

Reflection

Nicolette van den Bos

Living with Water

1. Introduction

Problem Statement (figure 1)

My graduation project, *Living with Water*, addresses the challenges caused by climate change, such as rising sea levels and extreme weather events, and their impact on the built environment. Coastal cities are particularly vulnerable to rising sea levels, and Rotterdam is no exception. In addition to making buildings water-resistant, the city faces a disconnect between its urban fabric and harbour water. Moreover, there is much less discussion, about the meaning of water itself, and the way it connects to dimensions as society, culture, economy, ecology, and spirituality. Peoples' perceptions about water and the notion of sense of place are sceptical.

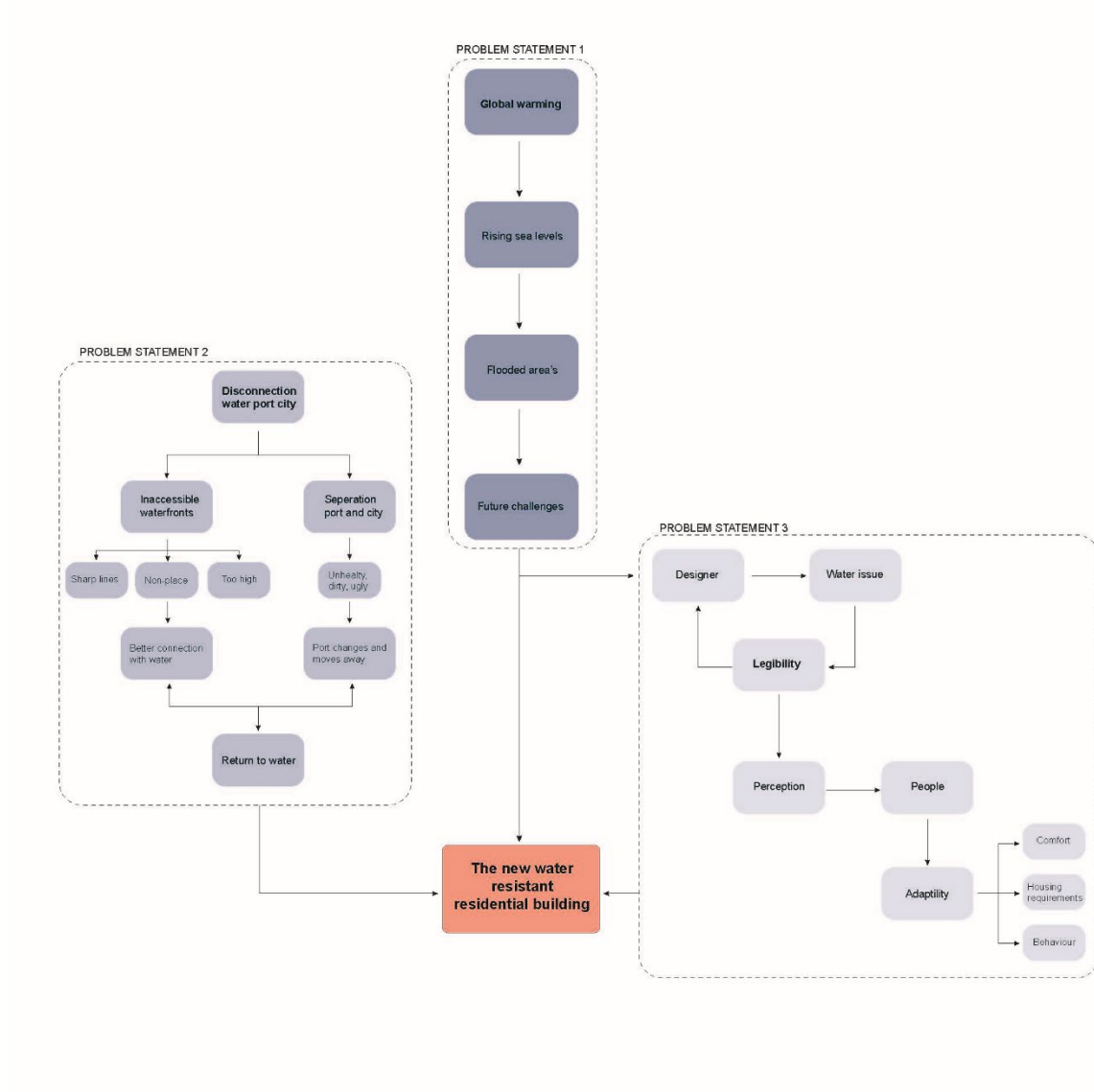


Figure 1: Problem Statement (author).

