CLIMATOPIA

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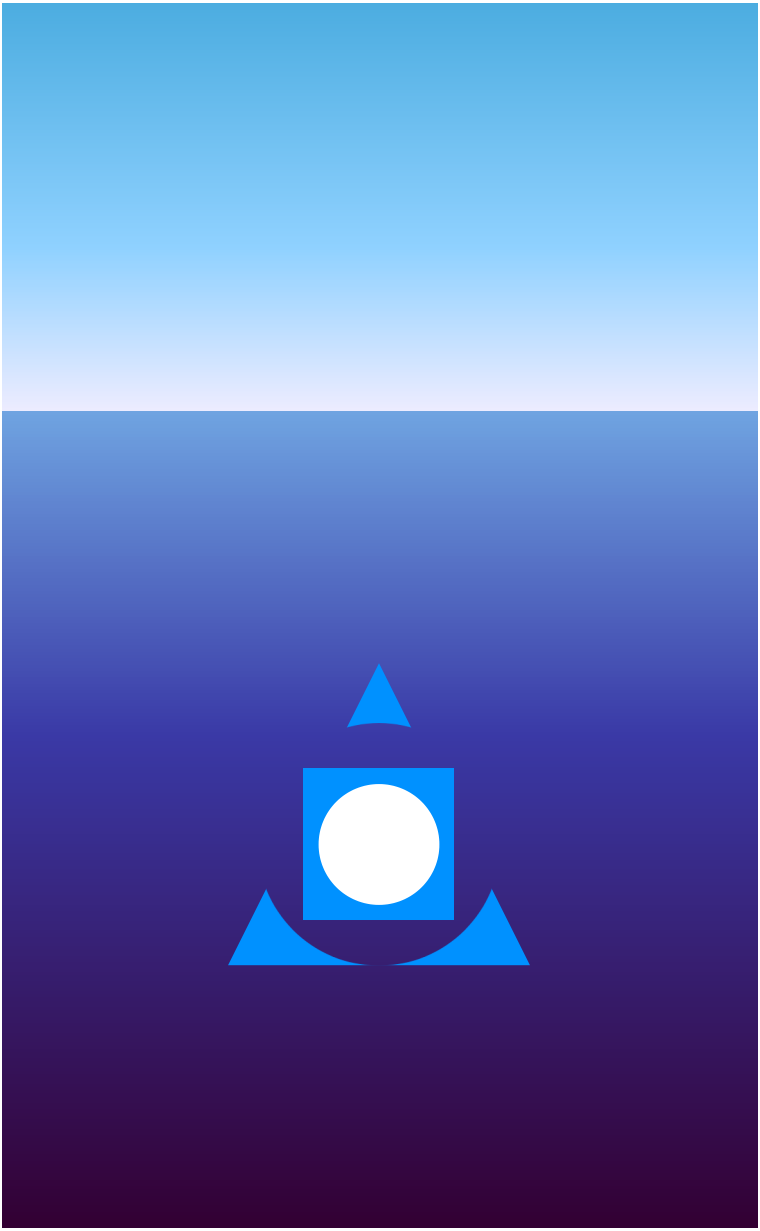
SECTION 1: CLIMATOPIA



SECTION 2: ATLANTIS

When coastal cities, islands and entire nations slowly go under in the rising sea, how will human life there change and continue?

Global warming is causing sea levels to rise due to three primary factors[1]:

- **Thermal expansion:** As the temperature of seawater increases, it expands.
- **Melting glaciers:** The balance between summer runoff and winter snowfall is being disrupted, as glaciers melt at a faster rate than they are replenished.
- **Melting ice shields:** The vast ice shields in Greenland and Antarctica are melting, adding large volumes of water to the ocean.

This trend of rising sea levels is not only increasing yearly but accelerating.

The consequences of this trend are severe and far-reaching. Islands across the globe are gradually disappearing underwater. Additionally, thousands of coastal cities face the imminent threat of being submerged. This situation calls for urgent action and adaptation strategies.

1. SROCC. 2019 IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (eds H-O Pörtner et al.). In press.

Defensive Architecture and Preservation Strategies

For centuries, defensive architecture like dams and other water-blocking technologies have been utilized to safeguard land from the encroaching sea.

Certain coastal cities and other cities at risk of flood surges have implemented defenses that are temporarily activated in the case of extreme conditions, such as the Thames Barrier in London or the MOSE in Venice. However, these systems are not equipped to handle the challenges posed by long-term sea level rise (SLR), as are not intended to stay closed for extended periods of time.

In some parts of the world, permanent defenses against rising sea levels have been implemented. For instance, the Netherlands, a country much of which lies below sea level, has developed a comprehensive system of dikes, dams, and storm surge barriers, known as the Delta Works, to protect their

However, these permanent technologies face issues when dealing with SLR on the long term because they require close monitoring, maintinance and upgrades to keep up with erosion and continuing SLR, especially in the face of more frequent and extreme weather events such as storm surges.

