# Regenerative Islands

Pacific island nations are threatened by coastal erosion and submergence due to storm surges and sea level rising must adapt to the changing natural environment. This proposal does not destroy ecosystems by artificial barriers, but rather promotes the sustainable self-growth capacity of islands by controlling ocean waves and promoting the accumulation of sand on the islands. Furthermore, by creating sandbars over the shallows, the environment, culture, and ecosystem of the island nation will be reconstructed, creating a future with new landscapes that are softly adapted to climate change.

2023 JACQUES ROUGERIE FOUNDATION AWARDS

Award's category : Grand Prix Climate & Rising Water

Project's Name Regenerative Islands

Description Regenerative Islands

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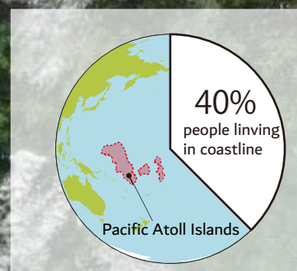
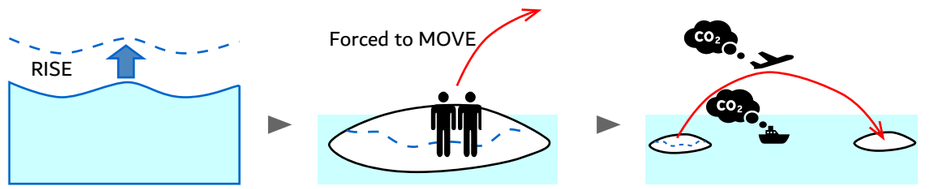



## 40% people linving in coastline

With approximately 40% of the population living in coastal areas, there is an urgent need to find new approaches to address this growing threat.

## Coastal Erosion in Paific Atoll Islands

As climate change progresses, island nations and coastal areas face an increased risk of sea-level rise and flooding from storms. Around 40% of the world's population live in coastal areas, where sea levels are rising by 0.36 m per year and 19,800 people are forced to migrate as environmental migrants. In the short term, strong waves, including storm surges, are eroding islands, undermining coastal ecosystems and human livelihoods. In this context, environmental migratory movements are emitting 6,500 tonnes of CO2 per year and there is an urgent need to find new approaches to address this growing threat. Therefore, instead of migration, we propose to create livelihoods that adapt to environmental change with the land.




Sea Level Rise : 3.6mm/Y

People forced to move : 19,800 Y

CO2 produced by migration: 6,500t/Y

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Award's category : Grand Prix Climate & Rising Water

Project's Name: Regenerative Islands

Description: Erosion of Islands and Environmental Immigrants

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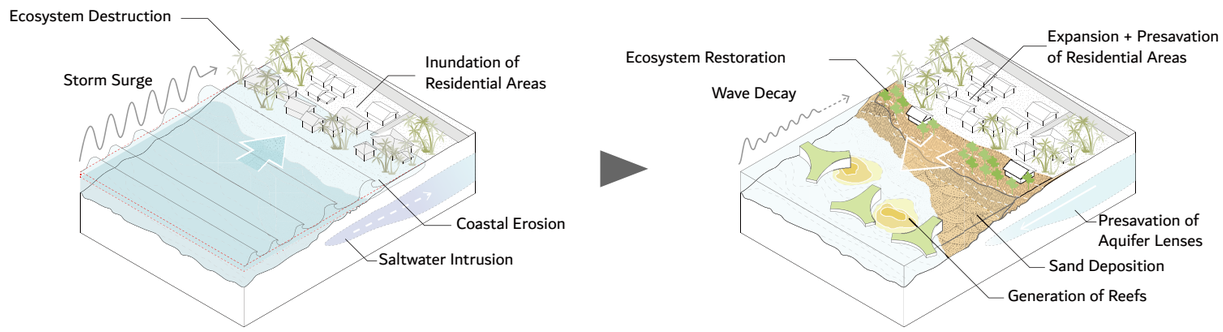
## Self-growth Ability of the Island

This proposal not only controls the energy of the waves that are eroding the island and reduces erosion, but also promotes the island to grow on its own by depositing sand. The goal is to rebuild the island by harnessing the natural power of the ocean, rather than by placing a physical barrier, as in the case of conventional levees, against nature. Currently, sea level rise and wave erosion are not only endangering residential and agricultural lands, but are also causing water problems as the freshwater lenses beneath the islands are chlorinated, depleting drinking water supplies. The sand deposition on the main island by the Regenerative Islands is intended not only to reduce wave power and erosion on the island, but also to increase the sand deposition and expand the land area. It is also expected that the expansion of land will reduce the chloride of freshwater lenses. The project will build a sustainable island by creating a system that allows the island to grow on its own, even if sea level is rising.