Objective

The project aims to develop innovative architectural solutions that address the dual challenge of mitigating future flood risks while enriching the human experience of water. The central design question is: *“How can architecture accommodate rising sea levels, ensuring human experience and sustainability in the context of the harbour of Rotterdam?”*

Rotterdam’s city ports provide an ideal setting for this exploration, offering opportunities to redefine the relationship between the city, its harbour, and the water. Specifically, the focus is on the Merwehaven, a port area outside the dike along the Maas River. Designated by the municipality as a transformation area for housing, the Merwehaven is highly susceptible to rising water levels. It also holds the potential for addressing the city’s housing needs while reconnecting with its creative and industrial history.

By designing a residential building within this master plan, which provides for a diverse community from starters, creative entrepreneurs, families and the elderly, a water-resistant building will be created that strengthens its connection to the water. Additional functions, such as community centres, cafés, exhibition spaces, educational facilities focused on water management and art and music studios, will enrich the area and serve as a prototype for the future built environment.

Research

Within my Master’s track in Architecture, I explored how water-resilient architecture can not only offer technical solutions but also enhance human perception and emotional engagement with water.

The research question driving this inquiry is:

“How can architecture, from a human perspective where emotions and experiences play a role, influence and enhance the perceived experience of buildings in port cities that interact with water?”

The outcome of this thematic research is a framework of design principles that merge technological innovation with enriched human interaction with water in urban and architectural contexts. This framework is presented in a paper that analyzes case studies in detail. By integrating water into architectural design—through sight, sound, smell, touch, and taste—architects can create environments that foster deep emotional connections. These connections are further strengthened by addressing personal memories, community histories, physical landscape characteristics, and emotional attachments.

The design incorporates floating and amphibious housing typologies, sustainable material choices, and innovative construction practices to ensure ecological balance and resilience. Water-resilient architecture that thoughtfully engages human senses and emotions has the potential to transform port cities into vibrant, sustainable, and meaningful urban environments.

2. Reflection of the process

My methodology was based on a multidisciplinary approach, employing both the human perception lens and the architectural engineering lens. A comprehensive literature review was conducted to examine the impact of architectural design on the perception of a location and the sensory experiences associated with it, with a particular focus on the creation of a sense of water. Furthermore, an investigation was conducted into technical solutions for water-resistant living, with a particular focus on water typologies, construction, materials, sustainability and biomimicry. The application of these two lenses enabled a comprehensive analysis of a number of case studies.

A broad spectrum of relevant literature was available on these topics, making it easy to incorporate this knowledge into my research. However, at times it proved challenging to maintain focus and avoid becoming overwhelmed by the sheer volume of information. The use of these lenses enabled me to maintain focus and to remain mindful of my initial objectives. The integration of sensory perceptions into concrete design proposals proved to be a challenging process. A solution was proposed after identifying the characteristics of water as a suitable combination with multisensory design.

Furthermore, in the process, the use of lenses also made it easier to analyse the case studies and gain valuable insights critically. However, it was challenging to locate all the necessary information, both online and in the literature. Due to the considerable number of case studies that I undertook, it proved challenging to conduct in-depth analysis on every detail in all cases. Consequently, I may have overlooked valuable information.

Throughout the research process, I received regular feedback from my mentors, who assisted me in structuring my investigation. This provided me with a great deal of clarity and direction, enabling me to focus on the most prominent elements.

3. Relation between Research and Design

The interaction between research and design is crucial (see Figure 2). However, the separation between the first six months dedicated to research and the subsequent six months focused on design, interrupted by a vacation, made this interaction more complex. This time gap made it challenging to effectively utilize and integrate my earlier research at the start of the design process.

Although the design guidelines I formulated at the end of my research phase provided valuable direction, I initially struggled to translate them into concrete design decisions, such as defining the building's form and layout. This was because the guidelines were primarily focused on technical aspects or sensory experiences, which operated on a smaller scale. As a result, they offered limited guidance for initiating the design process on a larger, spatial scale.

Only when I decided to repurpose the steel legs of offshore platforms I did find a clear entry point for my design process. This choice provided a structural framework that served as a foundation, enabling me to integrate the various water-related elements from my guidelines cohesively. Through this approach, I achieved a better balance between research and design, allowing both processes to complement and strengthen one another more effectively.