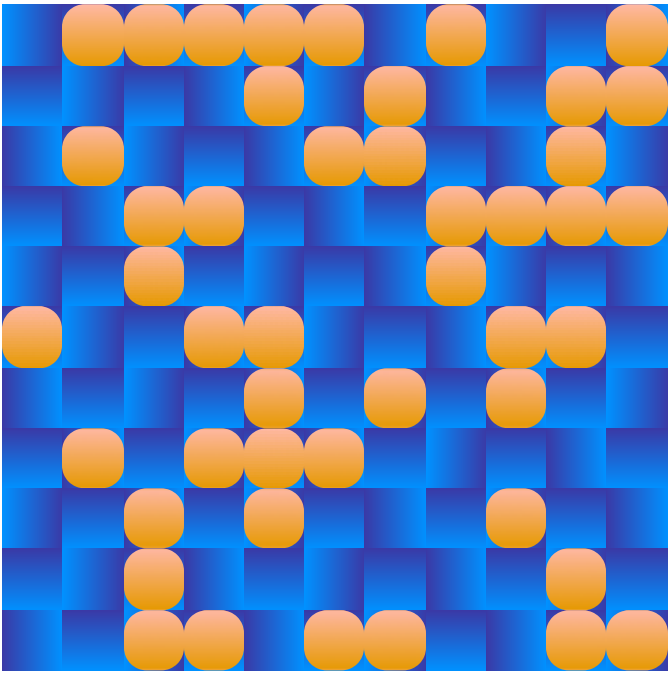
Many islands are low-lying and vulnerable to even minor increases in sea level. Traditional defensive architecture and beach nourishment (stocking up beaches with sand) are possible to employ, but they can cause significant damage to local ecosystems while still facing the issues described previously. The use of natural defenses like mangroves and coral reefs can help to reduce wave energy and erosion for temporary relief and protection of current ecosystems and human communities.

While these concepts offer some protection against SLR, they lack long-term stability and effectiveness, as sea levels might rise tremendously over the coming centuries[2]. The prevailing long-term recommendation is to relocate further inland. However, this is not a viable solution for islands and other regions that are barely above sea level. These areas will eventually be completely submerged, leading to the loss of their existing ecosystems and current human living environments.

2. 2021. Loss and damage implications of sea-level rise on Small Island Developing States. Current Opinion in Environmental Sustainability, volume 50 (Martyr-Koller, R. et al.). ISSN 1877-3435

Floating Cities - Rising with the Sea

The concept of building floating urban structures on water is not new. In fact, houseboats have been in use for a very long time in many countries around the world. In the face of sea level rise (SLR), floating cities offer a clear advantage: they rise with the sea instead of being inundated.



algorithmically generated abstract representation of a floating city from above

Current Floating Cities

Several floating city projects are already underway, including:

- **In the Netherlands, "Waterbuurt"** is a floating neighborhood of nearly 100 connected floating houses, completed in 2010. This project demonstrates the viability of constructing floating urban areas. The residents describe a strong sense of community in their neighborhood and a connection with the water.
- **In Korea, "Busan Oceanix City"** is a proposed sustainable floating urban area with large buildings, a zero-waste system, and its own energy production through solar and wave power. By additionally employing sea-reforestation systems, this project has the potential to become entirely carbon neutral[3].
- **The "Maldives Floating City"** project, if completed, would be the world's first floating island city. It aims to provide an alternative to living on sinking islands. By integrating sustainable construction practices, environmental care for the marine environment, local culture and community building, and resilience through dynamic adaptation and development, it has the potential to set a benchmark for future developments around the globe.

3. 2022. Analysis of floating city design solutions in the context of carbon neutrality.Energy Reports, Volume 8 (Huimin Yang et al.). ISSN 2352-4847

Island nations like the maledives wanting to embrace a floating lifestyle, permanently connected to the sea - as opposed to the high-rise buildings crammed on some of the larger islands - marks a return to a deeply nature-connected culture. While traditional living environments are changing drastically and some of the cultural heritage of many regions of the world will inevitably be lost to the rising sea, living with water might mean forming new, deep connections with the maritime environment. Moreover, living in interconnected networks of small floating buildings could foster stronger communities, resembling villages more than cities.