2023 JACQUES ROUGERIE FOUNDATION AWARDS

Award's category : Grand Prix Climate & Rising Water

Project's Name Regenerative Islands

Description Regenerative Islands Axonometric

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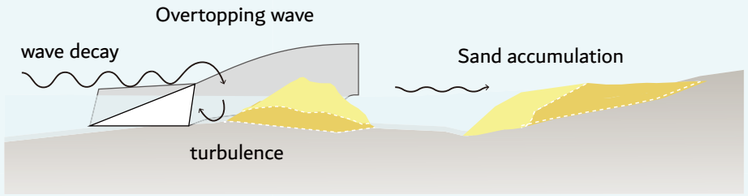
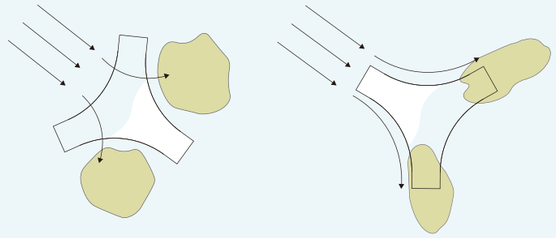
## Structure for Sand Accumulation

The structure is shaped to reduce wave forces and maximize sand deposition. The accelerated deposition of sand results in the accumulation of sand on the shoreline of the main island. Sand is also deposited near the structure, creating a sandbar around the structure and creating a new island.



