Asylum

Degree Project in Architecture | Lund University – Faculty of Engineering | by Andreas Lahti, tutor Ricardo Ostos, examinator Abelardo Gonzales | Autumn Semester 2009

Introduction

Asylum – A secure place of refuge, shelter, or retreat.
– Oxford Dictionary.

This project is set at the crossing of two burning topics of our time: the often ignored problematics of displaced people around the world; and the recently much more debated question of global warming. That these seemingly diverse thematics are deeply connected with each other becomes clear just by reading the IPCC* report from 2007 on global warming. As this report suggests, the real danger lies not in the potential flooding but in the potential production crisis. As the scientific community suggest that global warming will strike hardest on some of the worlds most vulnerable regions – several humanitarian organizations have warned that we run the risk of facing a global refugee crisis that can only be compared to that of Europe after World War II.

This is a situation that by itself evokes questions of responsibility, solidarity and humanitarianism. Sadly, awaiting the Copenhagen Climate Summit in December 2009, we see little evidence of a breakthrough towards sufficient actions against this threat. Even if the highest bid in these negotiations of mitigation of CO_2 emissions would be accepted and followed – the agreement would only bee around half of what is suggested from the IPCC. At the same time we already face a distressing refugee situation. In Europe isolationist forces are gaining power in an alarming manner. This suggests that the EU will raise its borders even further – at a time when global leadership is desperately needed. The call for a plan B is urgent…

The project is located on international waters, outside the North-African coast on the border to EU at the Canary Islands. Here the situation of refugees has deteriorated in recent years; around 10.000 boat refugees reach the shores of the islands annually. How many casualties this traffic generates is impossible to know. But it is certain that thousand of desperate people risk their lives every year, crossing the waters in poorly equipped vessels.

Within this context, I try to develop a strategy where architecture can be used as a vehicle for discussing the alarming situation. The project title "Asylum" is twofold. It is first and foremost the safe harbor for the asylum seekers. But at the same time it is in a sense an asylum for the devastated nature that in the first place forced these people to leave their homelands. This strategy involves exploring new technologies for producing energy, water and food – rethinking our relation to nature. The project tries to open a new frontier for an offshore asylum with a high degree of self-sufficiency. This is not an overnight process as the scenario plays out over a longer period, where the initial phase is just as vulnerable and dependent as any other refugee camp, as nature responds to the induced process a more symbiotic relation occurs – making the refugees part of a solution and not only victims.

On the other hand the project seeks to start off another discussion – "what should life hold?" As architects we design much of the framework where modern life takes place. In doing so we also provide visions and dreams – collective and individual. What should these perceptions hold in a world with fewer resources? By providing a "What if" – as this project demonstrates a form of living under very constrained circumstances – we have a chance to see the present from another point of view, something highly needed in a time of tough challenges.

*Intergovernmental Panel of Climate Change is the leading body for the assessment of climate change, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO)

Table of Contents

Introduction	3
Background	7
Final Proposal	9
The Scenario	10
Asylum Assembly	12
The Reef	19
Experience Asylum	21
Research	28
Global Warming	28
Global Warming and the Oceans	29
Methods of Mitigating Global Warming	30
Refugees and Global Warming	31
The Oceans as a renewable Energy Source	32
Methods of re-establishing Sea life.	34
Aeroponics	33
Bamboo Farming and Construction	33
Methods of re-establishing Sea life	34
Reference Study of Offshore Platforms	36
Camps	39
Design Process	38
Bibliography	43

Background

When I started this project I had followed the global warming debate for quite some time. With the UN Climate Summit in December 2009 in mind, I thought it could be interesting to develop an architectural project on this topic. However one question remained unanswered: how to do an architectural project on this rather abstract matter – so remote from the banalities of architecture?

After further research i came to the conclusion that global warming was here to stay. The opportunity to actually address the issue before the effects were noticeable was coming to a close, and global willingness seemed to be lacking. My conclusion was that the future will need to be fought on two fronts. On one hand we have to deal with the effects of global warming, and one the other try to mitigate an accelerating climate change.

