

Floating Community

Seasteading as a Solution to Navigate
Rising Seas and Growing Cities



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Seasteading as a Solution to Navigate Rising Seas and Growing Cities

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Abstract

Considering the looming threat of rising sea levels and the imminent flooding of many coastal cities by 2050, numerous initiatives are underway to strengthen these regions with various flood protection programs and barriers. However, there might be another solution than just building barriers around our cities. What if, rather than building next to the water, we envision a lifestyle where we inhabit the water itself? The concept of „Seasteading“ emerges as a potential new way of life for the future.

My proposal involves establishing a Floating Community within the city of Stockholm. This location is particularly suitable due to the absence of tides and ocean currents, making it ideal for such a project. Additionally, Stockholm and its surrounding areas already show a strong affinity for water, with excellent boat connections between the archipelago and the city. The residents also enjoy various recreational activities on and around it.

Moreover, the concept of a Floating Community isn't confined to one location; it holds potential for expansion to other cities and even across different countries. These floating communities could serve various purposes, such as providing temporary housing for refugees or accommodating athletes during events like the Olympics or other sports events held near water bodies.

This new Floating Community could not only be a new way of living, but it could also benefit the housing shortage that many cities are facing. While coastal cities typically expand inland, perhaps it's time to reconsider this trend and prioritise the water's significance. Often, water bodies serve as vital hubs for recreation and community vitality, acting as the beating heart of a city. Therefore, in the future, our focus could shift towards integrating living spaces that extend into and thrive upon these interconnected waterways.



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Introduction

Growing up on a small island in the North Sea of Germany, I developed a deep connection to the water. During the pleasant summer months, strolls along the beach, boat rides, and watching the sunset over the ocean were cherished moments. However, the winter months brought harsh conditions. The open ocean brought frequent storms, resulting in various consequences which we might not be able to fight forever.

To protect our islands from disappearing, we must construct higher and more robust dams. Each spring, significant investments are required to top up the beaches with sand lost during the storms, ensuring that our island doesn't slowly go away. Additionally, substantial gates must be installed to shield the village from storm surges. Looking further into the future, it's evident that sea levels are rising, raising concerns about the feasibility of combating the ocean's consequences indefinitely.

Living on the water has always held a special fascination for me, especially as I've witnessed the changes required to protect our island from the forces of the ocean over the years. These experiences sparked my interest in the concept of living on an island that could adapt to the water.

As I pondered this idea, the concept of a floating community began to take shape in my mind. In this thesis, I will explore a solution for addressing not only rising sea levels but also the global population growth experienced in cities worldwide. Drawing from examples set by architects around the world and their approaches to this issue, I will adapt my acquired knowledge to propose my own solution.



image 1 - 5: Showcasing the enormous ocean forces on my home island in Germany.



image 6: Image generated using Adobe Firefly from the prompt „Eisbär auf schmelzender Eisscholle wegen Klimawandel“.

01. Climate Change

Climate change presents a significant challenge for everyone, impacting our entire planet as well as its inhabitants, flora, and fauna. Several interconnected factors are working together, which are affecting our planet and are responsible for the many effects we are experiencing in the short or long term. It's essential for individuals to reflect on their actions and lifestyles because climate change will not be resolved by one person alone, but rather by collective effort.

Various global initiatives and agreements, such as the UN Sustainable Development Goals, the Paris Agreement, and initiatives like C40 cities, are already in progress to address this issue and safeguard our planet. Tackling climate change requires coordinated efforts on a global, national, and local scale to reduce greenhouse gas emissions, adapt to climate change impacts, and transition towards a sustainable, low-carbon future.

What is Climate Change?

With the end of the 1800s came the Industrial Revolution, which brought not only advancements to us but also serious consequences for our planet. Since then, humans have been the primary drivers of climate change, leading to profound long-term shifts in the world's climate. The widespread burning of fossil fuels, such as coal, oil, and gas, has notably contributed to this change, releasing main greenhouse gases like carbon dioxide and methane into our atmosphere. Consequently, temperatures have risen by approximately 1.2°C since the late 1800s.

The decade from 2011 to 2020 stands out as the warmest on record, emphasising the urgent need to address climate change. Contrary to the misconception that climate change solely means warmer temperatures, its consequences are far-reaching and interconnected. Changes in one area can trigger a domino effect, elsewhere. (United Nations, n.d. a)

The rise in temperatures has particularly contributed to sea levels rising and increased flooding in our cities. By 2050, an estimated 1.4 billion people will inhabit coastlines, with 800 million residents in 570 coastal cities facing threats from a half-metre rise in sea levels. (C40 Cities, 2021)

Efforts like the Paris Agreement represent crucial steps forward. The goal is to establish targets for all nations to limit the temperature rise to 1.5°C. This goal is essential for mitigating the most severe climate impacts and maintaining a habitable climate. However, even with such efforts, sea level rise and flooding are expected to worsen for centuries due to the emissions already locked into our atmosphere. This underscores the ongoing need for sustainable practices and global cooperation to effectively address climate change and safeguard our planet from its worst possible consequences. (C40 Cities, 2021)

"We do not inherit the earth from our ancestors, we borrow it from our children."

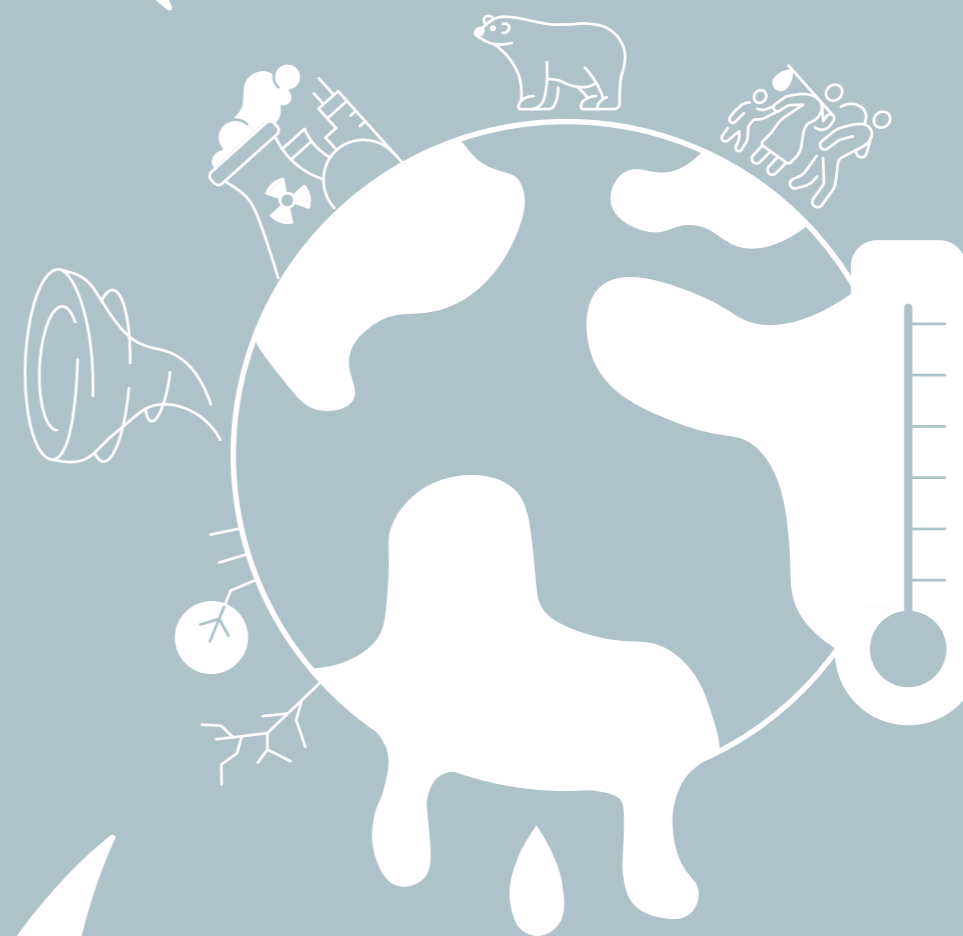
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"The planet will continue to cook."

- Paul Krugman, economist and journalist

„The world must come together to confront climate change.“

- Barack Obama, Former US President



"By polluting the oceans, not mitigating CO₂ emissions and destroying our biodiversity, we are killing our planet. Let us face it, there is no planet B."

- Emmanuel Macron, President of France

„... we risk denying present and future generations the right to a healthy and sustainable planet.“

- Kofi Annan, Former Secretary-General of UN

Greenhouse gases occur naturally in our atmosphere, but in recent years, their levels have been rapidly increasing. This rise in greenhouse gases results in rising temperatures, which in turn cause disruptions to the delicate balance of our environment. These effects of climate change present significant challenges to all life forms on our planet.

The United Nations has outlined numerous interconnected causes and consequences associated with climate change and its impacts for our world.



Approximately 75% of the electricity used worldwide is produced by burning fossil fuels. During this process, significant amounts of carbon dioxide and nitrous oxide are released into the atmosphere. The remaining 25% of electricity comes from renewable sources such as wind and solar, which emit minimal to zero greenhouse gases or other pollutants to the air.



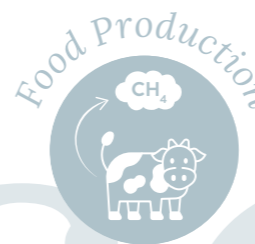
The manufacturing sector stands as one of the foremost contributors to greenhouse gas emissions. In the majority of processes involved in the production of items, such as cement, iron, steel, electronics, clothes and various goods, fossil fuels serve as energy sources or are utilised to power machines. This trend has seen a notable increase, particularly with the beginning of the Industrial Revolution.



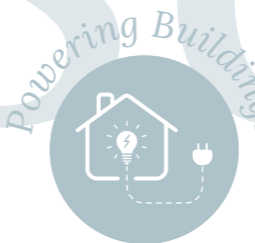
Trees play a crucial role in maintaining atmospheric climate balance by absorbing and storing carbon dioxide. On a daily basis, trees get cut down to make space for agriculture and other land uses. When cutting down a tree it releases the stored carbon dioxide back into the atmosphere. Deforestation and its aftermath contribute to nearly 25% of global greenhouse gas emissions.



People around the world rely on various forms of transportation each day to get from one place to another. While transportation is essential, it significantly contributes to greenhouse gas emissions, given that numerous vehicles, such as cars, buses, ships, and planes, run on fossil fuels. About 25% of energy-related carbon dioxide emissions come from transportation worldwide.



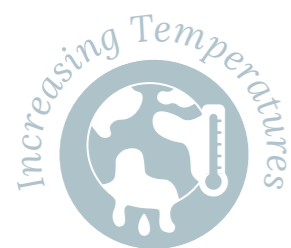
Food production contributes to greenhouse gas emissions in various ways. Deforestation is frequently used to clear land for agriculture. Cows and sheep, raised on this land, release methane during their digestion process, and the application of fertilisers further adds to increased emissions. Additionally, emissions result from the use of fossil fuels in farm equipment for harvesting and transportation.



Buildings account for approximately 50% of the world's total electricity consumption. Since the era of industrialization, energy-related emissions from buildings have increased. The demand for energy-intensive appliances, like heating and cooling systems, along with a growing reliance on additional technical devices, significantly contributes to the high number of energy consumption.



Our individual lifestyles have a big impact on our planet. Factors like the source of our electricity, means of transportation, daily dietary choices, food wastage, clothing preferences, electronics and plastic consumption all play a role in determining our greenhouse gas emissions. Notably, when focusing on the wealthiest 1% of the global population, their carbon footprint exceeds that of the poorest 50%.



Each year the world is experiencing a consistent rise in temperatures, leading to more frequent high-temperature events like heatwaves. Every decade since the 1980s has consistently been warmer than the last. These higher temperatures are causing a variety of consequences, including an increase in wildfires, greater rates of water evaporation, and potential shifts in the geographical distribution of climate zones.



The world is experiencing a rise in both the frequency and intensity of storms. As temperatures continue to rise, more moisture evaporates into the atmosphere, resulting in increased instances of heavy rainfall and flooding in various regions. Furthermore, the warming of the oceans contributes to the intensification of tropical storms, as these weather systems thrive on the heat absorbed by the ocean's surface.



Water scarcity is a growing issue in numerous regions, presenting a daily challenge for many individuals who struggle with not enough water availability. Particularly in areas already dealing with water shortages, the problem is even more noticeable. But also in other places around the world there is a diminishing water supply, resulting in more frequent droughts that affect crops and heighten the vulnerability of ecosystems.



The majority of the heat generated by global warming has been absorbed by the ocean, leading to its expansion. Furthermore, the warming climate and oceans contribute to the melting of ice sheets and glaciers, resulting in a rise in sea levels. Acting as a carbon sink, the ocean absorbs carbon dioxide from the atmosphere, leading to increased acidity that poses a threat to marine life and coral reefs.



Climate change presents a significant challenge to the world's fauna and flora, with about 1 million species, both on land and in the ocean, at risk of future extinction. Various threats to biodiversity, such as wildfires, extreme weather events, pests, and diseases, contribute to this risk. Unfortunately, most species can not protect themselves from the consequences of climate change and might be lost forever.



The impacts of climate change are diminishing our food resources both on land and in the water. Worldwide, there is a growing issue of global hunger and poor nutrition. Each year, we witness a reduction in marine food sources due to the increasing acidity of the ocean. Rising temperatures further contribute to a decrease in available water and farmland, affecting our crops and livestock.



Climate change doesn't create new health challenges; rather, it amplifies existing issues, making them more severe. Recognized as a major threat to human health, climate change claims around 13 million lives yearly. Factors such as air pollution, diseases, extreme weather events, forced displacements, mental health, increased hunger and poor nutritious food, all contribute to these high numbers.



People are forced to relocate due to weather-related events. The majority of these refugees originate from vulnerable countries that are not ready to cope with the consequences of climate change. Factors contributing to displacement and poverty include devastating floods that wipe out entire communities, high temperatures that hinder outdoor work, and water shortages that affect both crops and livestock.

Cities fighting against Rising Sea Levels

It is clear that cities need to prioritise environmental sustainability and future planning to reduce the worst outcomes of climate change.

Coastal cities, in particular, are highly vulnerable to a rise in sea levels. These cities must develop new solutions not only for future construction but also for protecting their existing infrastructure. Failure to address these issues could result in costs related to rising seas and flooding reaching approximately 1 trillion US dollars by mid-century. The east coast of the U.S. and major cities in Southeast Asia are especially affected, experiencing sea level rises two to three times faster than other cities.

All over the world, cities are having different approaches to protect themselves from the impacts of climate change. One solution is to build on the water, which addresses future construction but does not help to protect existing cities.

Examples of measures to protect our current cities include building sea walls, raising roads as barriers, installing stronger stormwater pumps, and creating beaches and dunes as natural defences. Additionally, coral reefs, mangroves, and salt marshes can serve as natural barriers that absorb stormwater. However, one solution is often not enough, and many factors need to be considered. (C40 Cities, 2021)

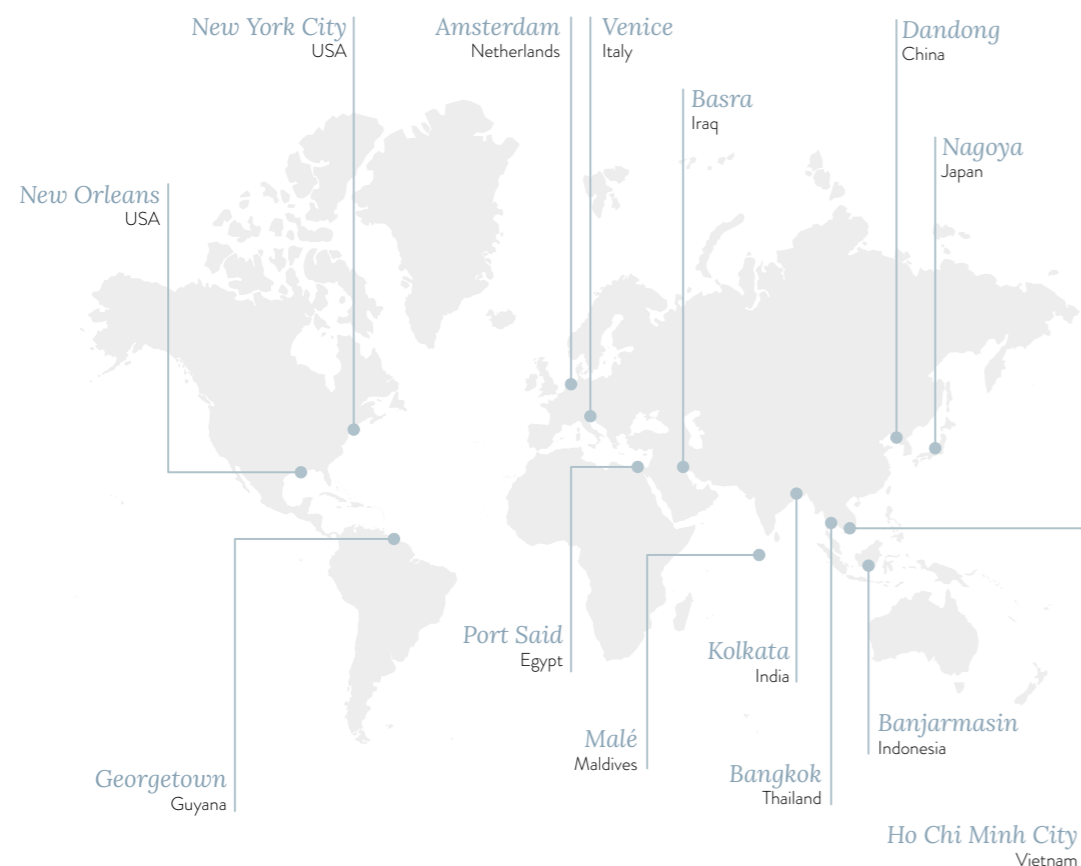


image 7: This map shows some of the cities worldwide that are at risk from rising sea levels.

After witnessing the enormous damage that Hurricane Sandy left behind in New York City, the city has asked for help to protect itself from rising sea levels and storm surges.

„The Big U“ is now under development, offering various flood prevention techniques such as elevated parks and pathways, deployable walls that can flip down in case of emergency, and many more. This new 16 km sea wall will protect Lower Manhattan, The Battery, and the East Side from future flooding and its consequences, including destroyed houses, power outages, and the flooding of streets and subways.



(Rebuild by Design, n.d.)

Fiji, on the other hand, has already tried various flood prevention techniques such as seawalls and moving houses away from the shoreline.

In 2012, the village of Vunidogoloa had only one choice left: leaving their village behind and relocating to a safer spot. Since then, three additional villages have been moved, and a further 40 are waiting to be relocated. Not only houses need to be relocated but also schools, health centres, roads, electricity, and water systems. Therefore, it is a very long process but often the only viable one due to the impacts of climate change.