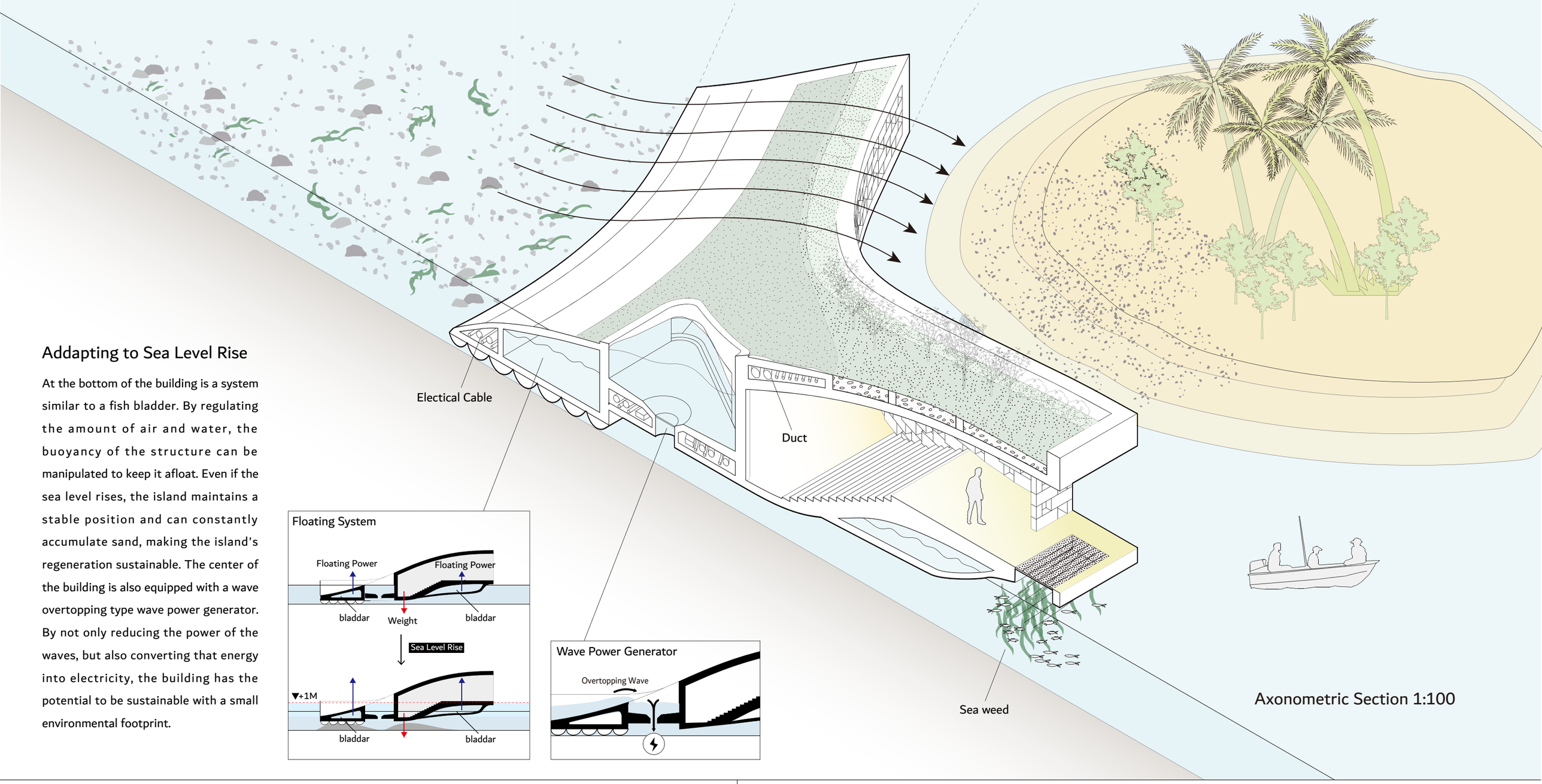

## Two Types of Articidial Reefs

The shape of the reef formed depends on the shape of the structure. If the structure is perpendicular to the wave, a bar is formed on the surface beyond the structure. On the other hand, if the structure is parallel to the wave, a bar is formed in a line at the edge of the structure.




## Addapting to Sea Level Rise

At the bottom of the building is a system similar to a fish bladder. By regulating the amount of air and water, the buoyancy of the structure can be manipulated to keep it afloat. Even if the sea level rises, the island maintains a stable position and can constantly