastructural elements. These are markers of water's influence on the production of space within the city, sometimes **visible**, other times **hidden**.

Simultaneously, Spain is experiencing water scarcity and the desertification phenomenon. The Spanish government invests in highly sophisticated water management systems and water infrastructure in order for the system to be interconnected on a national level. It is understood that solutions on water management in **moments of crisis** are to build and engineer more. For this reason, questions arise regarding the **effect** of this approach on the **landscape**, the **city** and **water territories**.

Water holds political and societal **power** due to its essential value to humans. This inherent power can be transformed into force and enable architecture which affords the implementation of infrastructure and the **generation** of **public space**.

## Operative Questions

*Where and how is water used in Madrid?*

*Where is the use visible and where is it hidden?*

*What is the greatest water need in Madrid?*

*What is the difference between architecture and infrastructure?*

*What if infrastructure was not invisible but also non invasive?*

*What if we converged architecture and infrastructure?*

## Complimentary Themes

moments of crises & alternative solutions  
un-blackboxing systems & mechanisms  
production of space  
dissolution of categories

*buildings as generators of energy, culture and new possibilities*



## Research Questions

*How can power become force?*

*What if the combination of architecture and infrastructure creates a generative building (the generator) which contributes to water management and the creation of public space, while altering Madrid's relationship with water?*

*In what way can the generator alter Madrid's relationship with water in response to the city's hidden hydrological layers?*

*What if architecture, as a generative force, could assist in reshaping Madrid's relationship with water?*

## Research Methods

### Cartographic Mapping

of water management nodes:  
reservoirs, dams, DWYP, WWTP,  
storm tanks, water towers,  
drinking fountains

to

understand the man made water  
cycle and spot potential areas of  
interventions within the system

### Diagramming

the water cycle both in the past  
and the present

to

understand the city's relationship  
with water regarding power and  
policy decisions

### Topo-morphological Cataloguing

of the water elements of the water  
management system separating it into  
architecture, infrastructure, public  
works outside and inside of the city

to

identify potential sites

3 potential concepts of research  
within the cycle

to

identify clusters and systems  
and understand their  
interdependencies

## Intensions

To understand the water cycle of Madrid in relation  
to time (past, present, future) and to frequency/  
intensity (how much, what for and for whom).

To understand how these parameters translate  
to spatial elements from large infrastructure to  
architectural elements, hidden mechanisms and  
visible systems outside and inside the city.

*Research Diagram*

## *Research Question*

*What if the dissolution of the boundaries between architecture and infrastructure could assist in the change of Madrid's relationship with water?*