(The Guardian, 2022)

China is mostly not greatly affected by rising sea levels, but its cities face significant flooding. The water-management systems of European countries were also used in these tropical cities, leading to numerous consequences regarding flooding.

Cities in these regions should therefore avoid using grey infrastructure and instead implement „Sponge Cities“. Creating wetlands, green areas, permeable surfaces, widespread vegetation, and open areas next to roads will ensure that water can be easily absorbed by the ground instead of flooding entire districts.



(Deutsche Welle, 2022)



image 11: Image generated using Adobe Firefly from the prompt „Skyline von einer Stadt im Zusammenhang mit Städtewachstum“.

02. Growing Cities

Currently, around 50% of the world's population lives in cities, and this number is projected to increase to 70% by 2050, resulting in the continued growth of urban areas. As cities expand, they often tend to take away land that was previously used as farmland or natural habitats for animals. Moreover, with new housing comes new infrastructure like roads and railways to connect the newly developed areas to the existing city.

Urban growth poses a challenge for urban planning and needs to be carefully planned. However, these challenges also present opportunities for new and innovative urban planning strategies. The decisions made now regarding urban development will shape the cities of the future and profoundly impact the well-being of their inhabitants. It's crucial to approach urban planning with foresight and creativity, ensuring sustainable growth and vibrant, livable cities for generations to come. (National Geographic, n.d. a)

History of our Cities

Cities have played a fundamental role in human civilization for thousands of years. One such early example is the region of Mesopotamia (7,500 B.C.E.), situated between the Euphrates and Tigris rivers. The fertile land provided abundant opportunities for the people. Here, humanity transitioned from a nomadic lifestyle of hunting and gathering to settled communities focused on cultivating crops.

Communities thrived along rivers, utilising them not only for agriculture but also as crucial transportation networks for trading goods with neighbouring settlements. As more cities emerged over the centuries opportunities arose, attracting people in search of better prospects such as trade, cultural exchange, education, job opportunities, and access to healthcare. This transition marked an important moment in human history, laying the groundwork for the complex urban landscapes we see today.

Urbangrowth is a relatively recent phenomenon. Before the Industrial Revolution, only about 10% of the population lived in cities, while the remaining 90% lived in rural areas. However, industrialisation drastically changed the way people lived. The emergence of factories created a demand for labour in urban centres. Therefore, millions of people abandoned their lives as farmers and sought employment in factories where they could earn higher wages.

Since then, new technologies have attracted an increasing number of people to cities. With advancements in urban planning, cities became more appealing and were able to evolve in innovative ways. The introduction of the first skyscraper, along with the invention of the elevator, allowed cities to expand not just horizontally but also vertically into the sky. This marked a transformative shift in urban development, shaping the modern landscape of cities worldwide. (National Geographic, n.d. a)

Causes of Urban Growth

Urban growth has been stronger than ever, and in recent years, a new phenomenon has emerged: the megacity, which is defined as a city with over 10 million inhabitants. New York and Tokyo became the world's first megacities in 1950. Shortly after, more and more cities started to experience exponential growth.

Currently, there are 34 megacities globally. Statista predicts that by 2050, this number will increase to 48, with each megacity being shaped by a variety of urban growth factors.



The most natural cause of urban growth is the rate of births and deaths. Particularly when there are more births than deaths, the population expands. It is common for young people to migrate to cities for education or better job opportunities, and these individuals are often the most fertile and likely to start families. With the arrival of a new baby, people tend to settle in the city and build their lives there.



Another big factor is immigration. A lot of times people are forced to move away from rural areas to find better jobs opportunities, education and housing in urban areas. Additionally, political, racial, economic, and religious conflicts force many people to seek refuge in urban areas.



- existing megacities
- future megacities (2050)

image 12: Cities expected to experience substantial population growth in the coming years, evolving into megacities.



During ancient times metropolises like Athens, Sparta and Venice flourished as prominent commercial centres. Today, commercial activities continue to draw increasing numbers of people to urban areas. Businesspeople come to cities to sell their products attracted by higher profits.



During the Industrial Revolution, the lack of efficient transportation resulted in people living near their workplaces. Nowadays, urban areas show great advancements in transportation systems, eliminating the necessity for people to live in close proximity to their workplaces. Individuals prefer to live in cities where facilities are easily accessible via public transport over short distances.



Educational facilities such as universities, schools, technical institutions, and training centres are primarily located in urban areas. Consequently, students and adult learners are frequently attracted to these regions to pursue higher education opportunities unavailable in rural areas. Moreover, urban areas offer amenities such as libraries, museums, and theatres, providing residents with access to entertainment and culture.



Modernization has brought significant changes to our lives. We got new technologies, better transportation, more fashion styles and more social amenities. Many individuals want to relocate to cities with the belief that they offer a better and more convenient life. In rural areas, dressing differently may attract curious looks, while cities provide an environment where individuals can freely express their unique identities.

(Conserve Energy Future, n.d.)



image 13: Image generated using Adobe Firefly from the prompt „Schwimmende Häuser in einem Kanal“.

03. Floating Structures

Living on water is not a recent innovation. Settlements of floating structures date back to the 1500s. Especially in regions like Southeast Asia, Peru and Bolivia water-based living is not a new idea and is integrated into the people's daily lives. These early settlements laid the foundation for modern floating houses seen, for instance, in the Netherlands. However, the concept must evolve beyond a few canal houseboats to truly help tackle the global problems we are facing.

The UN has asked for support for further research into floating cities to address the challenges we are facing with rising sea levels and urban expansion. While floating cities may appear as a radical shift in how we live, work and play, they are necessary for future-oriented urban planning. Floating cities have the potential to transform our cities in a way that has not been seen since the invention of the elevator, which pushed our cities into the sky.

Why Floating Structures?

Our coastal cities are especially affected by rising sea levels. Available land is scarce, and there is not much space left to build new dwellings or public buildings. Plots by the sea are often very attractive and expensive because they offer an undisturbed view of the water. As a result, these plots are usually reserved for the wealthy, leaving people with lower incomes without the opportunity to enjoy a life by the sea.

Floating houses on the water are generally cheaper than apartments on land because buying or renting space on the water is less expensive. However, the houses themselves may be more expensive due to the technical aspects involved. If designed properly, this cost can balance out, offering a more affordable solution. Additionally, floating communities can democratise access to waterfront living, providing many different people the chance to benefit from and enjoy the waterfront.

These new plots by the water offer not only places for dwellings but also various other functions. A few examples include offices, museums with water as a theme, commercial spaces, or even sports fields and swimming pools. Around the world, there are already many examples demonstrating what is possible to build on the water. For instance, the floating office in Rotterdam is built out of timber and is considered an energy-positive building. In larger cities, people often hesitate to swim in the water even on very hot days, but floating pools could change this. A new public floating pool in New York City will soon provide access to the water, offering people a new way to enjoy the water surrounding the city. Similarly, a floating sauna in the middle of Oslo offers a unique perspective on the city.

There are many different ways in which floating structures could benefit our future cities, and we should start exploring them more.



Our coastal cities worldwide face a significant threat from climate change. Sea levels are rising and there will be an increased risk of land loss and flooding in the coming years. Safeguarding our cities requires new and innovative solutions for future construction. Floating structures emerge as a potential answer, as these can easily adapt to the challenges of rising sea levels and increased flooding anticipated in the years ahead.



As people transition from rural to urban areas, our cities are experiencing an unusual growth. However, available land for building new housing is rare and it presents a challenge. Traditionally, cities expand inland, but it may be time to consider the significance of the water in urban planning. Floating communities emerge as a new solution to densify urban spaces without the need for additional land, thereby redefining the future of sustainable urban development.



Floating communities can change and evolve over time, easily reconfiguring to meet specific needs. Their versatile design allows for adjustments in various ways, accommodating diverse types of communities. This adaptability in urban planning presents a new approach to designing new neighbourhoods in a city. These neighbourhoods can seamlessly evolve with the changing demands of the environment and its inhabitants, offering a dynamic and flexible model for urban development.



Floating communities offer a promising path for sustainable living and construction in the future. Prioritising the use of environmentally friendly materials and harnessing renewable energy sources such as solar, wind and water, these communities aim to minimise their ecological footprint. Additionally, the inclusion of advanced waste management systems in the design ensures that floating communities not only adapt to environmental challenges but actively contribute to a greener and more sustainable future.

Oceanix City

Developer: BIG Bjarke Ingels Group, UN-Habitat

Location: Busan, South Korea

Year: 2025 - 2028

Oceanix is the world's first prototype for a sustainable floating city which will be built in Busan (South Korea). Designed in collaboration with BIG architects and UN-Habitat, this project features hexagonal-shaped islands that can be connected to form villages for 300 residents or even entire cities for 10,000 people. The modularity ensures that the city will adapt and grow over time depending on the needs of its residents.

All buildings are kept under seven stories to ensure a low centre of gravity. The roofs fan out to create sheltered spaces from the sun, not only on the inside but also on the lower levels where the public outdoor spaces are located. This design lowers cooling costs and provides more space for solar panels. Around each island are additional public functions, encouraging residents to move around the different neighbourhoods.

(BIG | Bjarke Ingels Group, n.d.)

What I learned from this project:

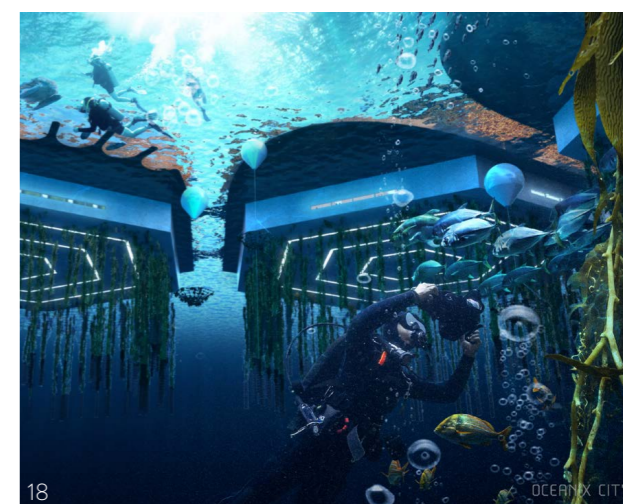
- Strong connection between the project and existing city to enhance the activation and integration of the floating city into the surrounding area
- Integrate a blend of residential, commercial, and public buildings to attract different people
- Smaller islands surrounding the project area to facilitate energy production, promote biodiversity, and provide protection from waves
- A modular system to facilitate adjustments according to evolving needs over time
- Sustainable building techniques and efficient energy use to promote environmental responsibility and minimise carbon footprint



“The sea is our fate - it may also be our future.”
- Bjarke Ingels, Founder & Creative Director BIG



image 14 - 18



“Living on the water offers a great solution for places where climate change and a rise in sea levels are a looming hazard. It not only protects people against nature, but it also protects nature itself.“

- Sascha Glasl, Co-founder Space & Matter

Schoonschip

Developer: Space & Matter, Group of Residents

Location: Amsterdam, Netherlands

Year: 2008 - 2021

Located in the north of Amsterdam lies this floating community with 46 households divided among 30 different floating houses. This community was brought to life by the residents themselves, who shared a common dream: to build a sustainable, close-knit community on the water. In collaboration with the Dutch architecture office Space&Matter, the residents made their dream a reality and designed their community.

The community seeks sustainable solutions for living as a response to climate change. Water is either collected from rain to be used in toilets or recycled for reuse within the community. All the houses are connected through a smart jetty to ensure efficient energy and water distribution among all the households. The residents share electric cars and cargo bikes, the energy their houses produce, and even organise events to foster neighbourly relationships.

(Space&Matter, n.d.)

What I learned from this project:

- Community with a population size of around 150 people, fostering a strong sense of belonging and togetherness through organized events and mutual assistance
- Individuals of all ages, fostering inclusivity and diversity rather than catering to one specific group
- Designing individual houses can be challenging due to the multitude of unique designs and architects involved, leading to various complications throughout the process
- Connect buildings with a „smart jetty“ for efficient energy and water distribution among the households



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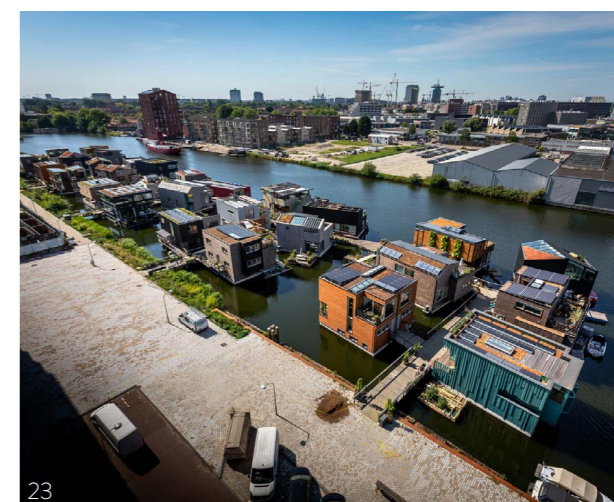


20

image 19 -23



22



23

Maldives Floating City

Developer: Dutch Docklands, Government of Maldives, Waterstudio.nl

Location: Lagoon close to the capital Male, Maldives

Year: 2022 - 2027

The Maldives is a country significantly affected by rising sea levels. More than 80% of its archipelago lies less than one metre above sea level, highlighting its vulnerability to being submerged. Consequently, the government of the Maldives is seeking new solutions for their residents' future living arrangements. Currently, they are developing a floating city just a 15-minute boat ride away from the capital, Male.

The design of the floating city was inspired by brain coral and its organisation. Around 5,000 houses will be linked together to create this new coral-like city, utilising both land and water for infrastructure. The city will offer a variety of functions, such as dwellings, hotels, shops, and restaurants, to attract a diverse group of people and create a vibrant city. The first prototype of a unit was completed in 2023 and has been towed to the project site.

(Maldives Floating City, 2021 a)

What I learned from this project:

- Multiple access points scattered around the city ensure accessibility for a wide range of people
- Modular system which should be adaptable to accommodate unforeseen changes in the future to ensure quality, standardization, rapid construction, cost control, and efficiency
- Avoid constructing overly dense structures to allow sunlight to reach the seabed

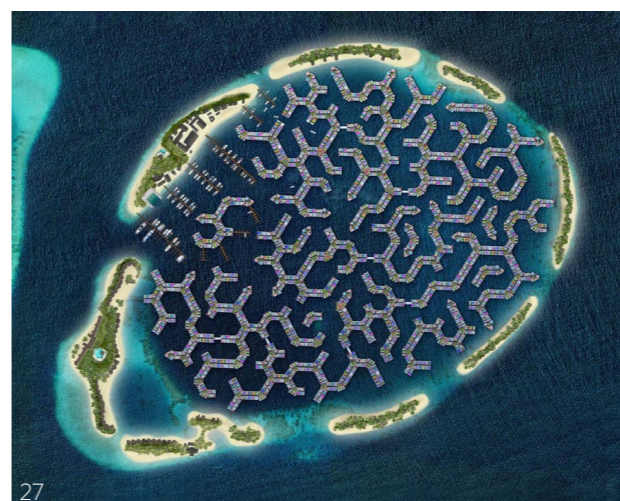


image: 24 - 28

“Everyone thought that as long as you fight hard enough, we could defeat nature. But the consequences of climate change have made it clear that this battle can no longer be won. We urgently need to rethink things.”

- Koen Olthuis, Founder Waterstudio.nl

Advantages

Not very long ago, the concept of a floating city that adapts to rising seas was merely an utopian idea. However, looking at the different examples set by architects and developers around the world, it is clear that this idea is slowly coming to life.

It is essential that we explore the possibility of building on water since our cities are facing numerous challenges worldwide. These new floating communities can offer many advantages compared to land-based living and building.



Floating modules have the possibility to be prefabricated in a closed-off factory, where there are no environmental influences. Construction in a factory also offers advantages in terms of faster and more efficient construction because workers can work on it every day. Once constructed, the modules can be easily towed to their location and anchored in place.



Floating communities offer a unique approach to urban planning since they can be built wherever there is water. By choosing a modular construction system, the various modules can be arranged in different configurations depending on the location. Additionally, should a module need to be moved or relocated, it can be easily towed to its new location without much difficulty.



Unlike land-fill or land reclamation methods, floating structures only rent space from nature. Floating modules are anchored into the ground, and when removed from the area, they leave little to no trace on the seabed. In contrast, land-fill operations can have irreversible consequences for marine life, as once water is filled with sand, the damage is permanent.



Living near water bodies offers many benefits for inhabitants. People tend to be more happy and relaxed when in close distance to water. Additionally, they are more likely to engage in outdoor activities and social interactions, leading to improved mental and physical well-being. Exposure to sunlight near water bodies also enhances the production of Vitamin D, further contributing to overall health and vitality.



Additional small islands can be created around the community to further promote biodiversity. These islands could provide new habitats for fish and other animals both under and on the structures. Moreover, these islands can serve as sites for wind or solar energy production, not only powering the community but also contributing to the energy needs of the surrounding city areas.



Floating communities offer the potential for innovative food cultivation methods, both on the surface and underwater. Underwater farming, in particular, presents an intriguing opportunity, especially given the increasing importance of foods like algae in our future diets. These communities have the capacity to become partially self-sufficient, exploring new avenues for sustainable food production.

Disadvantages

But of course, with advantages also come disadvantages. Especially in this more recent field of research, there are many challenges we need to face before finding a viable solution to living on water in the future.

But despite these disadvantages and challenges, we need to continue exploring the possibility of living on the water instead of fighting against it. There may come a time when we can no longer protect our existing cities from the consequences of climate change.



Various environmental factors can impact floating buildings, particularly severe winds or large waves, causing instability and movement on the structures. Therefore, it's essential to locate these structures in well-protected areas and accurately determine the centre of gravity to minimise excessive movement of the modules.



Living on water may not appeal to everyone, and only certain individuals may be interested in living in a floating house. However, it's crucial to avoid exclusivity and high costs that could limit access to these communities to only the wealthy. Therefore, offering buildings of different sizes is essential to attract a variety of people to these communities.



Living on water involves the unavoidable movement of the house, as even small waves can cause slight shifts due to the structure's lack of a stable foundation. However, various measures can be implemented to minimise the impact of waves on the community and prevent occupants from experiencing seasickness. One such measure could be installing smaller islands around the community to shield it from larger waves.



When building on water, it is important to be cautious about the area you build on. Taking away too much space on the water surface can disrupt the seabed and its inhabitants. Plants reliant on photosynthesis struggle to survive without enough sunlight. Therefore, incorporating „skylights“ in the floating structure is essential to ensure sunlight reaches the seabed, preserving the marine ecosystem.



When introducing a new structure on water, the behaviour of the surrounding water is uncertain. There's a possibility that the movement and flow of water could be altered by these interventions, consequently impacting marine life. It is therefore important to be careful and cautious when building on water to avoid disrupting the natural flow of water.