New Sea Organisms

Floating cities have a high potential to function similarly to organisms due the following factors:

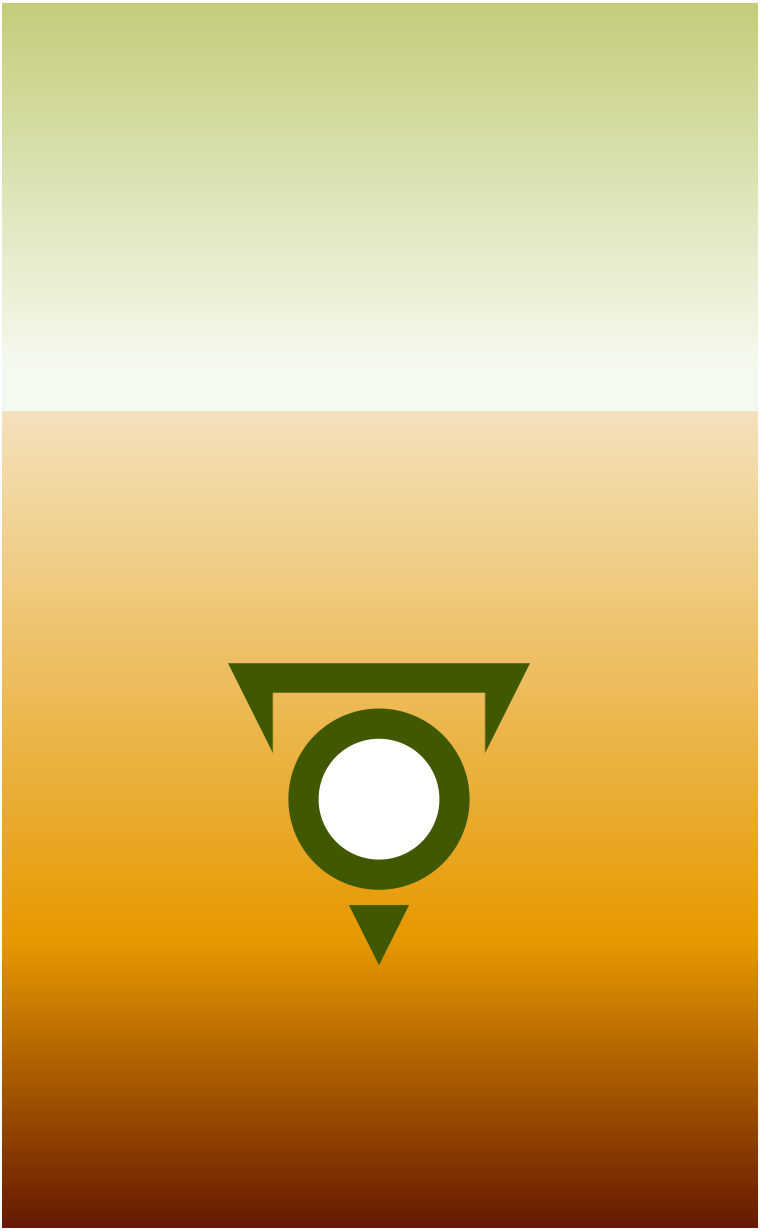
- **Modular structure:**
  Damaged modules can easily be repaired or replaced. Moules can be moved and reconnected, creating a dynamic, organically changing city structure.
- **Metabolism:**
  Floating cities need to be designed with resource and waste management as a priority. By using solar and wave energy and incorporating submarine gardens, these cities can become useful species in the marine ecosystem.
- **Reproduction:**
  This aspect is more speculative, but as floating cities grow, they might dynamically split off parts, creating new cities, similar to cellular organisms.

Coral Cities and Submarine Lifestyles

One of the significant challenges for life on Earth under climate change is the slow speed of evolutionary processes. A majority of species will not survive as they can't adapt quickly enough to their changing environments.

As sea levels rise, not only are islands that host many unique species threatened, but submarine lifeforms are also at risk. Global warming is causing ocean temperatures to rise, creating conditions that many species cannot tolerate. Additionally, the increasing distance between the ocean floor and surface due to rising sea levels reduces the amount of light available in many areas.

What if we could evolve fast enough to adapt to these changes? If islands become submerged, could human civilizations continue to inhabit the same islands, but below sea level instead of above? Corals would provide a multifunctional, renewable, and climate-positive building material for submarine infrastructure. Humanity could form much stronger bonds with their marine environment than ever before, by learning to coexist, cooperate, and communicate with many other lifeforms



SECTION 3: CACTUS

When potable water slowly becomes a rare resource in many regions, how will human life there change and continue?