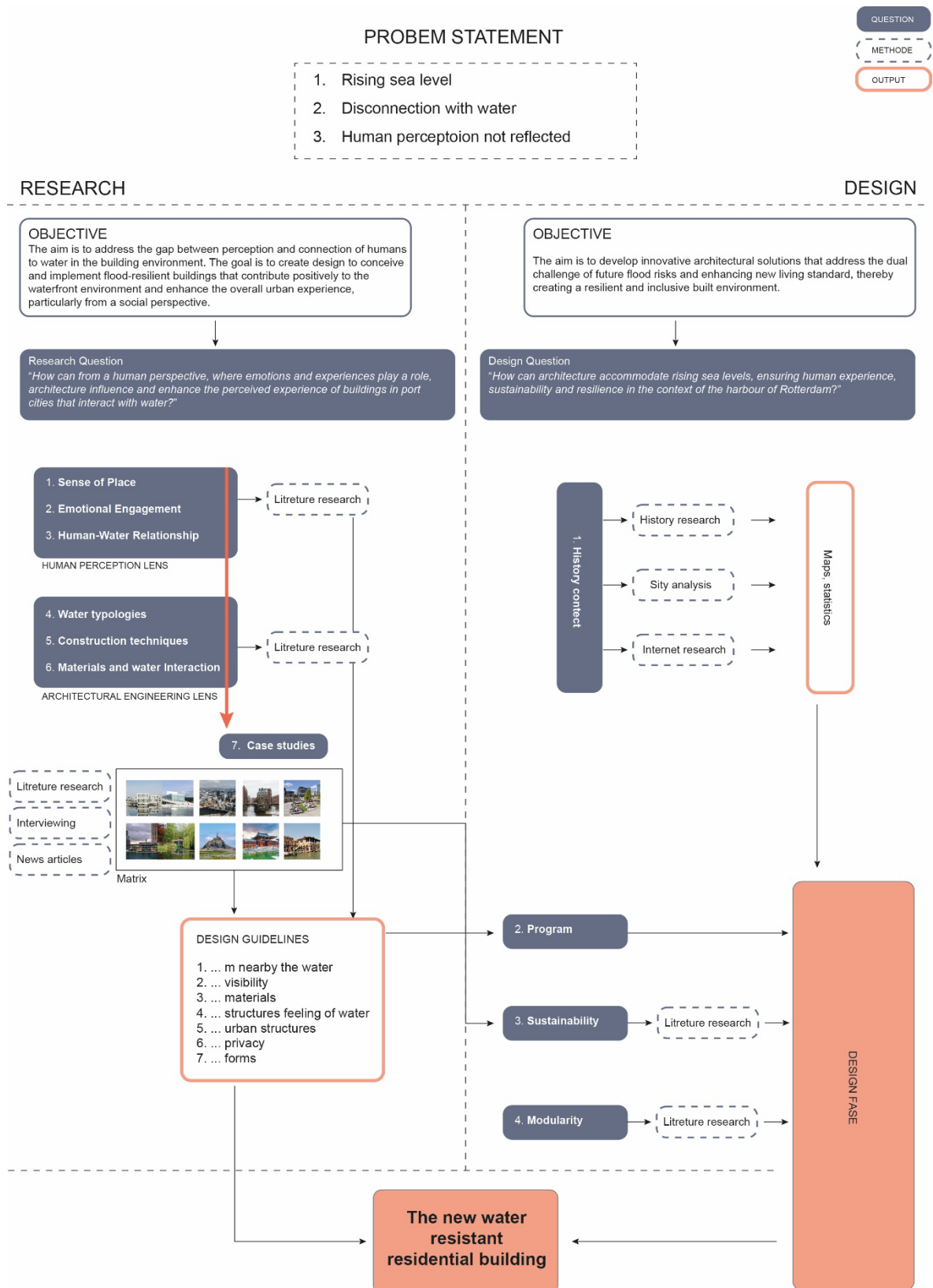


Figure 2: Research and design strategies (author).

4. Relation between the graduation project and the wider social, professional and scientific relevance

My graduation project offers an innovative solution for climate-resilient buildings in the outer dike areas, where fluctuating water levels present a significant challenge. The design is a prototype for water-resistant construction methods that integrate both technical and social solutions. It strengthens the connection with water and enhances the experience of living alongside it.

The developed structure combines robustness with flexibility, allowing for seamless incorporation of future adaptations. The building accommodates diverse residents and can serve as a model for similar projects. Additionally, it contributes to addressing the housing shortage in Rotterdam.

The project also has the potential to be applied in other coastal cities worldwide, where similar challenges arise due to climate change and rising sea levels. By combining technical innovation with social relevance, the project contributes to scientific knowledge on climate-adaptive construction and urban development.

The design emphasises sustainability, using eco-friendly materials and energy-efficient strategies, such as reuse, while respecting the local ecosystem by enhancing interaction with water. The project is future-oriented, aiming to create a safe, flexible, and sustainable living environment that will remain valuable for future generations.

To conclude, the reflection will be ended with two reflection questions:

How can cultural differences in the perception of water be incorporated into the design of water-related architecture?

Water has diverse symbolic, religious and functional meanings in different cultures. For example, in some Asian cultures, water is associated with purity and spirituality, as in temple complexes with water features. Designers can start with an in-depth analysis of how water is experienced historically, culturally and spiritually in the context of the specific project. Also, by actively involving local communities in design and asking them how they experience and interact with water, a design can be enriched with insights from everyday realities and cultural preferences.

How can the design principles I developed be adapted for other cities that are also facing climate change?

The design principles I developed can be adapted by applying flexibility and context-specific approaches. By taking into account local water issues, culture, infrastructure and economy, these principles can effectively contribute to the climate adaptation of various cities worldwide.