accumulate sand, making the island's regeneration sustainable. The center of the building is also equipped with a wave overtopping type wave power generator. By not only reducing the power of the waves, but also converting that energy into electricity, the building has the potential to be sustainable with a small environmental footprint.










Axonometric Section 1:100

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Project's Name: Regenerative Islands

Description: Axonometric Section

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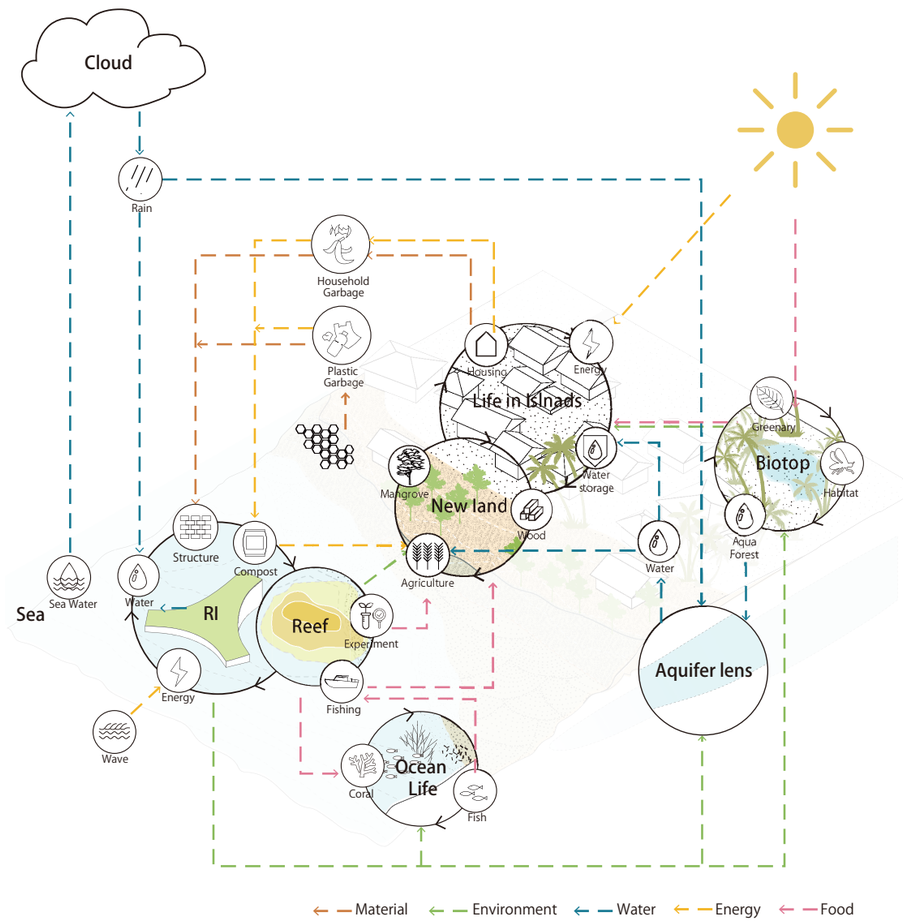
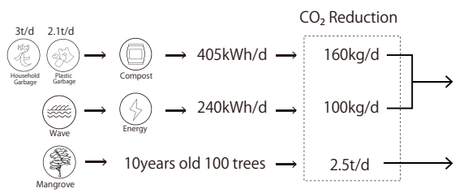
## Ecological Circulation