Regulations play a big role when it comes to building on water. Determining the jurisdiction over water territories is often unclear, making it difficult to determine their governance, especially for communities situated further offshore. As a tentative solution, these communities may be regarded as separate boroughs or extensions from bigger mainland cities.



04. Stockholm

Stockholm, the capital of Sweden, is widely recognized as the „Venice of the North.“ Built on 14 small islands connected by over 50 bridges, the city’s unique charm and picturesque setting have earned it this lovely nickname. The city is one of the best-preserved, safest, and cleanest European cities.

Nevertheless, the city is currently facing several challenges. One of the most pressing issues is the rapid growth of the population, which means more houses need to be constructed. However, this is proving to be difficult due to the lack of available land. Additionally, climate change offers other future challenges with sea levels rising, increased floods and higher temperatures.

Given the shortage of available land and the challenges that come with climate change, it is essential for the city to explore innovative, sustainable alternatives for urban densification.

image 29: Image generated using Adobe Firefly from the prompt „Stockholm Skyline mit Wasser im Vordergrund, wo sich die Stadt spiegelt“.

General Facts

Stockholm is one of the largest cities in Scandinavia, with a history dating back more than 700 years. It was first founded in 1252 and quickly became the country's political centre and royal residence. Today, Stockholm is the capital and also the biggest city in Sweden and a real magnet for not only Swedes but also tourists from other countries. The city is located at the junction of Lake Mälaren (Mälaren) and an arm of the Baltic Sea, the Salt Bay (Saltsjön). This unique location and layout allow the city to be surrounded by nature and water. One could say that the city itself consists of $\frac{1}{3}$ built structure, $\frac{1}{3}$ parks and nature, and $\frac{1}{3}$ water.

Because of its balance between nature and built structures, Stockholm has become one of the cleanest capital cities in the world. However, it used to be very different. During the 1940s, the waterways in the centre of the city were very polluted, and it was not possible to swim in them.

Since then, the city has strived to be more environmentally and climate-friendly. Today, people can enjoy the water in the city centre and swim during hot days. Not only has the water quality improved, but air pollution has also decreased due to the development of a new district heating system.

Stockholm has become one of Europe's leading climate-conscious cities, with its greenhouse gas emissions and climate impact reduced by more than half, even as the city has grown significantly. However, Stockholm aims to improve further and is part of various agreements and groups such as the C40 Cities, the Climate Contract, and has developed its own Climate Goals. The city is working to eliminate fossil fuels and increasingly incorporate renewable energy into the daily lives of its residents. Therefore, using public transport, bikes, and clean cars is highly encouraged.

(Stockholms Stad, 2024)

2040: climate positive Stockholm

Achieving this goal will require collaboration between Stockholm, the government, and the EU, given its ambitious nature.

2020: Climate Action Plan

Together with 8 other cities, Stockholm has formed the first Swedish climate contract. The primary objectives for Stockholm are to achieve climate positivity by 2040 and fossil-free status by 2030.

2007: C40 Global Green New Deal

Stockholm is part of the C40, a global network comprising around 100 mayors from major cities worldwide. Together, they strive to find solutions to combat climate change.

2023: 100 Climate Cities in the EU

Stockholm has been chosen as one of the 100 selected climate cities in the EU due to its ambitious climate goals for the future. In addition, they received a Mission Label as one of ten cities, as their city plan has been approved by the EU Commission.

2010: first European Green Capital

Stockholm was honored as the first European Green Capital for its commitment to emission reduction, utilization of renewable energy, provision of high-quality green spaces, and implementation of sustainable urban development programs.

since 1990: reduced Emissions

Stockholm's climate impact and greenhouse gas emissions have decreased by more than half, even as the city has grown significantly and its population has increased.

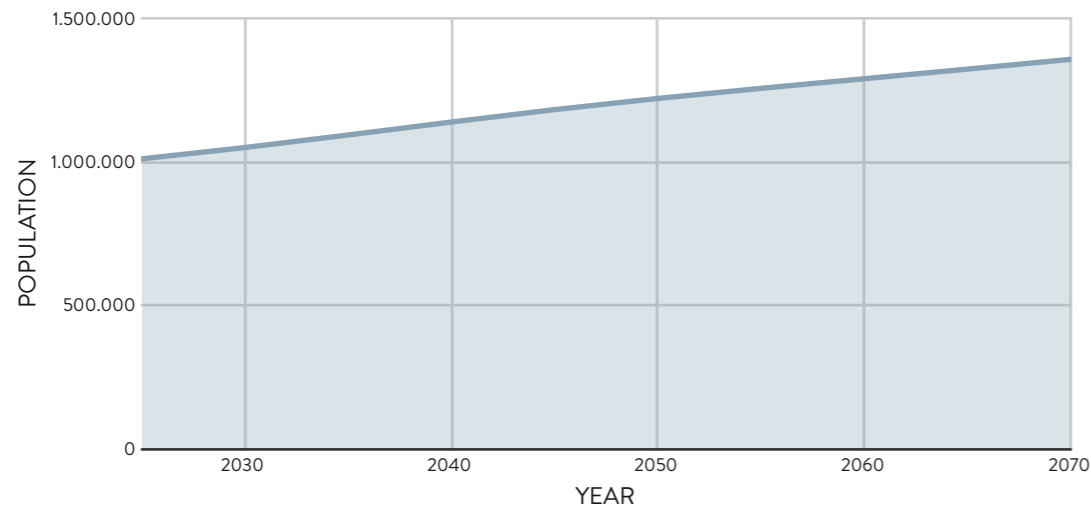


image 30: Population Growth, Stockholm

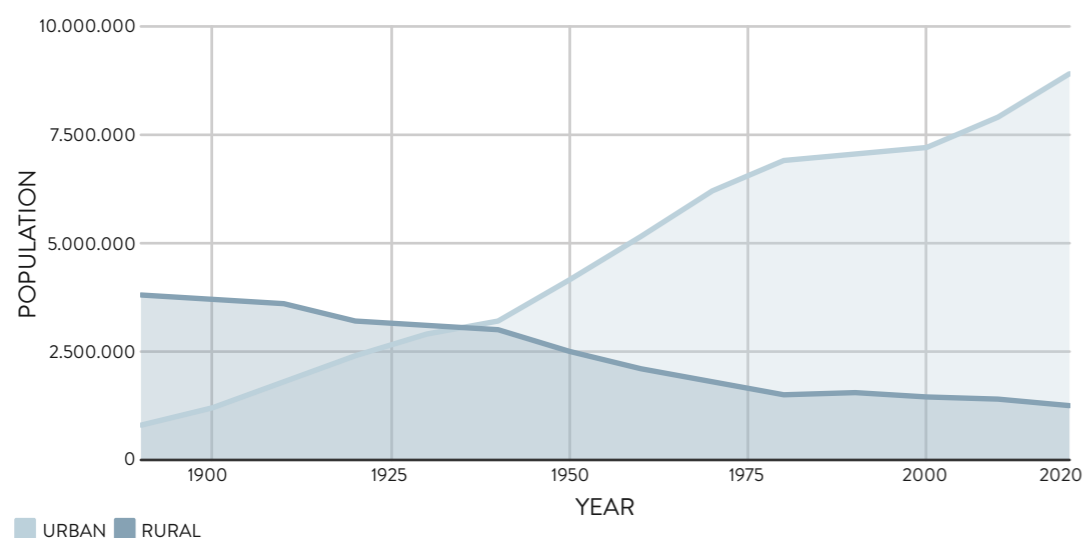


image 31: Population Rural and Urban, Sweden

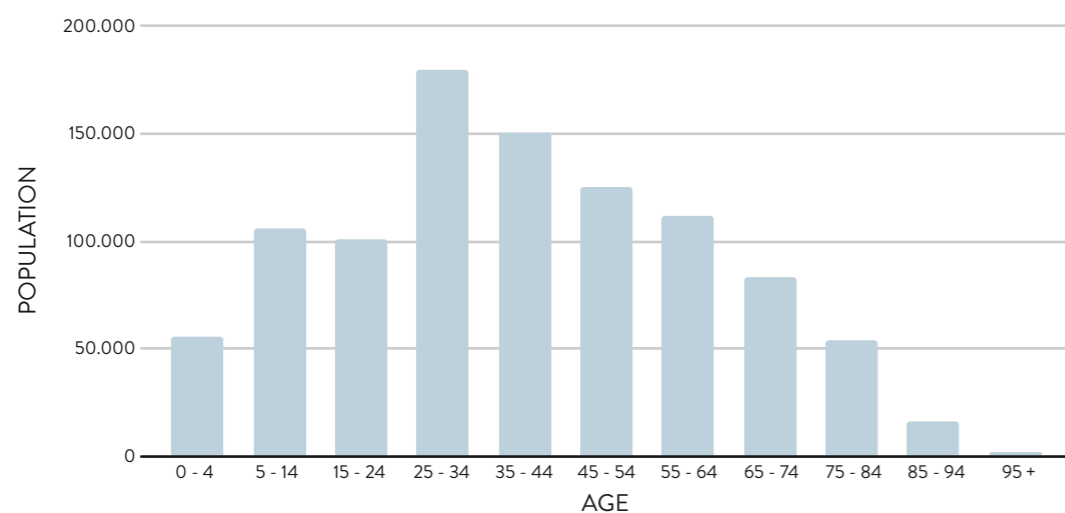


image 32: Population by Age, Stockholm

Population

As mentioned, Stockholm is one of the best capitals in all of Europe, but like many other cities, it is also facing problems primarily connected to a growing population. With the start of the Industrial Revolution, more and more people began moving from rural to urban areas in Sweden, and Stockholm was a major destination for this migration. Over the years, the city has experienced many shifts in its population.

One of the strongest periods of population growth was in the 1940s when the subway system began to be built. The improved public transport made the city an even more attractive place to live. However, during the 1960s and 1970s, the population declined following the „Miljonprogrammet,“ a government initiative that built many new dwellings in the neighbouring regions. Many people moved from the city to these newly constructed suburban homes.

Currently, the municipality of Stockholm has a population of nearly 1 million people. Over the last decade, the city has grown by almost 15,000 new inhabitants each year. While the city’s population has been increasing since 2010, its area has not expanded, making the city more densely populated each year. The numbers are expected to rise even further, with the population projected to reach around 1.35 million by 2070.

People in Stockholm tend to be relatively young when they move there, contributing to a youthful overall population. These young people come to Stockholm seeking higher education and better job opportunities. While a young population is good they also tend to have the highest birth rates, making it common for them to settle in the city and start families. To keep up with the rising population, the city needs to develop innovative ways to densify the centre and build new housing.

(Stockholms Stad, n.d.)

City Planning Goals

Stockholm is considered to be one of the most alluring cities in Europe, attracting both locals and tourists with its high quality of life, innovative capacity and strong social trust. The city is rapidly expanding, with more and more people aspiring to live, study, and work in this vibrant hub. This not only benefits the city's development but also its position as a key engine powering the whole of Sweden.

However, Stockholm is also facing some challenges, primarily concerning housing and transport infrastructure. In fact, as many as 140,000 homes must be built by 2030 and the growth is expected to continue beyond that. In addition to new dwellings, the city must also expand its infrastructure. These new projects need to be developed while simultaneously reducing the city's environmental impact, addressing challenges caused by climate change, and preserving the green and blue areas of the city for the inhabitants to enjoy.

Amid these challenges lies a unique opportunity for Stockholm to leverage extensive future city planning work, steering development towards sustainability. The city planning process emerges as a powerful tool to shape Stockholm into a dense, cohesive urban centre where buildings and green spaces blend together to create optimal living environments.

The Stockholm City Plan encapsulates four fundamental goals. These include addressing the pressing need for more homes and jobs, enhancing public spaces, fostering sports and culture, and prioritising the development of preschools and schools. The overarching aim is to ensure that the city's growth is not only substantial but also adds value while aligning with housing and sustainability objectives. Ultimately, the entire Stockholm community is poised to benefit from this comprehensive and forward-looking approach to urban development.



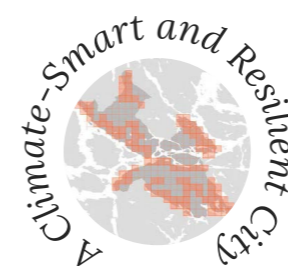
Stockholm wants to become a magnet for people, companies, and visitors from all over the world. The city's urban development focuses on homes and public services for everyone, ensuring inclusivity in the bustling metropolis, with a focus on excellent accessibility. Stockholm envisions itself as a dynamic global hub by offering everything people and companies might need to flourish and grow in the future.



Stockholm aims to create seamlessly intertwined areas that allow people to discover new places naturally. The city intends to foster a diverse range of interactions within the urban landscape to encourage people from various backgrounds to come together in their daily lives. The goal is to create a range of urban settings with various features that will be easily accessible to people of all ages and backgrounds.



Stockholm aspires to cultivate a city characterised by numerous diverse local areas, each with a distinct identity and thriving district centres. The idea is to create a positive environment that is easily accessible. Essential for this vision are well-designed and secure public spaces that actively encourage community participation and engagement, fostering a vibrant local community life for residents.



Stockholm envisions a climate-smart city characterised by efficient land use and a well-planned transportation layout. The goal is to boost accessibility, lower climate impact and optimise resource consumption. Essential for this will be a city structure and technical systems designed for high functionality and resilience, which will help Stockholm to effectively adapt to climate change and other stressors.



05. Design Proposal

After exploring various factors contributing to climate change and urban growth, it's evident that we need to reconsider our future urban planning. Floating communities offer a promising avenue to explore the potential of water-based living. With rising sea levels and increasing urban populations, it's crucial to consider alternative solutions. While the journey towards establishing modern floating communities worldwide may be challenging, it's essential to explore the possibilities and opportunities they present.

During my design process, I delved into different approaches to building on water. Through this proposal, I aim to highlight the key considerations for floating communities, based on what I believe are essential factors. Although I selected a site in the centre of Stockholm, this proposal has the potential to be adapted to various regions worldwide and is not limited to one specific location.

image 37: Image generated using Adobe Firefly from the prompt „Schwimmende Häuser in einem See vor Bergen“.

Floating Communities should be ...

During my process, I explored various approaches to how developers around the world are designing floating cities and communities. When designing these new structures on the water, several important factors need to be considered to create a successful design.

After reviewing my references, I identified six key points that are important for my proposal. These points will be my guidelines and, in general, I believe they are essential for anyone designing floating communities.



With abundant water space in many cities, there's no need to build these communities far out at sea. Integrating a floating community with an existing city and its infrastructure creates new transport routes and connects various areas of the city. The city and its inhabitants will profit from these new typologies. Ensuring good connections for pedestrians, public transport, and cyclists further enhances accessibility.



Attractive urban environments hold the potential to unite people from diverse backgrounds. By integrating a mix of building functions and housing, cities can create space for a variety of activities in a compact manner. Additionally, shared public spaces play a crucial role in fostering interactions among residents, enhancing social connections, and enriching the urban experience.



Living on the water should not be a privilege reserved only for the wealthy. To ensure that many people have access to the opportunity of living in such a community, it's crucial to offer dwellings of different sizes. Additionally, commercial spaces should provide a range of options, including smaller and larger spaces, to ensure that smaller businesses can afford to operate there.



Living on the water offers a unique living experience for both inhabitants and visitors. Therefore, it's essential to maximise connections from all facilities to the water. All houses should provide views and direct access to the water to fully capitalise on the many activities and benefits associated with water-based living.



Ensuring feasibility is crucial for the success of the project. Many past proposals from other developers have been utopian and ultimately unrealistic. Therefore, I opt to stick to a more traditional style of architecture, prioritising practicality and achievability. Flexibility is also key in creating a feasible project, as it's one of the key advantages of floating structures compared to land-based ones.



This presents an opportunity to pioneer a new sustainable lifestyle. Designing with renewable energies can significantly reduce greenhouse gas emissions and lessen reliance on fossil fuels. Equally crucial is the establishment of habitats for diverse species, both above and below the water's surface. This introduces innovative greenery to urban landscapes, fostering biodiversity and enhancing ecological balance.

Project Site

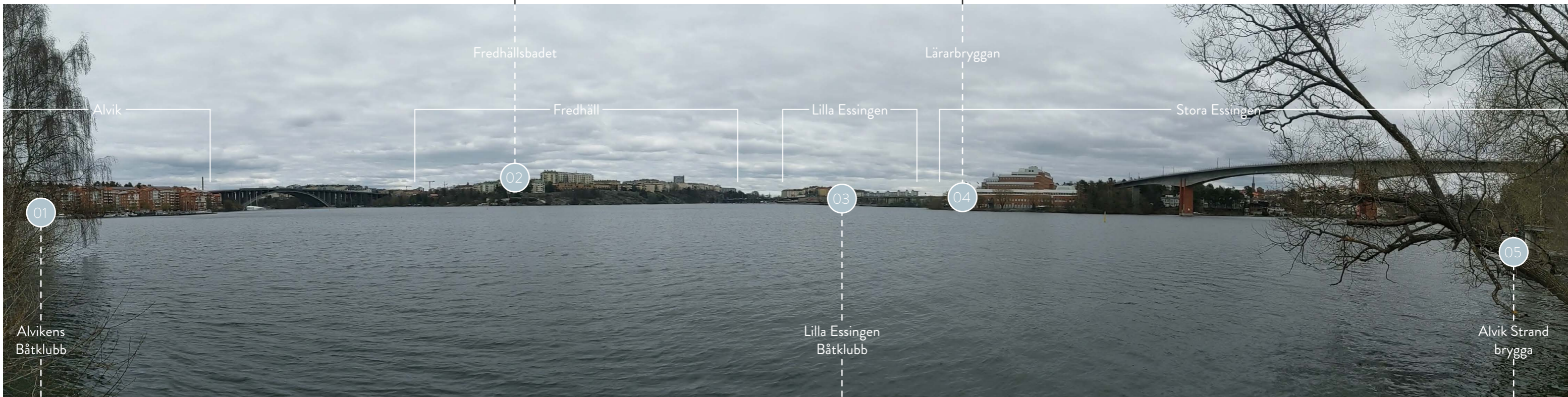
Stockholm is not significantly affected by rising sea levels. While the ocean is rising, so are the land masses of the country due to a phenomenon called „land uplift.“ During the last ice age, the country was covered by kilometre-thick ice. As the ice started to melt, the pressure on the Earth’s surface was relieved, causing the land to rise. However, even though Stockholm is currently not affected by rising sea levels, at some point, the ocean will rise faster than the land, and even Stockholm will not be safe anymore.