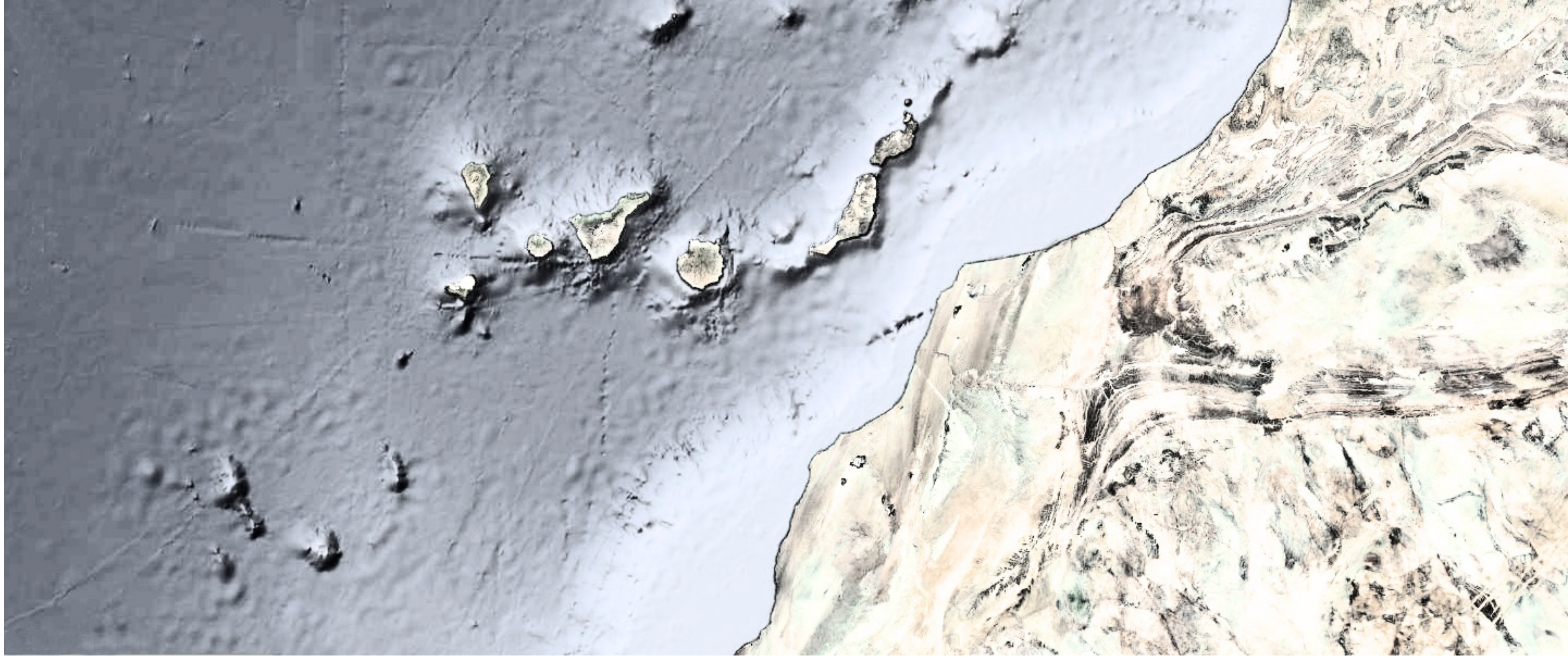
Further, the reading suggested that global warming will not strike evenly. Some regions of the world will face worse consequences than others. For instance large parts of Europe are likely to experience relatively mild effects, while some already vulnerable regions have tougher luck. The reports suggests that several regions will need massive investments to secure themselves against global warming. As some of these regions are counted among the poorest in the world it is not realistic that this will be possible without unprecedented international aid. A more probable scenario contains a growing number of displaced people in the world, and people fleeing from drought, desert spreading, flooding, lack of fresh water and arising conflicts caused by any of the previous causes.