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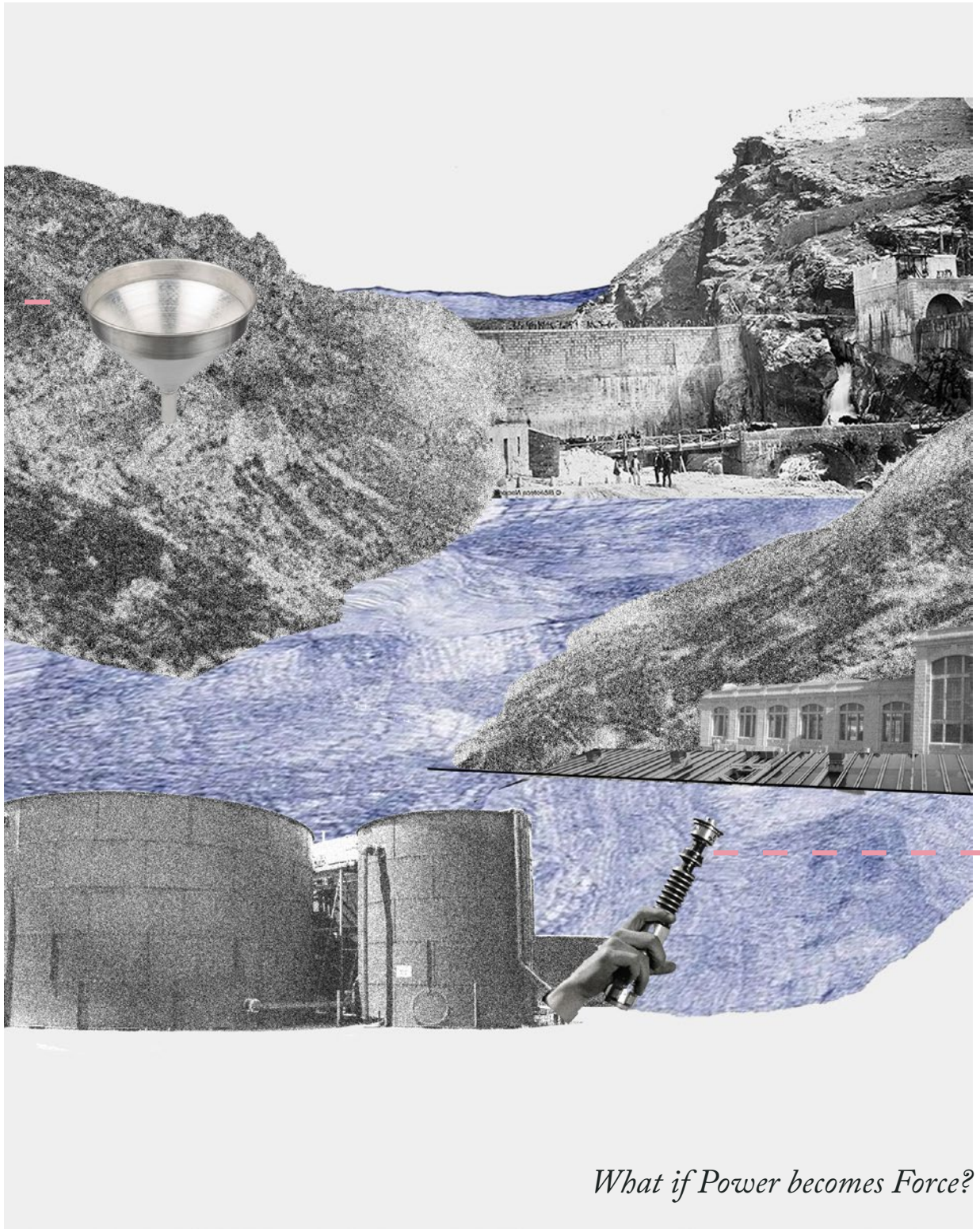
## *Relevance*

'I love cities' was the first sentence of the 'personal fascinations' presentation of the graduation year. This investigative journey has unfolded combinations of themes in architecture I have never dared to position next to each other: water, generative architecture, public space and technicity. By narrowing down large concepts and decoding or translating what seemed to be irrelevant with each other nouns, I have come to understand my own positioning towards architecture and the built environment.

I have researched these themes within the wider context of Spain's prolonged droughts and the desertification phenomenon. These conditions place water in the centre of the conversation around urban environments. The efficient collection, use and reuse of water is being tackled in various levels, in the government, the agriculture and the environmental protection and preservation sectors.

In the built environment highly engineered solutions and hyper closed systems for energy generation are the current solutions for such issues. These trends alter people's perception of water and its role within the city while accumulating great amounts of space. This phenomenon territorializes the generative areas and particularly the water regeneration and treatment areas, leading to clear distinctions between infrastructure, architecture and landscape.

I do not intend to colour these realities as positive nor negative, instead I believe that innovative design proposals and prototypes could emerge from placing juxtaposing themes together. My intention is to explore the possibilities of using water as a force and merge morphologies to address the paradoxical role that water has in Madrid's life today.



*What if Power becomes Force?*

Identification of Areas of Intervention within the Water Cycle.

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