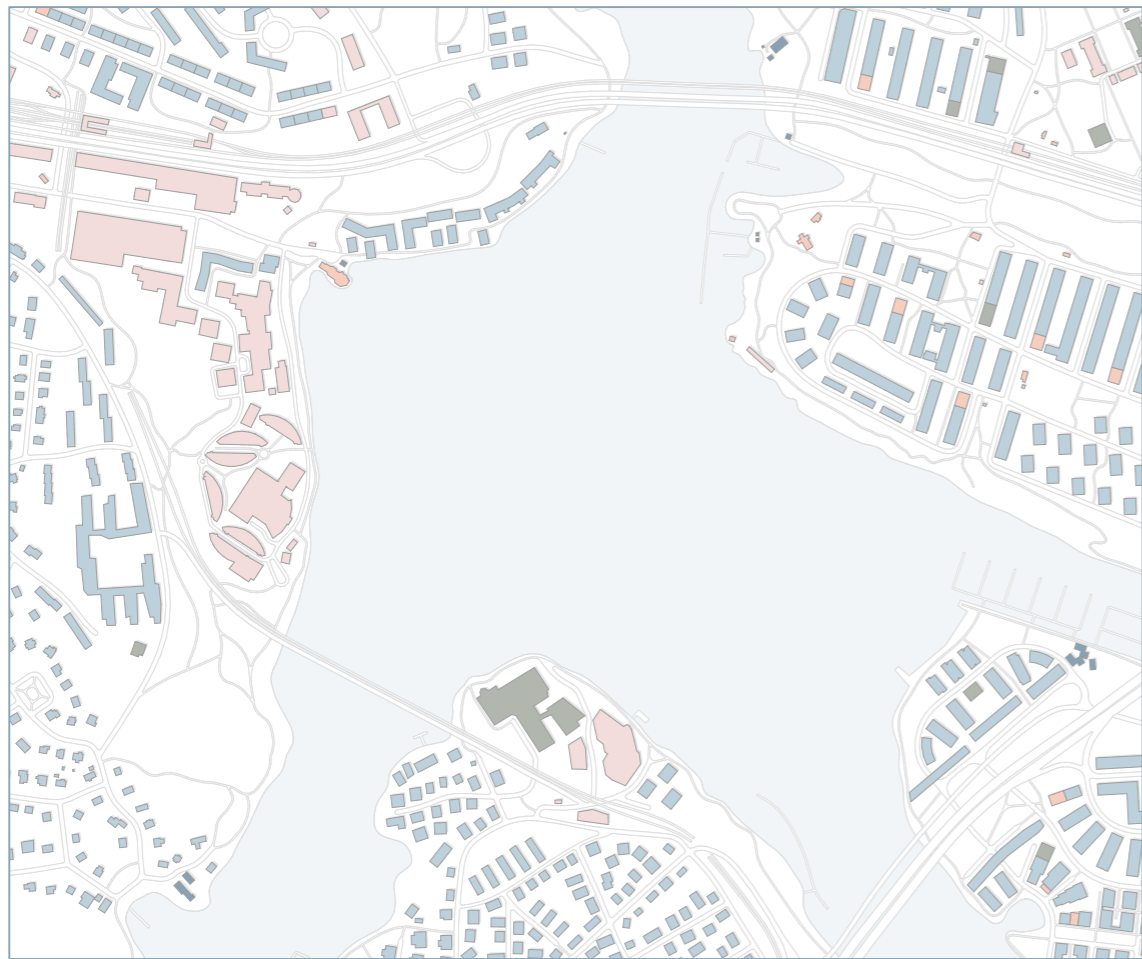
The main reason I chose Stockholm as my project site is its close connection to the water. People use it for paddleboarding, swimming, and ice skating. This makes it an ideal base for a prototype of a floating community. Additionally, the city is facing significant housing shortages due to its growing population. Land is scarce, and there is a need to start thinking about new ways of building in the future.

The site I chose is located a 15-minute subway ride west of the city centre, between the areas of Alvik, Fredhäll, Lilla Essingen, and Stora Essingen. This location offers many opportunities. It is a relatively calm area with only one ferry line currently crossing it. Therefore, a new community on the water could thrive here, undisturbed by major traffic.

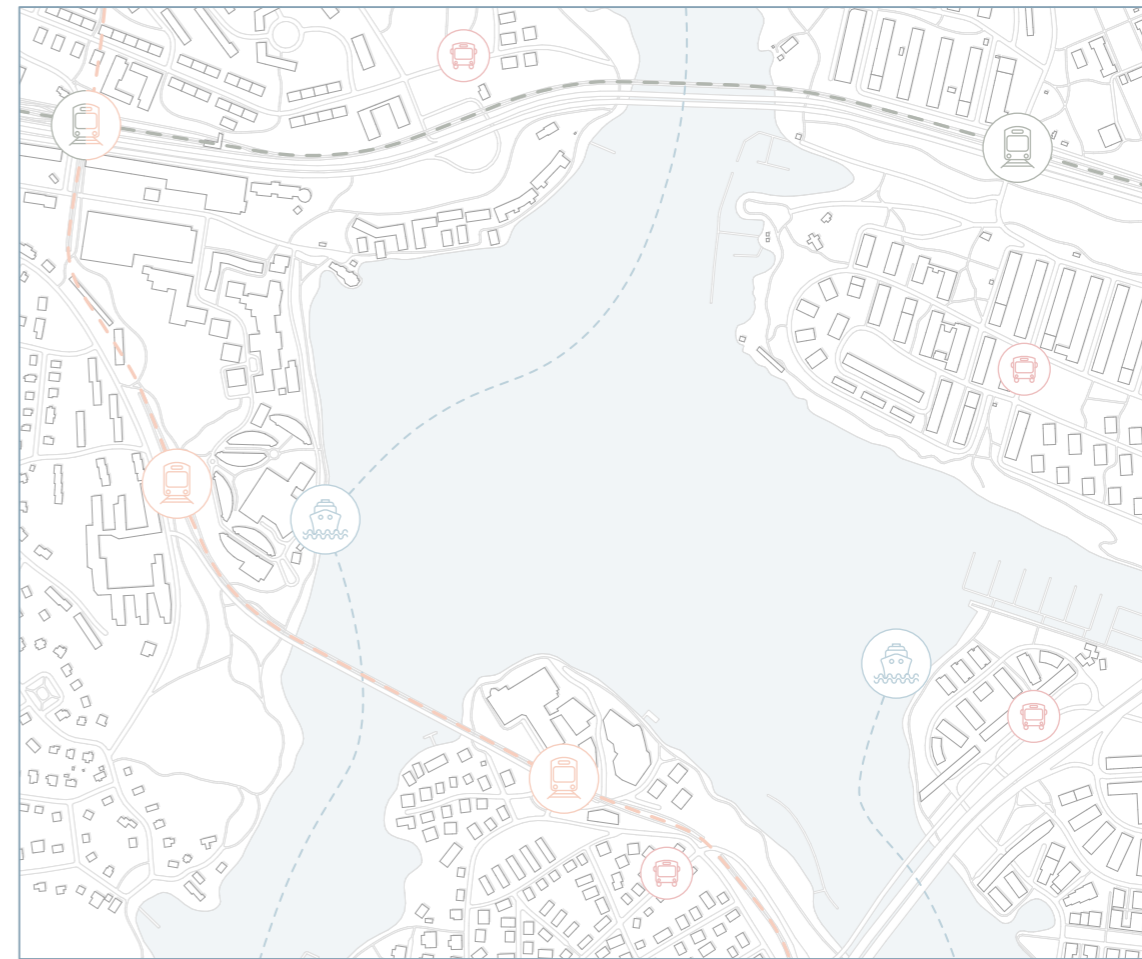
When visiting the site, it was very clear that the four areas are not well connected. There are bridges between the islands for cars, buses, and subways, but it is very difficult for pedestrians and cyclists to move from one area to another. The bridges are very tall and challenging to access. I saw potential in creating a floating community in this area to improve connections between the four islands and make everything more accessible for everyone. This new neighbourhood on the water would be a place for everyone to enjoy and to boost neighbourly interactions.



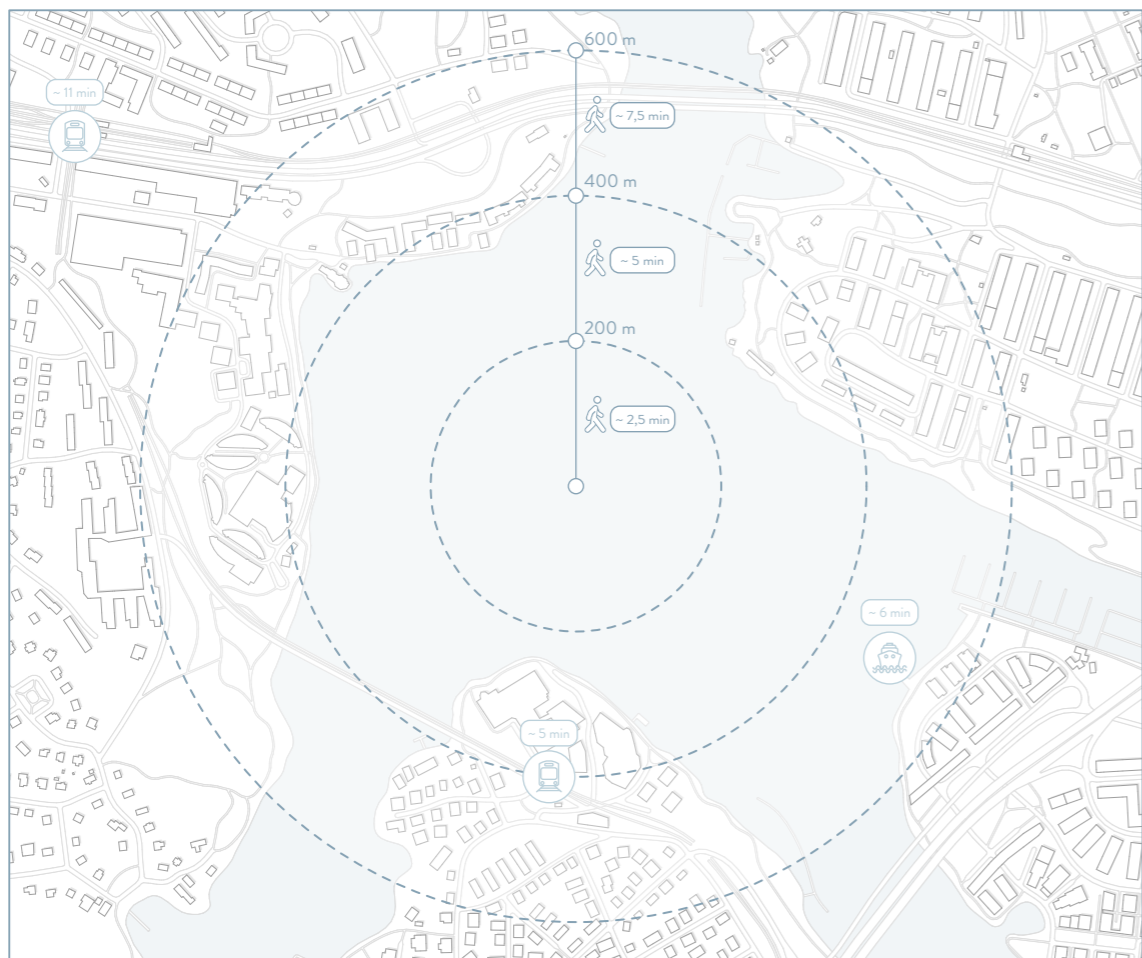




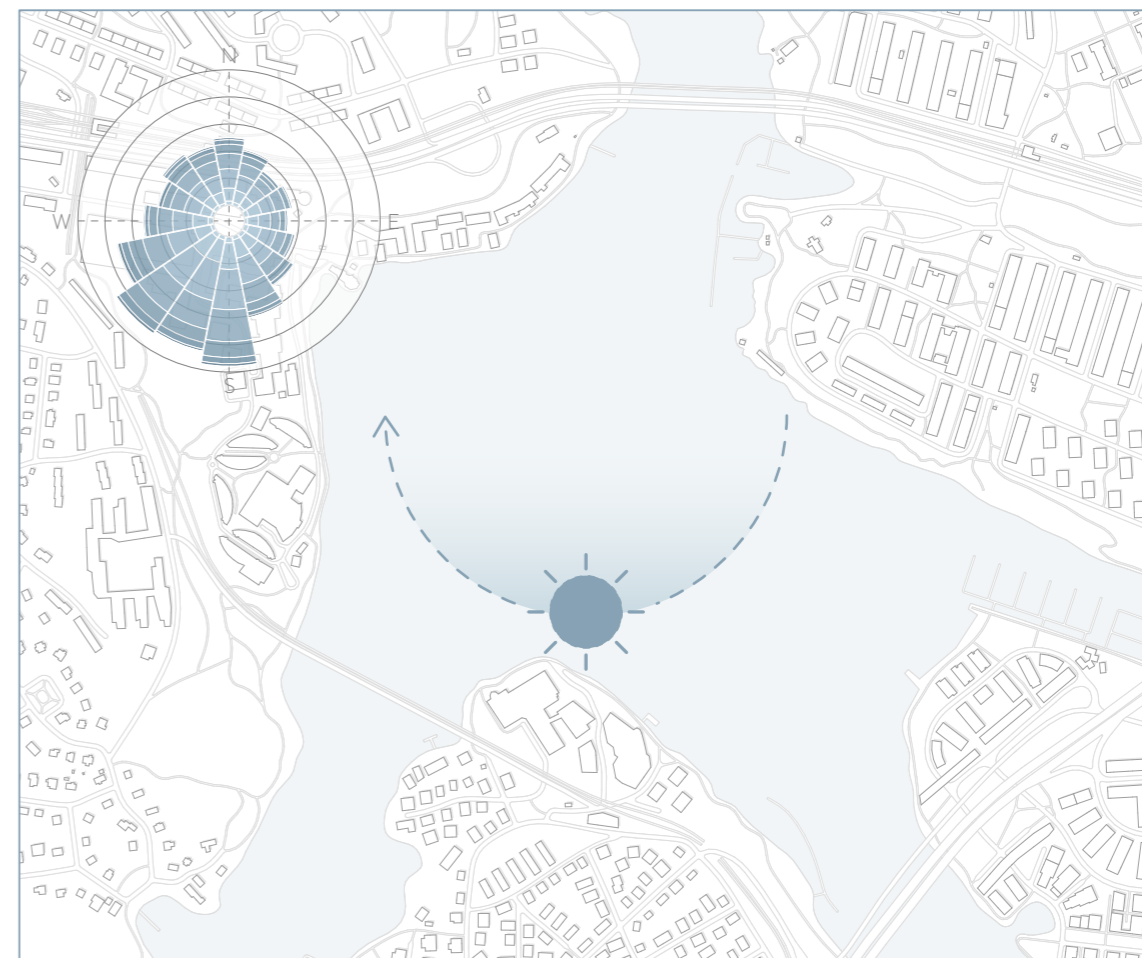
building functions ■ housing ■ commercial / public buildings ■ restaurants ■ schools ■ marina



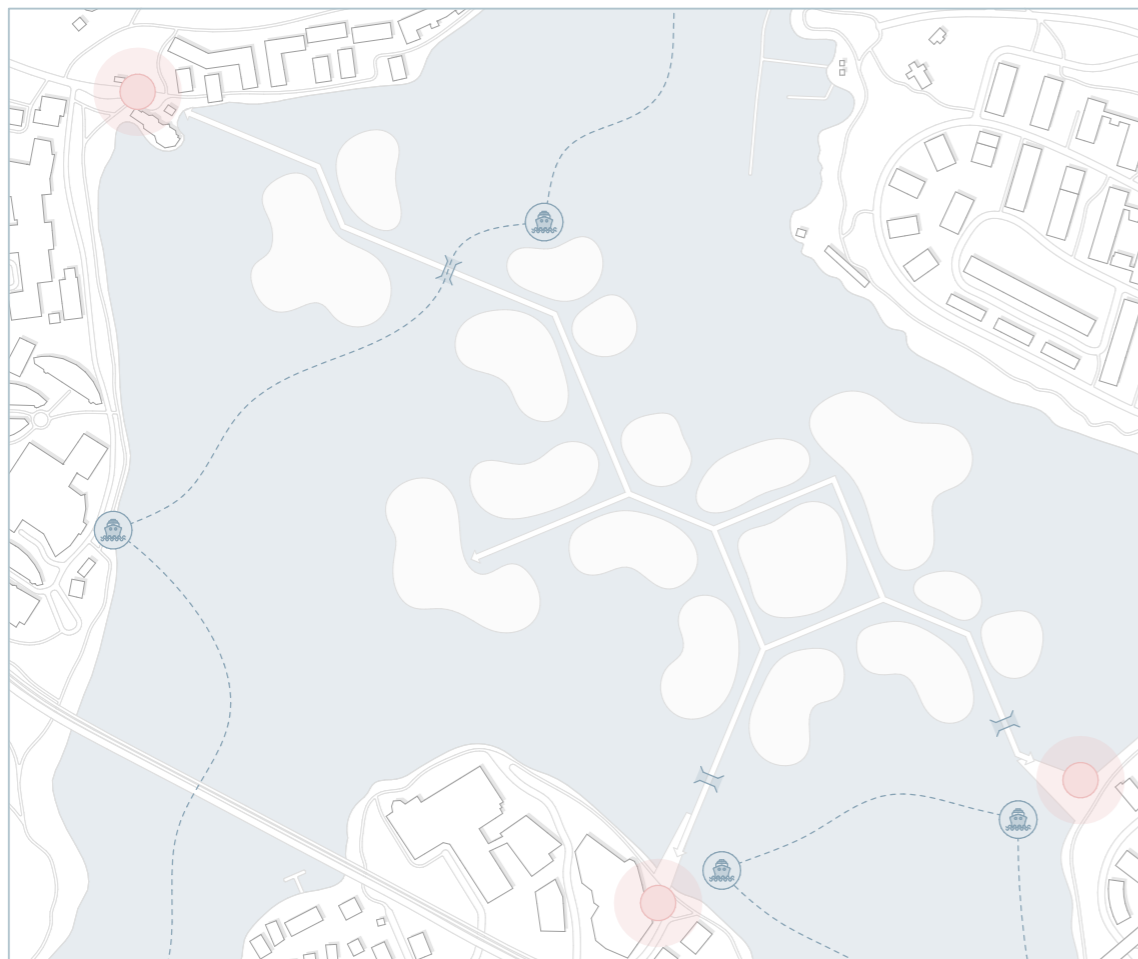
transportation Different kinds of transportation are in close connection to the site.



walking distances All important facilities are reached by foot or by bike in under 10 minutes.



sun / wind The wind comes most of the year from south-west.



connection points

New connections are formed by linking the islands to the existing surroundings.