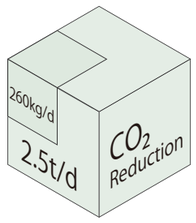
Coastal areas are faced with the problem of disposing of garbage that washes ashore or is generated within their own countries. This architecture will be constructed using these waste materials to create a new environment in coastal areas. It will also create a new ecological circulation between the land and the sea, which will lead to the circulation of energy, water, and food.




## $CO_2$ Reduction

Case study: Marshall islands
Population:53,000
Area:180k ㎥
※Carbon dioxide reductions are mainly from fuel transportation.

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Award's category : **Grand Prix Climate & Rising Water**

Project's Name: Regenerative Islands

Description: Ecological Circulation of Islands and Sea

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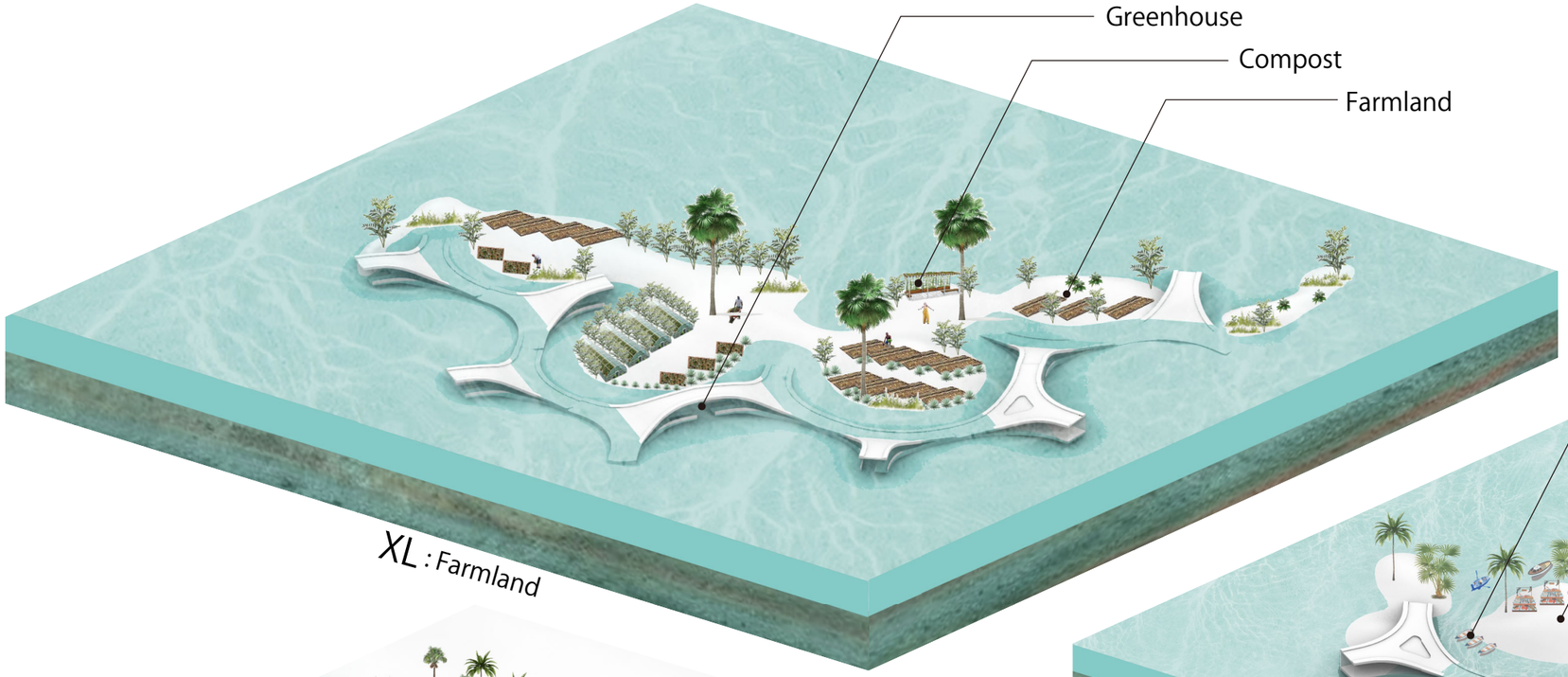
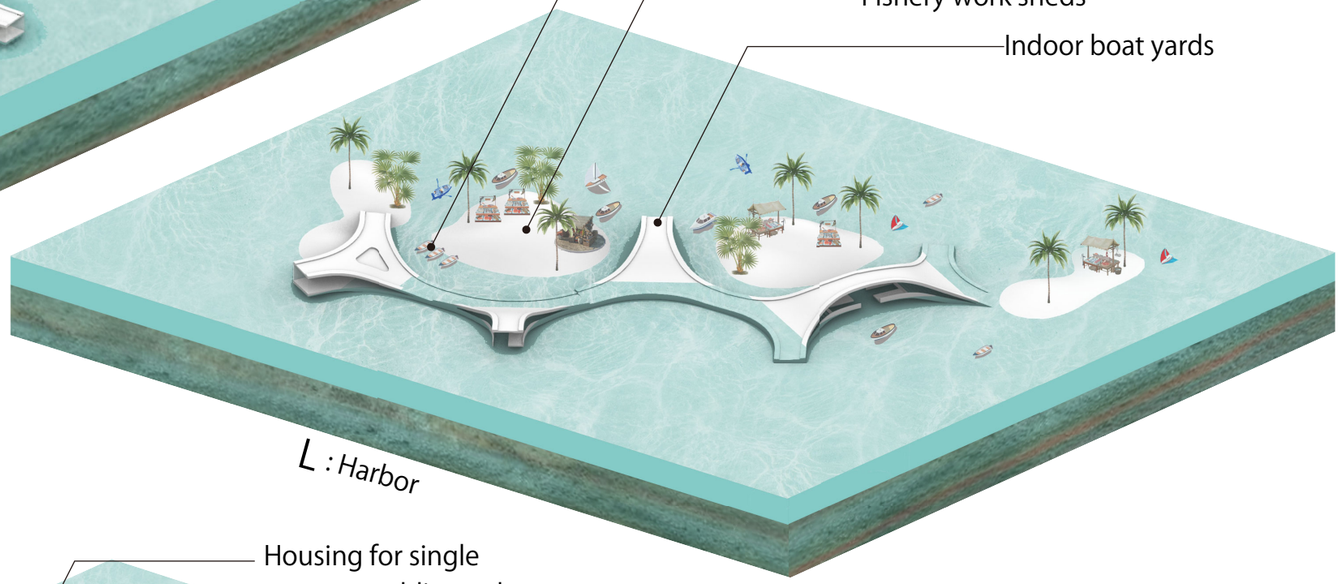
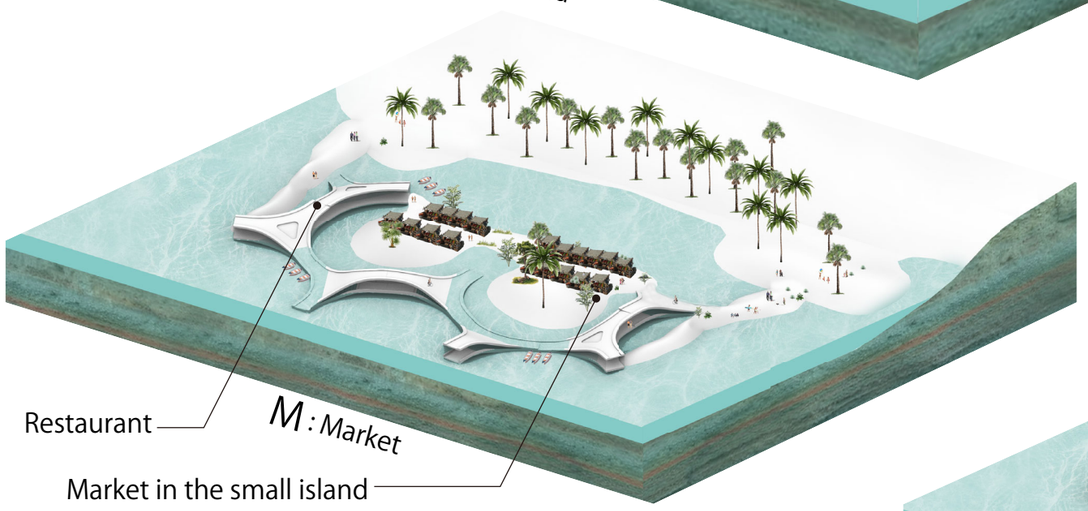
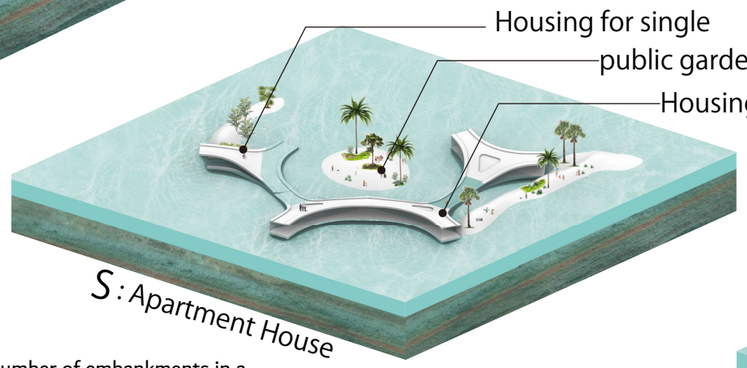
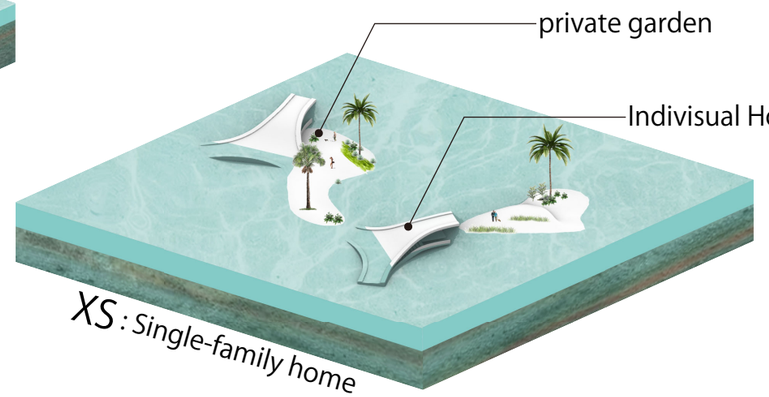