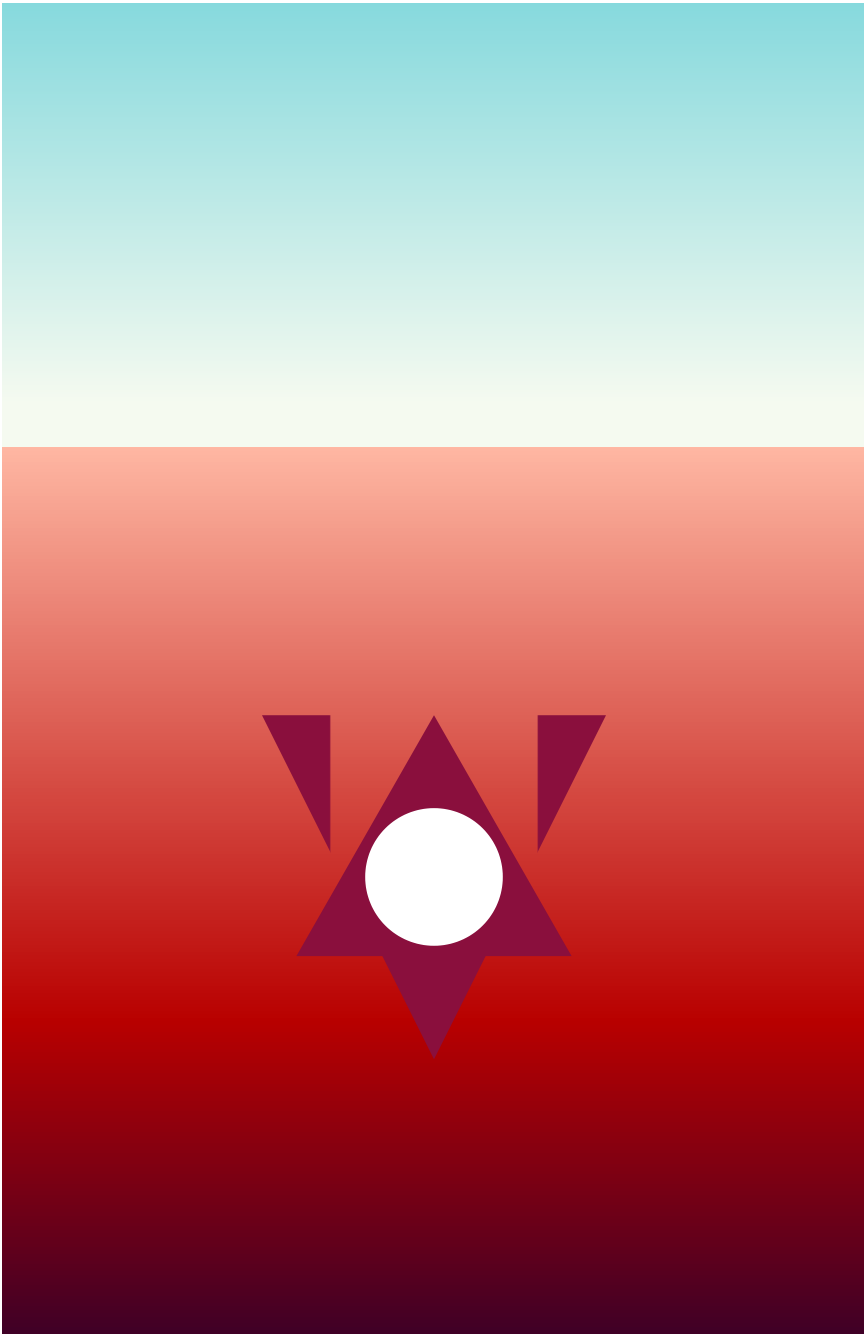
Due to climate change the availability of potable water is increasingly threatened in many regions by various factors[4]:

- **Droughts:**
  The frequency and intensity of dry periods and droughts are increasing globally
- **Floods and water-caused damages:**
  Increasingly frequent floods cause damage to infrastructures and ecosystems, consequentially affecting water safety
- **Glaciers and snowmelt:**
  The accelerated melting of glaciers and decreased snowfall are threatening water security in regions that depend on meltwater.

This trend of extreme water-endangering conditions is accelerating.

The consequences of this trend are severe and far-reaching. Not only are already disatvantaged groups and populations especially affected by these developments, but no demographic or geographic group including the richest and most developed regions are spared from the threat of water scarcity. This situation calls for urgent action and adaptation strategies.

4. Water. 2022. Climate Change: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (eds Caretta, M.A. et al.).



SECTION 4: PHOENIX

When cities, seas and air slowly heat up to unpreceded levels in most areas, how will human life there change and continue?

With global warming, further heat related events become more extreme and frequent[5]:

- **Hot extremes:**
  The frequency and intensity of hot extremes (including heatwaves) is increasing
- **Fire Weather:**
  The probability of compound events such as fire weather conditions (hot, dry and windy - conductive to wildfires) is increasing
- **Heavy precipitation:**
  The frequency of heavy precipitation is increasing over a majority of land regions

This trend of weather and climate extreme events of all types is accelerating.

The consequences of this trend are severe and far-reaching. All regions across the globe are experiencing unprecedently hot weather, posing serious threats to human health and ecosystems and disrupting societies and economies. This situation calls for urgent action and adaptation strategies.

5. Weather and Climate Extreme Events in a Changing Climate. 2021. Climate Change: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (eds Seneviratne, S.I. et al.)

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