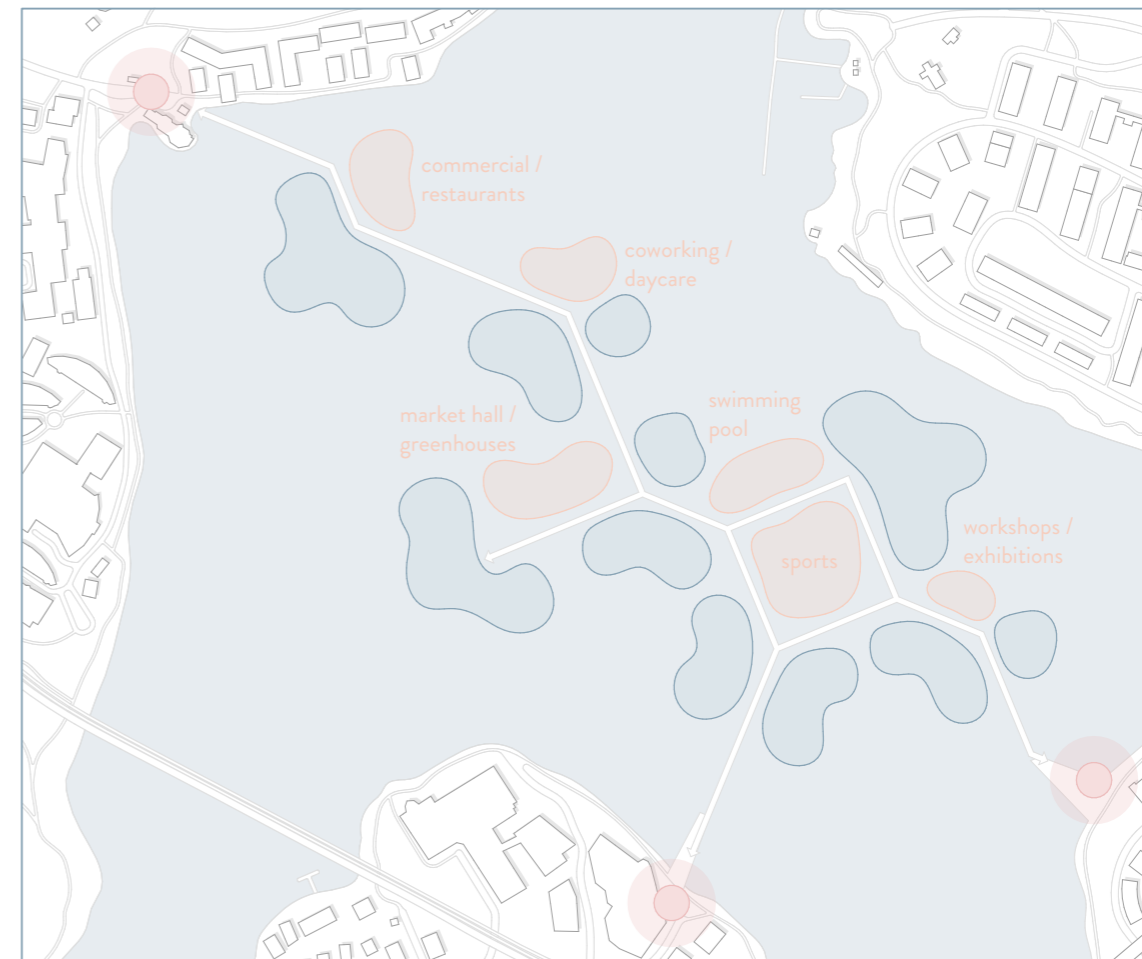
Connection Points

When visiting the site, I quickly noticed that there are not good connections between the different existing islands. Therefore, I thought about connecting my project at three potential points: Alvikens Båtklubb, Stora Essingen Lärarbryggan and Lilla Essingen Båtklubb.

I chose these points because they will provide many advantages to the people living there, making it easier to get around the area by foot and by bike. I chose not to connect it to Fredhäll since the landscape is very rocky, and this area is already a well-functioning neighbourhood with good connections to the city.

Additionally, to the connection points on the land, I also created connection points on the water by adding new ferry stops. There is already one ferry stop at Alvik Strand, and another one is being built on Lilla Essingen right now. To further enhance the connections by boat for the inhabitants of the floating community, as well as others, I added two more stops: one at the connection point of Stora Essingen and another on one of the floating islands.

This will ensure good connectivity not only on a smaller scale within the area but also to the city centre of Stockholm.



island functions

Public and private islands are designed to accommodate a diverse range of people.

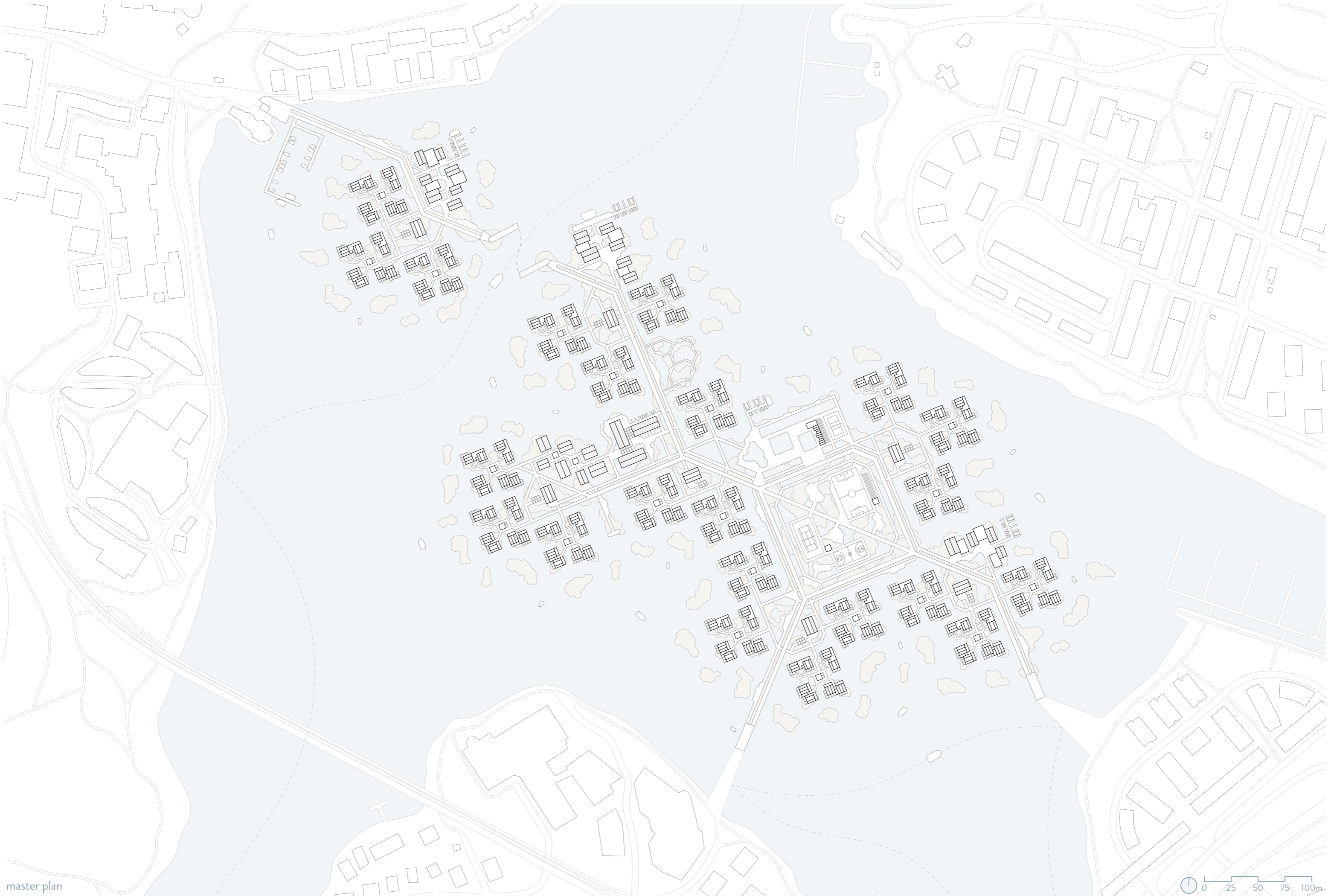
Island Functions

The connection points are then connected by a floating pathway for pedestrians and bikes. To guarantee access by boat, three bridges are added along this pathway. Two bridges allow boats to pass underneath, while the third bridge opens up when the ferry needs to pass.

Along the pathway, different islands are laid out with various functions. The blue dots represent more private islands with dwellings and small community houses. In contrast, the orange dots are for public use and enjoyment, with different functions depending on the needs of the neighbourhood.

The more private islands consist of three to four housing clusters, connected by a central community house to foster strong connections between neighbours and provide a place to meet and interact with each other.

The public functions are laid out in a way that they are not centred in one specific area but are spread out throughout the entire floating community. This design encourages movement across the islands. Each island is accessible by bike, foot, or boat, ensuring multiple access points throughout the community and to give access to many different people.



On the same island, Commercial spaces and restaurants can be found right next to each other, offering a variety of sizes to accommodate businesses of all types. This guarantees that even small boutiques can find a place in this sought-after location.

Instead of heading to the busy city center on a Sunday, one can choose a leisurely stroll across the interconnected islands. Concluding the day with some boutique shopping and a delightful waterfront dinner, while enjoying scenic views as a perfect weekend finale.



The daycare and coworking spaces are located right next to each other on the same island. In the mornings, parents can bike or walk with their kids to drop them off at daycare before settling into one of the nearby coworking offices overlooking the water.

And for those living off the island, the ferry stop right in front of the offices makes commuting a breeze. With easy access to the commuter ferry, working on the island becomes a convenient option for everyone.



This innovative island provides a diverse array of workshops, catering to individuals from various locations keen on exploring their creativity. From woodworking and ceramics to photography and metalwork, there are ample opportunities for artistic expression.

Even if you're not a resident of Stockholm, you can still visit and stay in one of the artist accommodations. This allows you to experience living and working in the same space, while gaining insight into life on the water.



The local market hall offers a great selection of different kinds of food. You can find many different delicatess from small businesses. However, the primary attraction lies in the fresh produce sourced from the local floating greenhouses. These produce can be enjoyed on-site or taken home to prepare a delicious meal for family and friends.

Throughout the week, the market hall becomes a meeting point, especially among those from the nearby coworking spaces. They relish the opportunity to enjoy a delicious local lunch while taking in the picturesque waterfront view.



The floating greenhouses provide to the community with a diverse selection of vegetables, fruits, herbs, and even fish and shellfish. These products are grown inside the greenhouses using different farming methods including aquaponics, hydroponics, and vertical farming.

Additionally, when the weather becomes warmer, the surrounding green spaces are utilized for additional food production. This approach ensures a steady supply of locally grown produce throughout the year, enhancing food sustainability within the community.

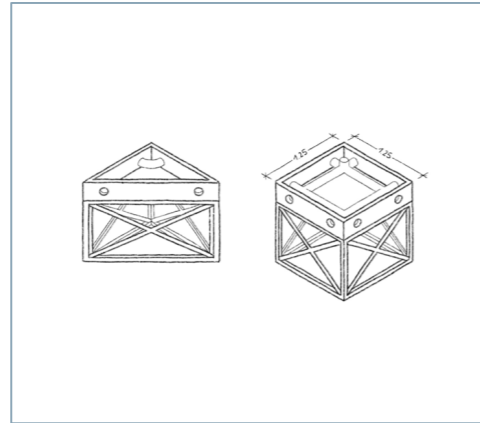
On the central island, diverse activities are available, including sports like soccer, tennis, basketball, and a running track. The highlight, however, is the outdoor swimming pool, offering direct access to Stockholm's waterways to cool off during the warmer months.

In winter, the pools are transformed into ice rinks, inviting visitors to enjoy ice skating and enjoy hot chocolate. For the brave ones, there's the chance to take a dip in the freezing water after a relaxing sauna session. This ensures year-round enjoyment of the area, extending its appeal beyond just the summer season.



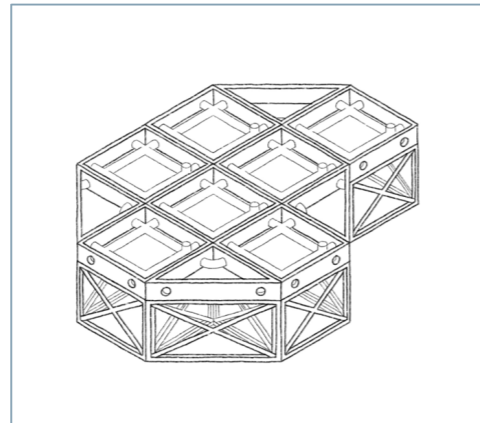
Step 01

The floating modules are based off the dimensions 1,25 x 1,25 m. There are two types of modules one square and one triangular one.



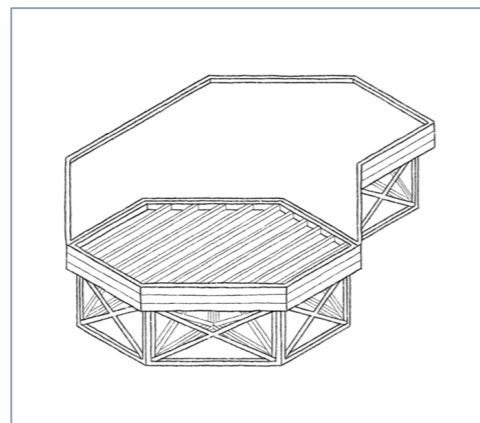
Step 02

The modules can be connected in various ways depending on the needs, offering endless options for configurations. The cage system underneath the platforms is filled with flotation devices, which are adjusted according to the weights on top.



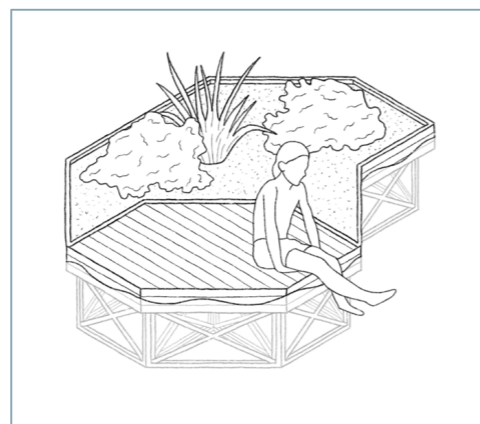
Step 03

The modules are framed with wooden blanks and filled either with timber frame construction for buildings and pathways or with soil for greenery.



Step 04

In the final step, wooden planks are installed for the pathways, and soil is prepared for planting grass and plants.



The housing modules will be prefabricated in a closed-off factory. This ensures that no environmental influences affect the building process. Construction in a factory also offers advantages in terms of faster and more efficient construction, as workers can work on it every day. In the factory, most of the work can be completed, including building the walls and roof, laying out the cables for electricity and pipes for the water system, and even painting or cladding the walls.



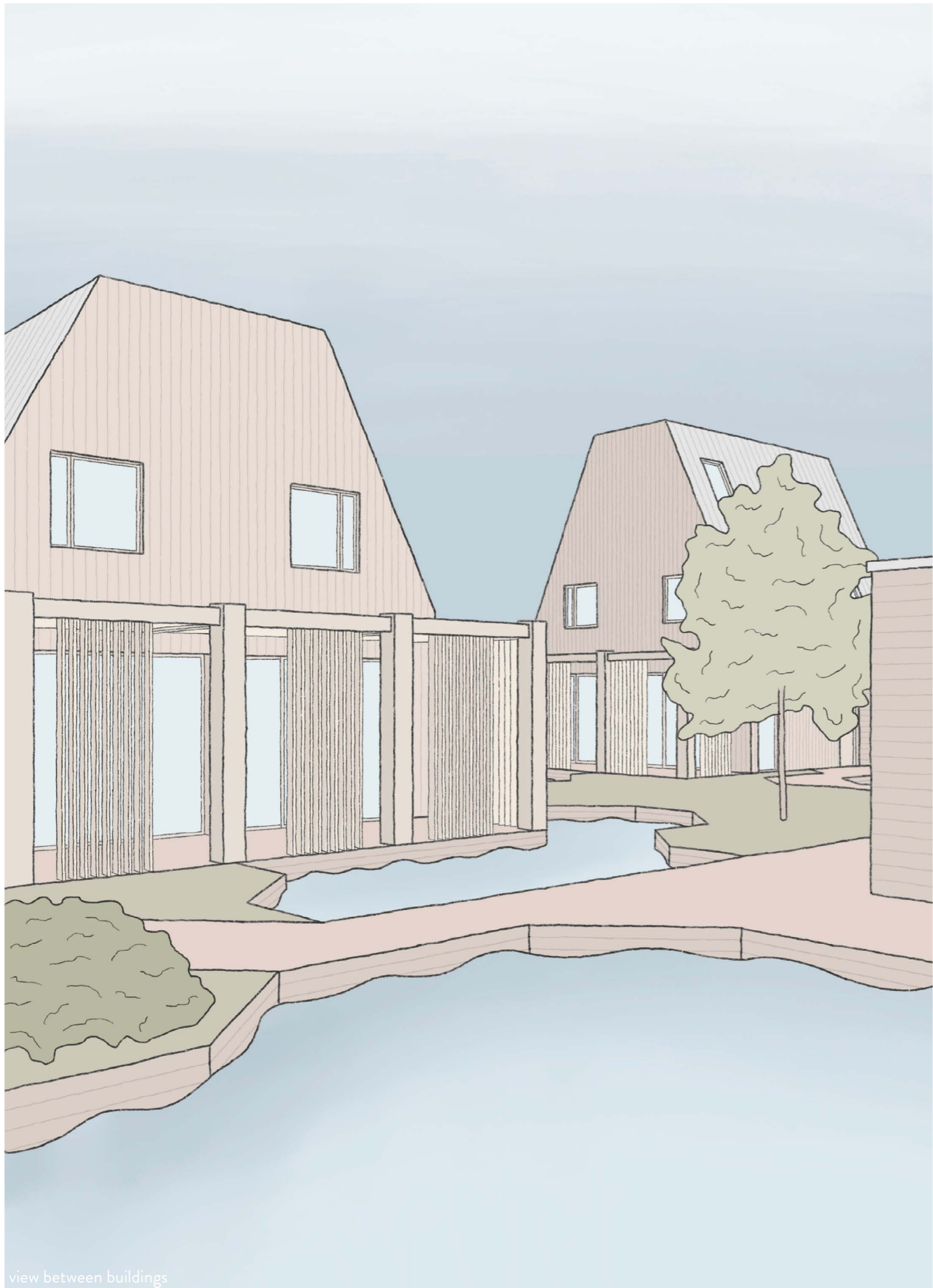
After finishing a module, it can be loaded onto a transporter or a cargo ship, depending on its destination. The module cannot be transported as a whole due to its measurements, so it will be transported in smaller „slices.“ The transporter or cargo ship will then travel to the project location, where the module will be prepared for the next step.



Upon arriving at the project site, the floating modules are already connected and ready to be towed into the water. The „slices“ of the housing modules can then be attached to the floating platform. After assembling everything, the floating house is ready to be towed to its designated location with the help of a boat.