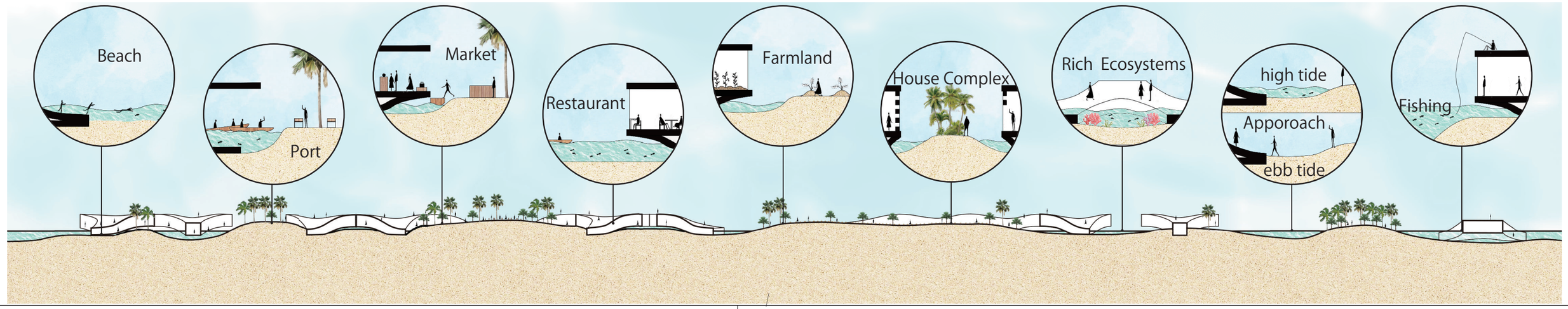




## Typology of Regenarive Islands

The size and shape of islets made by connecting multiple structures can be manipulated by the number of embankments in a row and the orientation of the embankments in relation to the waves. The size and shape of the islets can therefore be manipulated according to the needs of each programme in response to sea level rise. At the boundary between land and sea, a new landscape is created by connecting coves connected to the sea suitable for boat landings, sandbars for fishing, farms and greenhouses large enough to provide food for the islanders, markets with a series of sandbars that circulate with the land, and housing complexes and private houses with courtyard-like sandbars.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Award's category : Grand Prix Climate & Rising Water

Project's Name: Regenerative Islands

Description: Regenarative Islands Plan

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## Alive Boundary between Sea and Land

The Reefscreated by the architecture will be connected to the island to create a seamless landscape. For example, the market that will be created there will be the liveliest place on the island, where farm products from the island and seafood from the sea will be traded. The new area between the sea and the land will create a variety of activities and landscapes through the ambiguous mixing of human activities on the island and in the sea.

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Project's Name: Regenerative Islands

Description: Alive Boundary between Sea and Land

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## Self-Sustaining Communities

“Regenerative Islands” will create sustainable spaces and communities by establishing self-sustaining circulatory systems for energy, water, and food. Not only will the islands become self-sufficient and a place for the locals, but they will also become an environmentally friendly tourist resource that will circulate through the island's economy, thereby making the island's culture sustainable as well.

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Award's category : **Grand Prix Climate & Rising Water**

Project's Name **Regenerative Islands**

Description **Self-Sustaining Communities**

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## Livin According to the Tidal Rhythm

The reefs created by the Regenerative Islands are expressive spaces where the balance between land and sea changes with the ebb and flow of the tide. For example, at low tide, an area like a seawater pond becomes a safe landing place for boats or a safe swimming pool. At high tide, the area becomes a space where fish and other ecosystems can enter, and the boundary between nature and human space disappears, creating a space where people can live in harmony with nature.

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Project's Name: Regenerative Islands

Description: Livin According to the Tidal Rhythm

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ACADÉMIE DES BEAUX-ARTS

• **Growing Islands**
https://selfassemblylab.mit.edu/growingislands

• **Global Sea-Level Rise & Implications Key facts and figures**
https://ane4bf-datap1.s3-eu-west-1.amazonaws.com/wmocms/s3fs-public/ckeditor/files/WMO_Global_Sea_Level_Rise_Fact_sheet_15_Feb_Final_1.pdf?.0vuuTU1EiltzLVOcC0XA7cKV.huY_KW

• **Rapid human-driven undermining of atoll island capacity to adjust to ocean climate-related pressures**
https://www.nature.com/articles/s41598-019-51468-3

• **Estimation of littoral drift from beach topographic changes**
https://www.ahec.jp/images/technicalinfo/dobokugakkaihokkaido/dobokugakkaihokkaido17.pdf

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