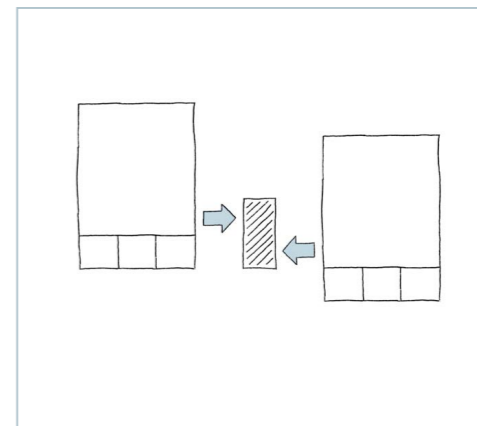
Now that the floating house is in its correct position, it will be attached to the existing floating infrastructure next to other floating houses. The modules themselves are connected to each other, but to make the building more stable and prevent excessive rocking in rough waves, it is also anchored into the seabed. A product called „biorock“ is used as an anchoring point, which resembles natural coral. This way, marine life is not disturbed too much by any foreign materials.



view between buildings

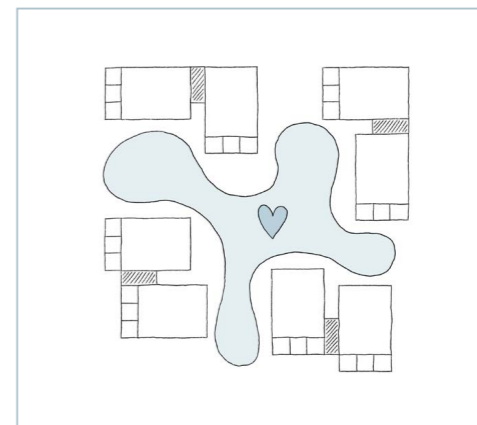
Housing Typologies

Two housing modules are linked by a central technical room, supplying both residences with the required energy.



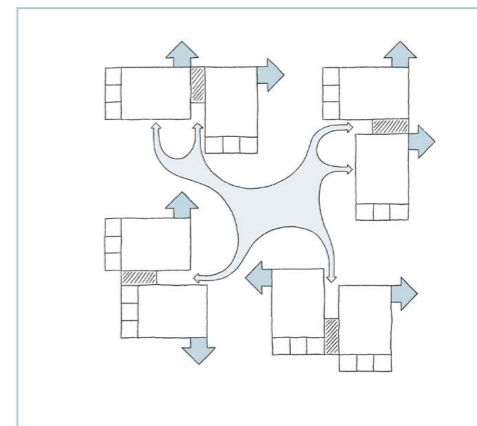
Courtyard

A central courtyard designed for bikes, storage, laundry and communal areas to connect with your neighbours.



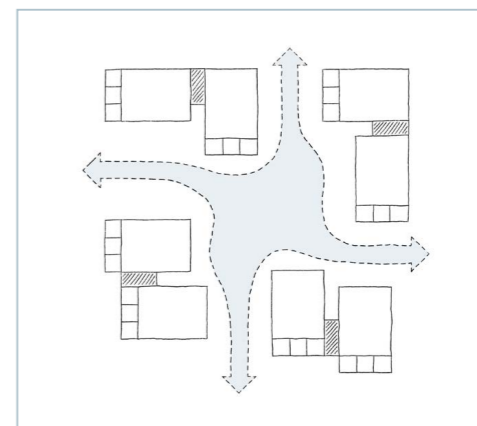
Paths

Positioning the pedestrian pathways at the center of the cluster allows for direct access to the water from the house via boat.



Connections

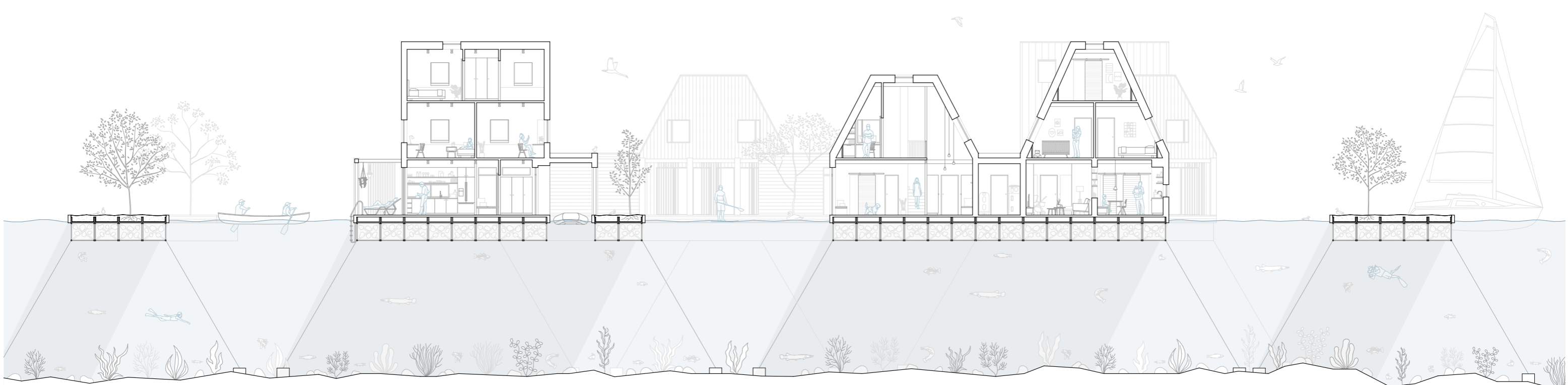
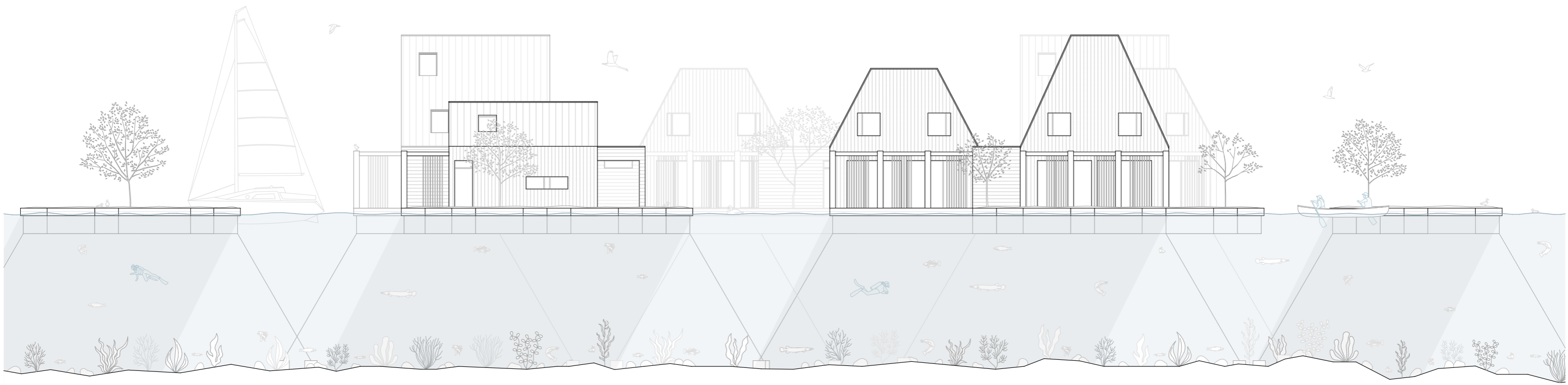
The housing cluster can connect to the surrounding areas in any direction based on specific requirements.





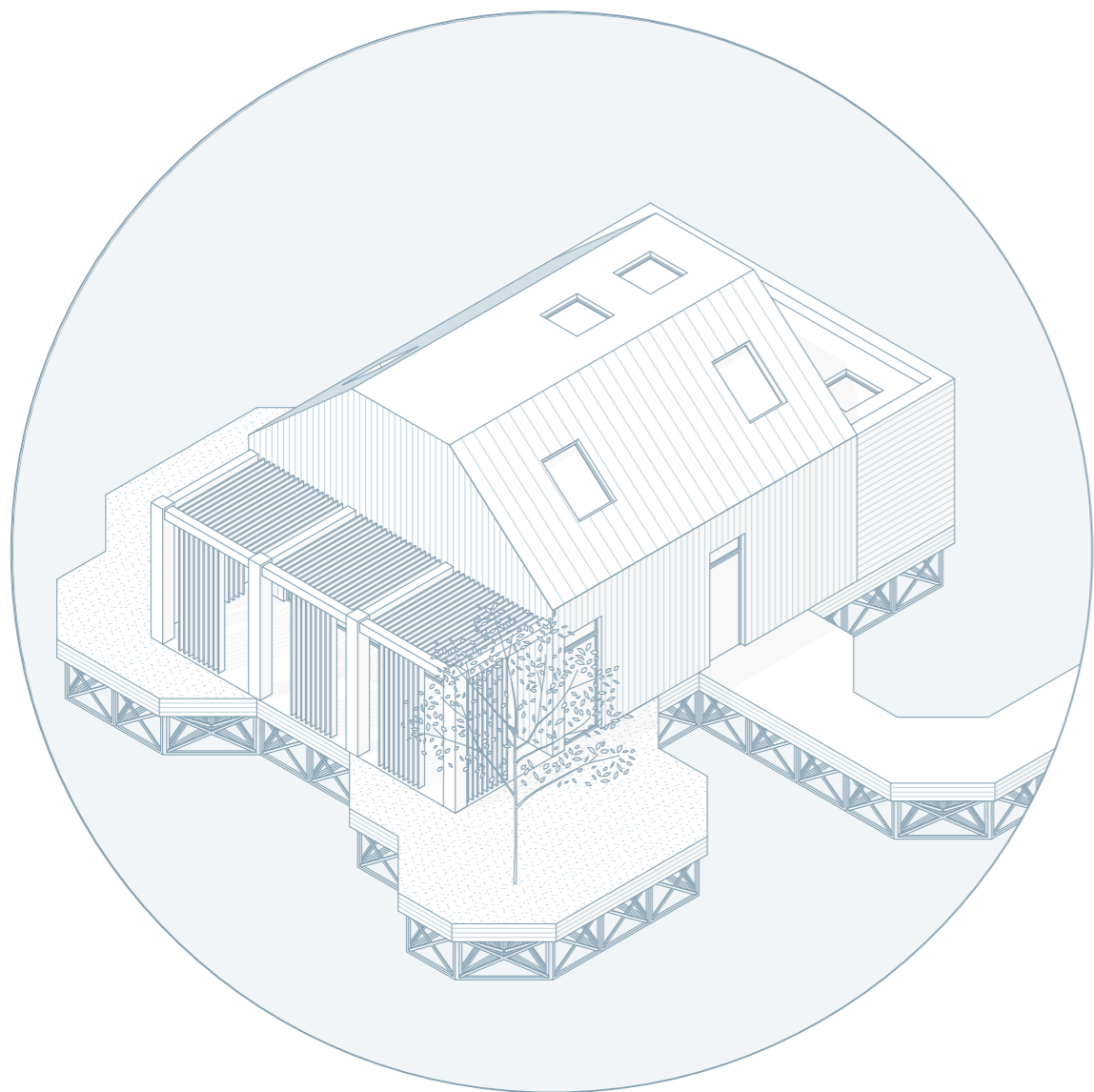
plan housing cluster







axonometry housing cluster

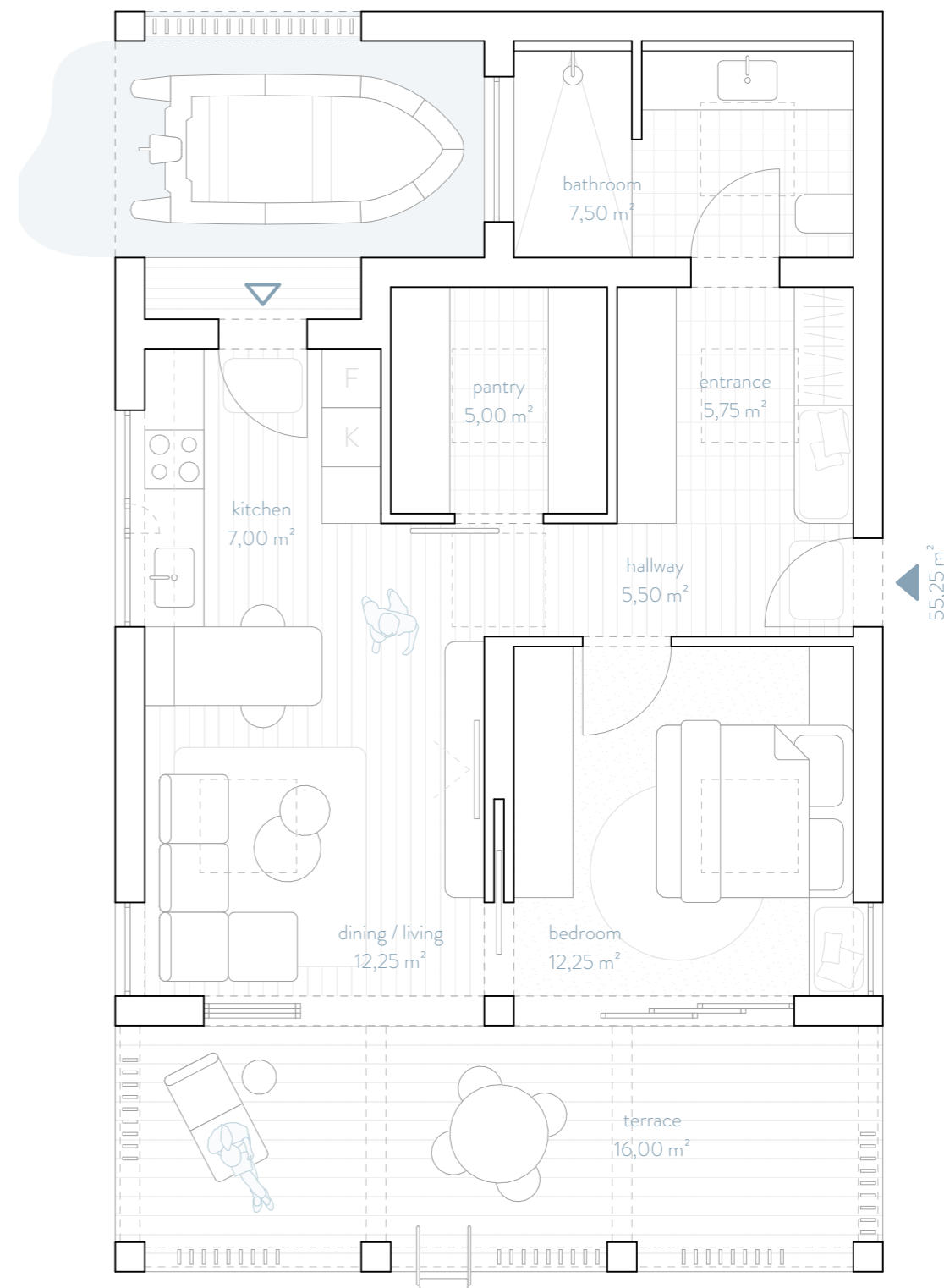


Module S

couple, single, senior, young professional

The smallest of the modules is a single-story unit. Its design, free from barriers and stairs, ensures easy access and comfort for everyone. All the modules are based on the same footprint, with the bathroom and boat garage at the back and the social rooms at the front towards the terrace. There are two different kinds of entrances: one from the pathway and another when arriving home with your boat, providing easy access to the kitchen and pantry for putting away groceries.

This module is ideal for singles or couples, and even elderly people can feel at home here since it is free from any barriers.



floor plan



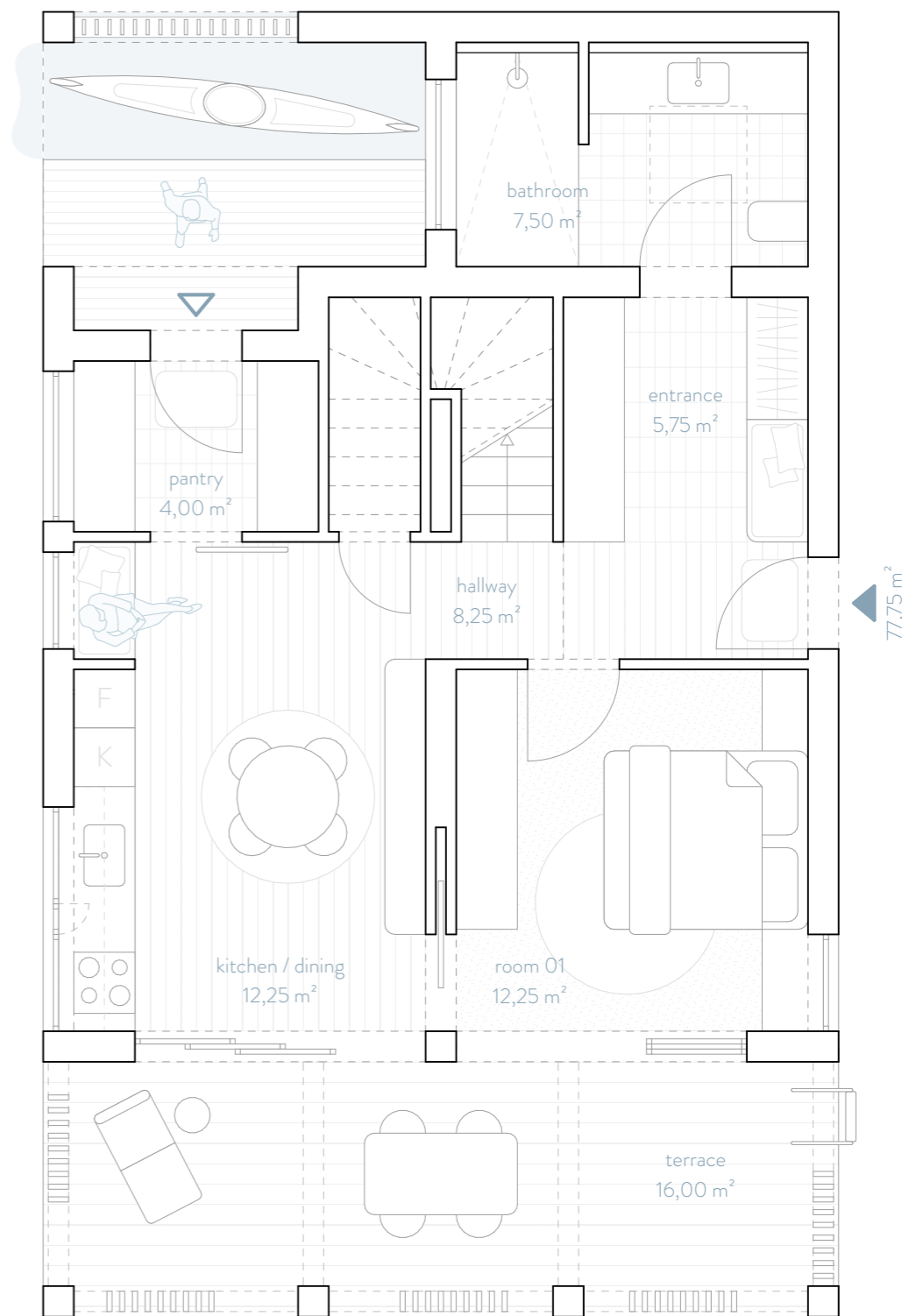


Module M

couple, single parent, senior + student, collective, small family

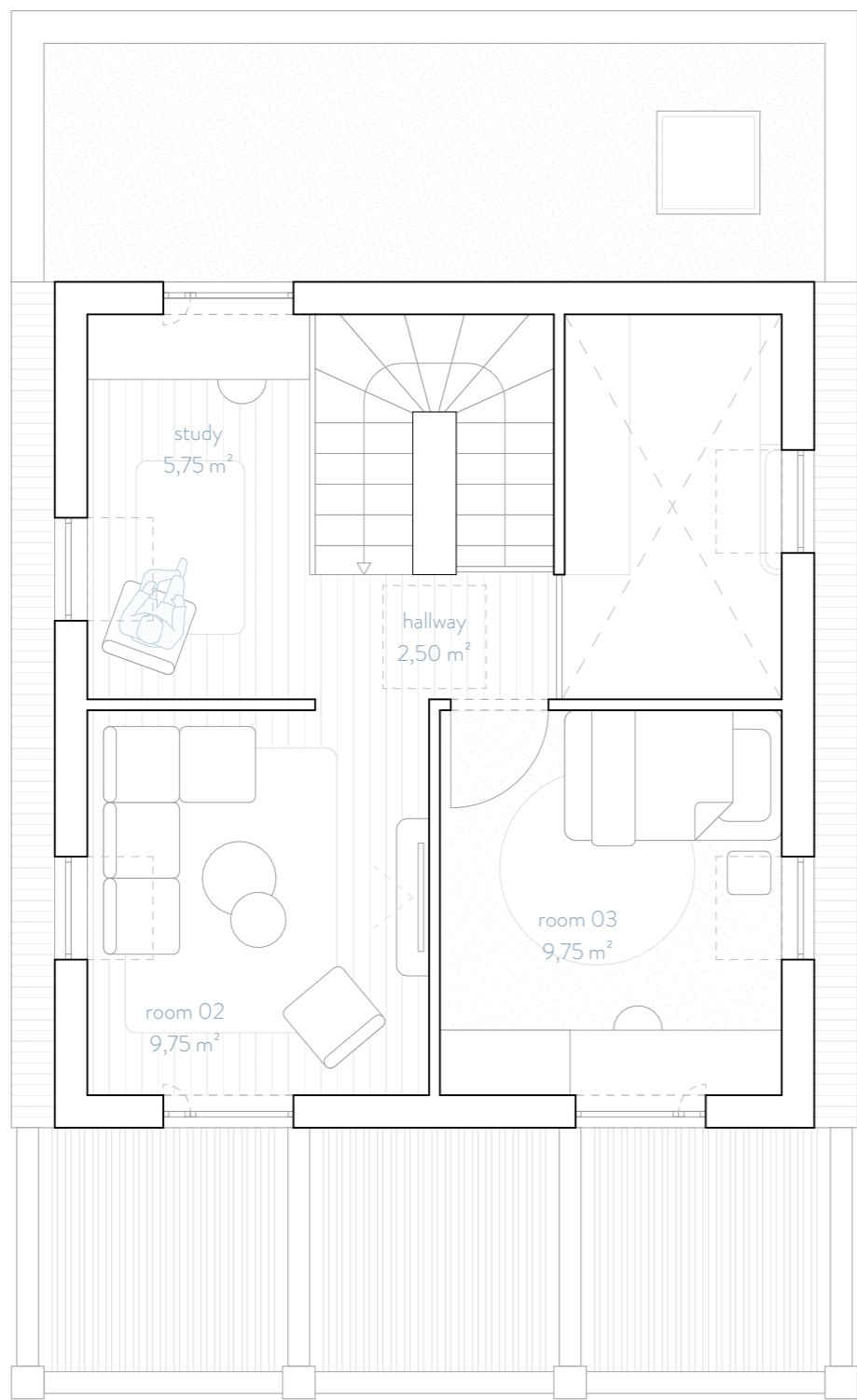
The medium module features an additional story, providing more versatility in its layout. To accommodate a set of stairs, the pantry is relocated to where the kitchen was previously situated, and the kitchen is moved closer to the terrace. The social rooms in the front are connected by a sliding door, creating different paths of circulation and openness. In this example, the bedroom remains on the ground floor, and a second bedroom, a living room, and a small study are added on the first floor.

This module is ideally suited for a single parent, a senior plus a student, or even a small family.



ground floor

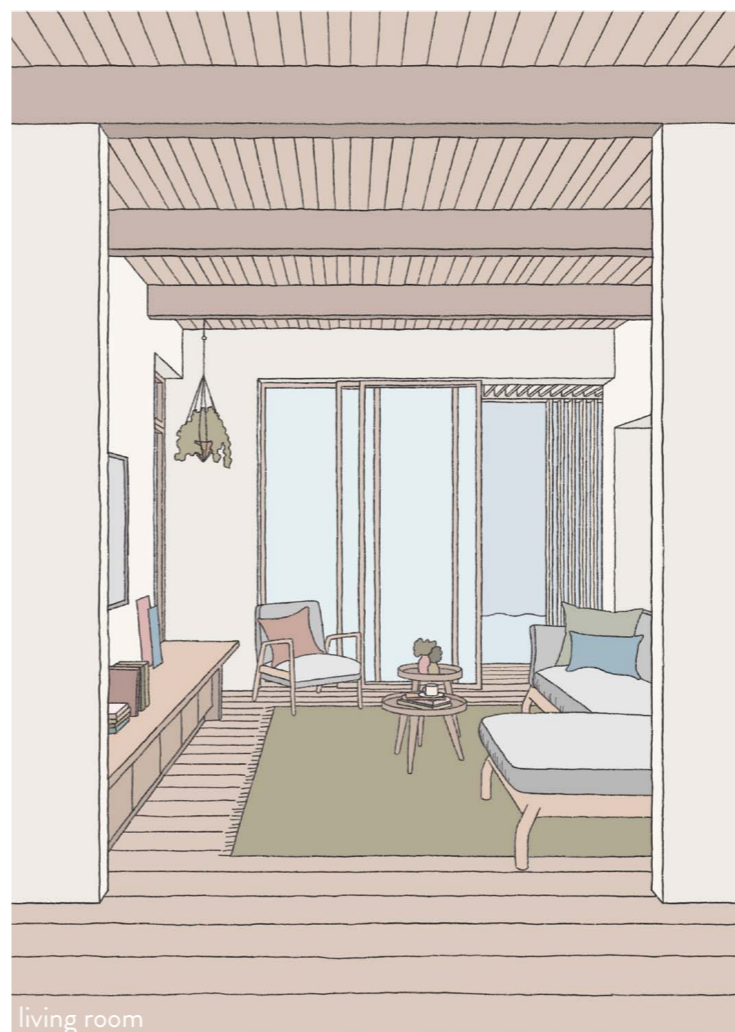




1st floor



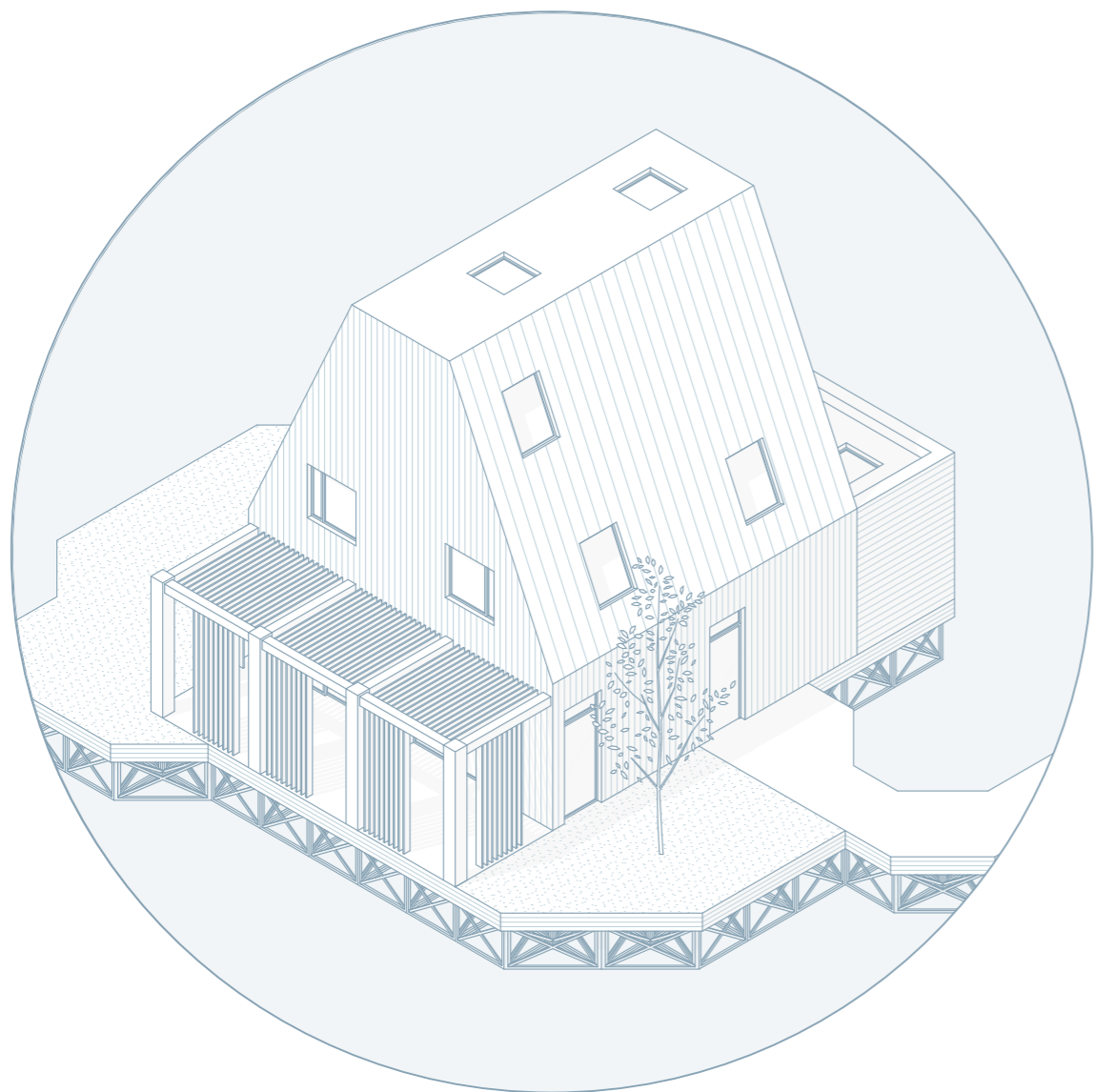
kitchen



living room



study

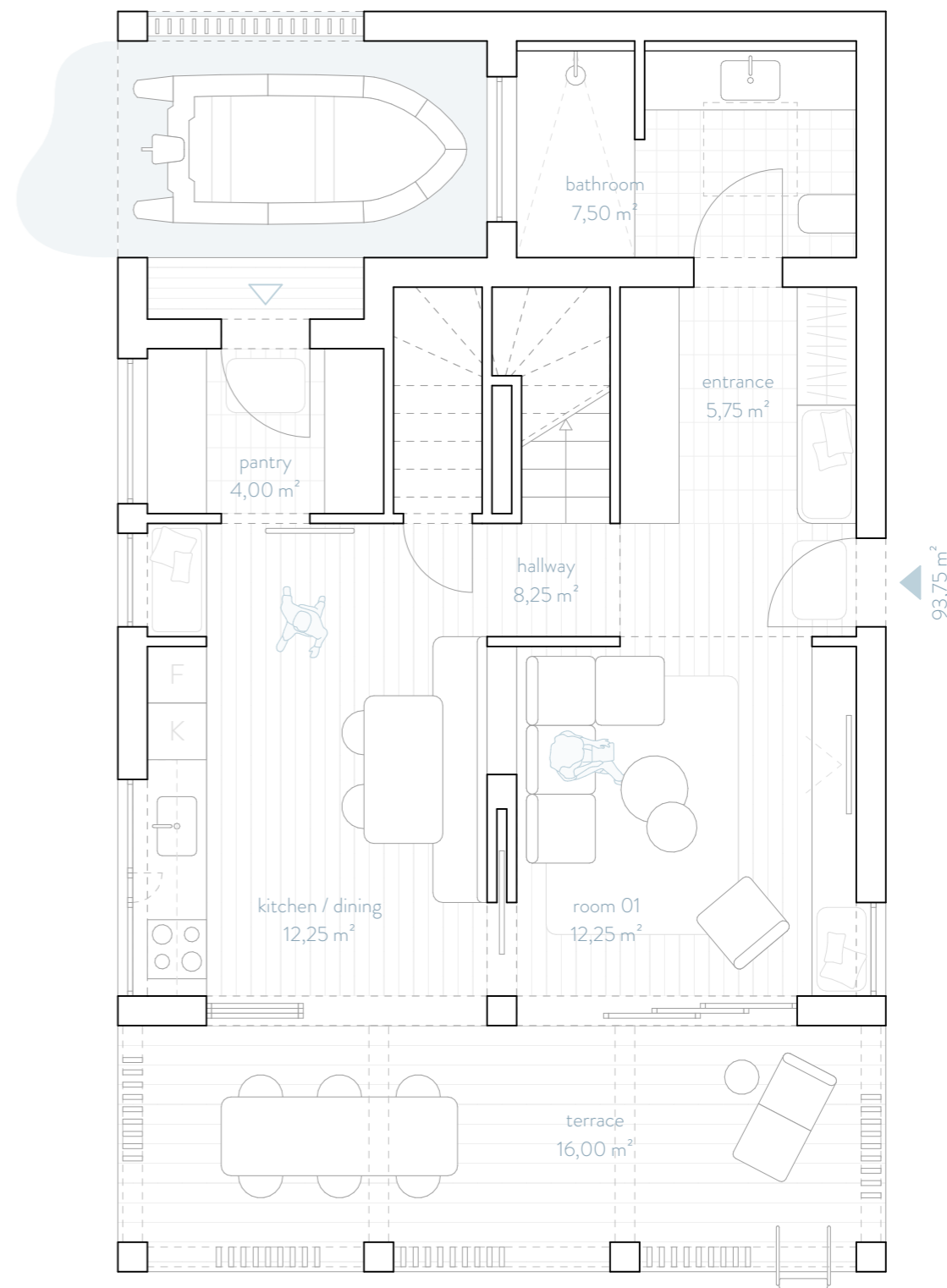


Module L

family, collective, couple + students

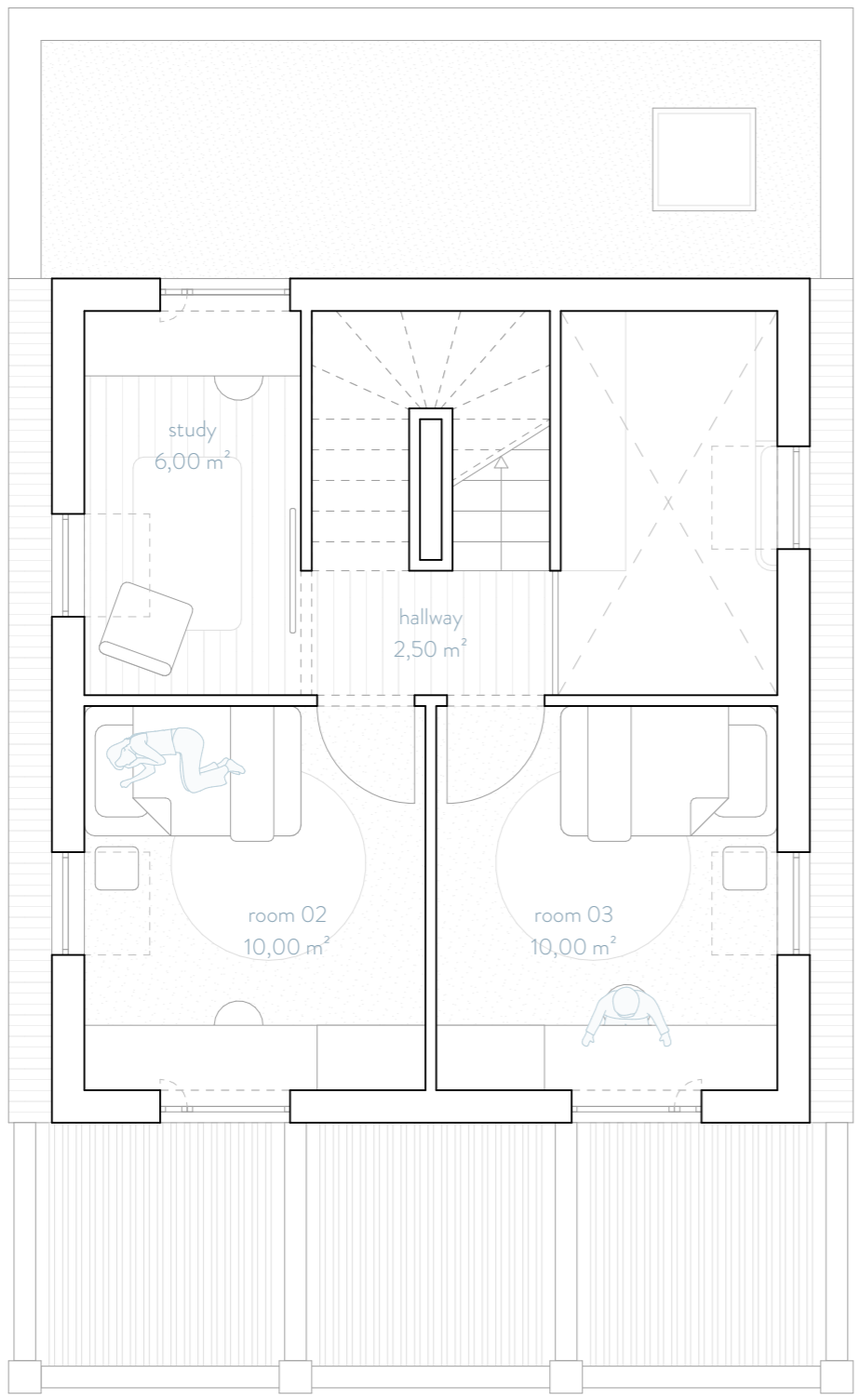
The largest module spans three stories, providing ample space and flexibility. Like the medium module, its rooms can be adapted to meet diverse needs. In this example, there is a living room on the ground floor instead of a bedroom, creating a separation between the more public and private rooms in the house. The bedrooms are located on the upper floors, along with a small study, similar to the medium module.

This module is perfect for families, shared living arrangements, or couples looking to rent out rooms to students.

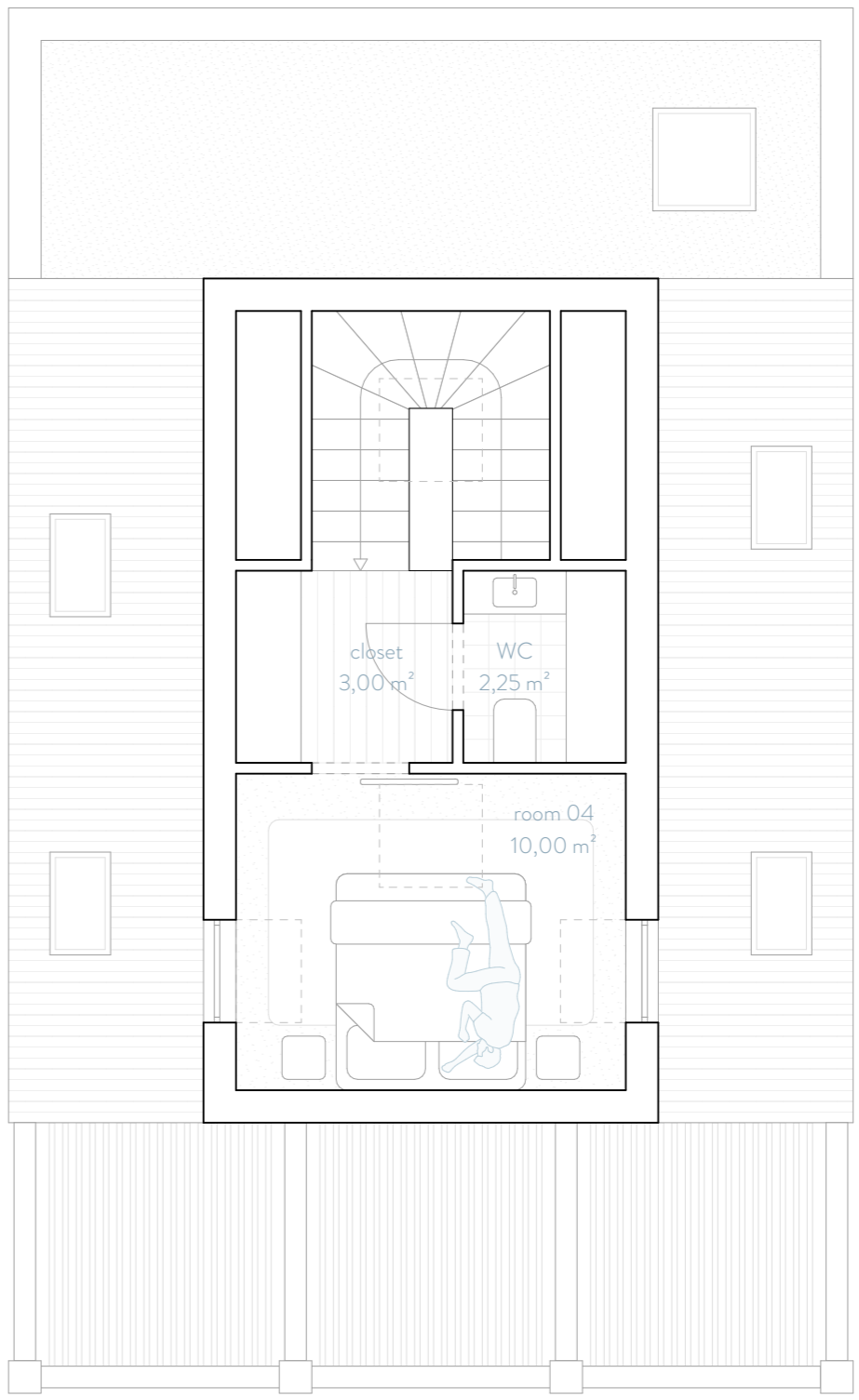


ground floor





1st floor

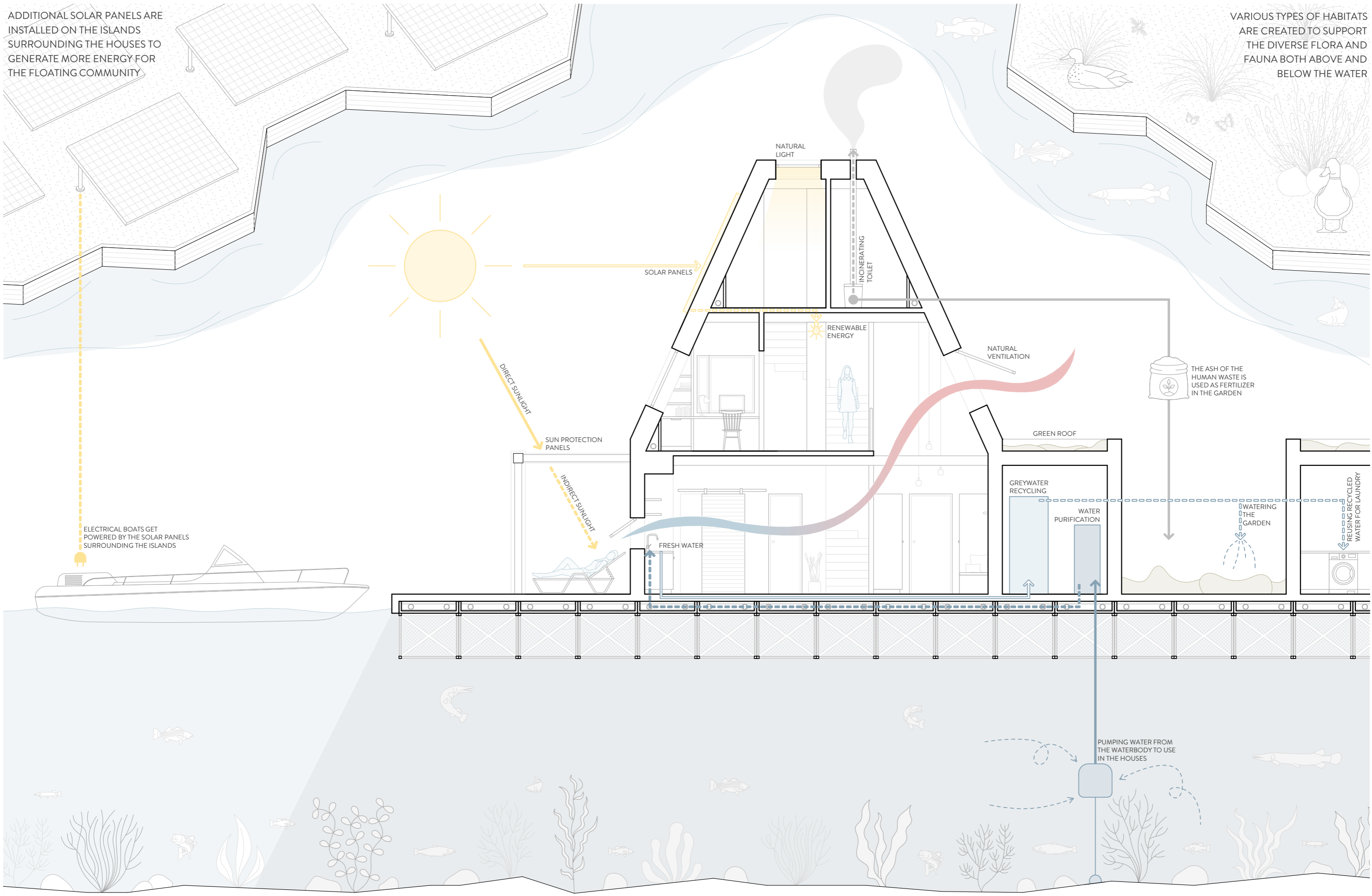


2nd floor



ADDITIONAL SOLAR PANELS ARE INSTALLED ON THE ISLANDS SURROUNDING THE HOUSES TO GENERATE MORE ENERGY FOR THE FLOATING COMMUNITY

VARIOUS TYPES OF HABITATS ARE CREATED TO SUPPORT THE DIVERSE FLORA AND FAUNA BOTH ABOVE AND BELOW THE WATER



system section

How does the building work?

My goal was to create self-sufficient floating houses that can be adapted to various locations, even if there is no possible connection to a local energy or sewage system. Therefore, I researched different kinds of energy production, water management, and waste management to ensure that the houses could work on their own.

This ensures that the project can grow from a small community with a few houses into a larger neighborhood consisting of multiple smaller connected communities.



A significant question was how to provide the house with fresh water. After examining various techniques, I decided on a water purification system. Lake water is pumped into the technical room through pipes located on the seabed. The water flow is very low to prevent marine life from being sucked in. Subsequently, the water undergoes purification and becomes suitable for use in the house, such as for sinks or showers.



The used water will not be dumped into the lake or sent to the city's sewage system. Instead, it returns to the technical room, where it undergoes filtration through a multi-stage filtration system to remove any dirt, hair, or lint. Although this water is not pure enough for reuse in sinks or showers, it can be utilised for washing clothes in the laundry machine or watering the garden.



Especially black water from toilets is almost impossible to recycle, so I decided not to have any running water for the toilets. Instead, I opted to use only incinerating toilets in the buildings. These toilets are easy to assemble and do not require any special technical installations. After use, the human waste gets burned inside the toilet, and the resulting ash can be used as fertiliser in the gardens leaving no waste.



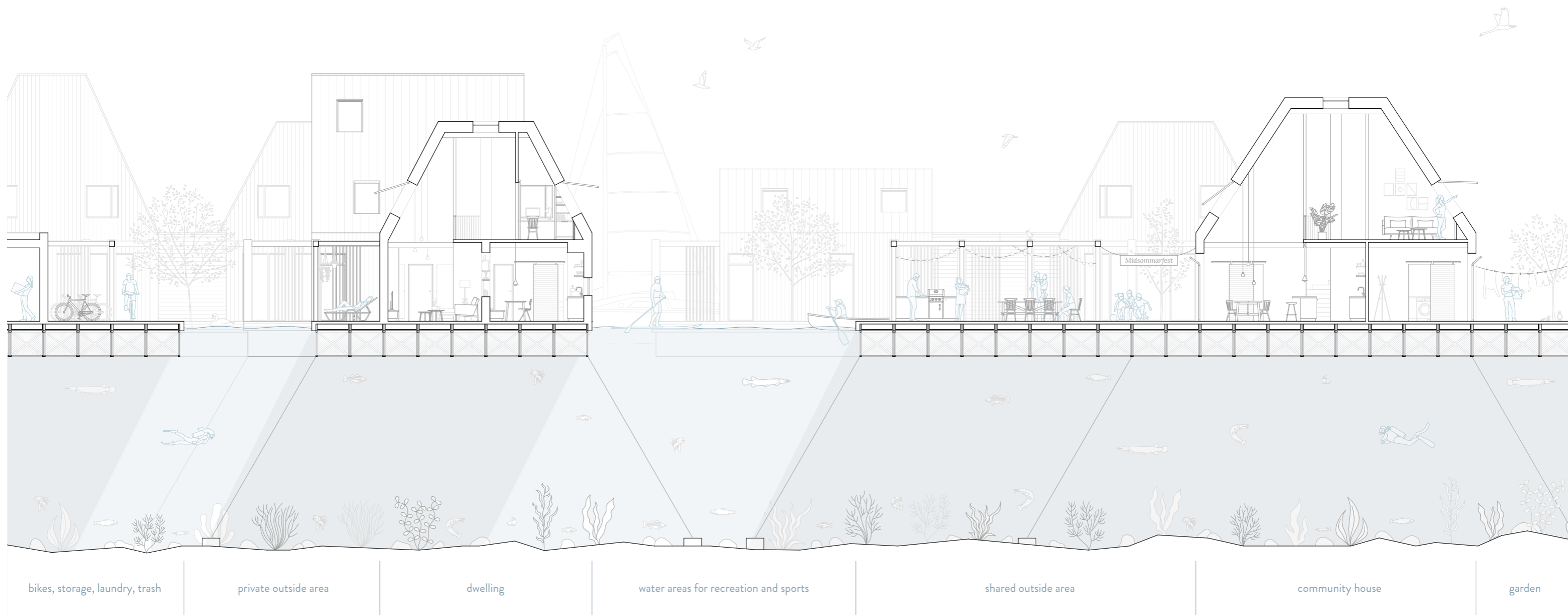
On the roof of each building, solar panels are installed to provide a renewable source of energy for the community, powering lights and other technical systems inside their houses. In addition to the solar panels on the roofs, more are spread out around on the islands surrounding the community. This additional energy can, for example, be used to charge electric boats or can be given to the city.



The windows on the ground floor are designed with small openings either at the top or on the side of the windows. Through these openings, fresh, cold air can enter the building. Meanwhile, the double-height space, at the entrance, allows hot and used air to escape through the chimney effect via the roof windows. This design ensures a comfortable climate inside the houses.



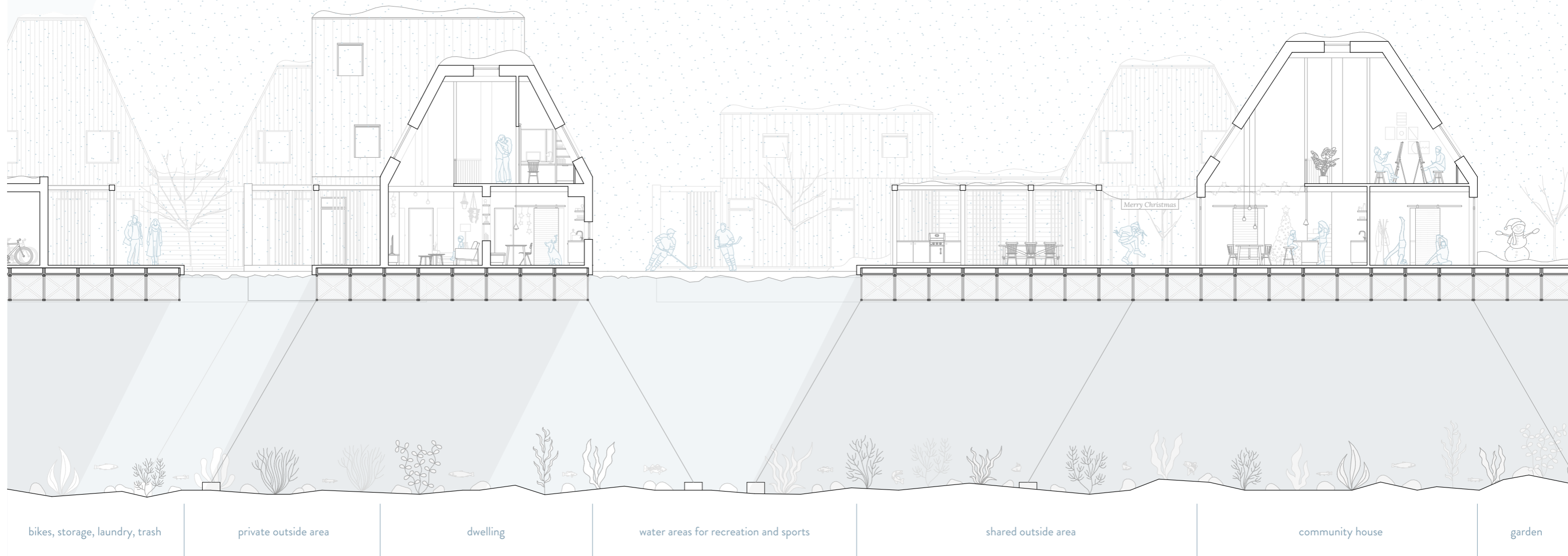
Since there are no large trees surrounding the houses, there is a significant amount of sunlight reflecting off the water, which could disturb the inhabitants. To naturally minimise some of this reflection, sun shades are installed around the entire terrace, which can be adjusted depending on the direction of the sunlight. This way, the interior doesn't receive excessive sunlight and remains cool during sunny days.



During the summer, residents of the floating community enjoy a close connection to the water. They swim, paddleboard to visit neighbors, and take boats out into the archipelago to explore other islands.

Private outdoor spaces are frequently used for sunbathing or enjoying dinners with family and friends, all while taking in beautiful water views.

The community house and its surrounding areas are vibrant hubs of activity. They host celebrations, provide laundry facilities with outdoor drying spaces, and offer places for children to meet and play.



As the colder months settle in, activities transition from outdoor to indoor spaces. Residents cozy up in their homes, preparing for holidays and hosting dinner parties for friends and family.

The community house becomes a focal point for neighborly gatherings and activities, offering yoga classes, arts and crafts afternoons, or simply enjoying a warm cup of hot chocolate together.

In the unique winter environment of Stockholm, where water freezes, a new realm of enjoyment emerges. People venture onto the ice for activities like ice hockey, ice skating, or even braving a dip in the cold water for the brave ones among them.

Reflection

This thesis aims to explore the potential of floating communities as a sustainable and innovative solution to address both rising sea levels and the growth of our cities. It proposes a new approach to future urban planning, helping to densify cities in a climate-conscious manner. The primary objectives were to assess the feasibility, benefits, and implications of implementing floating communities in urban areas.

By examining examples set by architects worldwide and reviewing various articles on floating communities, I found that these communities offer numerous advantages compared to other building techniques. Their adaptability to rising sea levels is a significant benefit, but their flexibility in urban planning, minimal environmental impact, and ability to be built anywhere with water are also notable advantages. Unlike traditional land-based development, floating communities do not

destroy the space underneath them and leave almost no traces in nature after removal. These floating communities could be especially viable alternatives in coastal regions most threatened by climate change-induced sea level rise. Floating communities not only present a solution to housing shortages and the consequences of climate change, but they also offer an opportunity to explore new sustainable living possibilities by making the community self-sufficient in terms of energy production, water, and waste management.

However, despite the numerous advantages that floating communities offer, there are also significant disadvantages and limitations that make building these structures challenging. There are many questions regarding regulations and governmental frameworks, as well as concerns about selecting appropriate locations for these floating communities without disturbing existing land-based developments.

Additionally, there are concerns about their durability when it comes to storms and large waves, as people might get seasick or the interconnected platforms could break apart. Moreover, the social acceptance and integration of such communities into the existing urban infrastructure pose challenges that need to be further discussed.

Future research should, therefore, focus on addressing these problems and exploring potential solutions. Regulations, innovative construction materials, new technologies, and sustainable innovations need to be further developed to make floating communities a viable solution for the future. It is important to explore what is possible and develop prototypes of floating communities. Even if these prototypes are not immediately feasible, they will still help to understand what is necessary to create viable solutions for floating communities in the future.

In conclusion, floating communities represent a promising frontier in urban development, offering sustainable and resilient solutions. As cities continue to grow and face the impacts of climate change, embracing such innovative approaches will be essential for building a sustainable and adaptable future.

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