During a one and a half years' stay in Switzerland I witnessed a quite harsh political debate on immigrants. Coming back to Sweden I noticed a growing "nationalistic" movement here as well. The scope of a happy ending – where the global warming victims could find a safe harbor in Europe that seem to have both more resources and less stressing effects to cope with – seems more unlikely as intolerant and isolationistic forces gain ground.

This came to be my architectural project: creating an asylum for some of these global warming victims. Starting out with the existing problematics of boat refugees – charged the project with a new range of questions dealing with colonialism, cultural values, intolerance, inequality, religious conflicts and humanitarianism. Creating a world parallel to ours is in a sense also the architectural visualization of what is already a reality for the growing number of paperless refugees that have made it here but simultaneously ceased to exist.

Leaving ethical and geo-political problematics aside this project becomes an endeavor in science and technology. Asking: in a world of fewer resources – would it make sense to live on the vast oceans – which after all make up a 70 % of the planets surface? Can it be done? Could it help us cope with the climate crisis? And lastly, could it offer a good life for the people who are choosing to live there?

Some of these questions will be given an answer in this report. However the lions part will not. And this is also how I choose to look at the project – it points out an area of great problematics and evokes questions that will be crucial to address in our lifetime. Often the questions are more important than the answers.



Final Proposal

This report follows a back-casting disposition. Starting with the result of the project process. Then I lay out my research and process documentation.

The Site

The border between the Canary Islands and western Africa is one of the world's most unequal. The economic divide between the Spanish islands – that for the last half of the century has served as a tourist resort for mainly wealthy europeans – and the west african coast – that hosts several of the worlds absolute poorest countries – is immense.

This relation is most dramatically shown by the frequent attempts from desperate Africans trying to reach the islands in almost any sort of vessel – often overloaded and with questionable sea-worthiness. Far too often this traffic has had a lethal outcome.

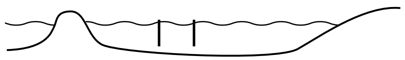
The alarming situation is further worsened by the EU's fishing agreement that sends money to corrupt regimes in return of fishing rights. As the modern european fishing fleet is rapidly diminishing the fish stock along the coast. The local population is rapidly losing it's traditional livelihood.

Natural conditions with relevance for the project are the sea-currents that follow a south-western trajectory. And that the location is positioned in the northern east-wind belt (following the earth's rotation), often bringing sand from the Sahara desert.

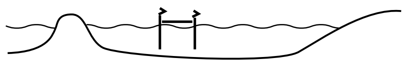
The future doesn't look too promising as we see increasing droughts and desert spreading – as global warming predictions suggest. Added up these changes would likely only stress the situation further. More on this topic in the research section.

The Scenario

The project is not primarily bound to a place it is mostly about a development – a scenario. It describes the development of the refugee camp as a response to changing conditions.



1.
OTEC – water prod
Pipeline.



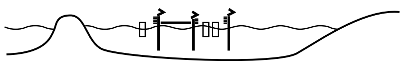
2.
Coast Guard
Border Surveillance

1. Water and Energy

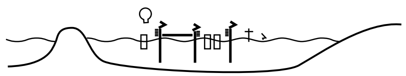
Based on the general global warming situation (read more in the reasearch section) we can expect that one resource will be gaining importance. This resource is water. Having access to drinkable water will be a very valuable resource. As temperature rises, demand for energy will also rise as people (that can afford it) will want to use air-conditioning for cooling offices and homes. Based on these assumption this stage is focused on basic infrastructure that can provide drinkable water and energy. For our particular scenario this resource is not evenly distributed (as economic wealth is not).

2. Security

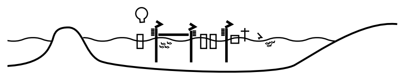
With the traditional geo-political logic, security is achieved by military superiority – “add enough guns and you are victorious”. This stage is very much bound around this principle. The infrastructural investments made in stage 1 need to be protected against terrorists and pirates.



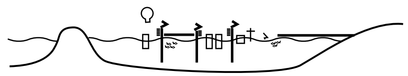
3.
Sea Farm
Refugee Camp
Reef initialisation



4.
Reef Growth
Roof Garden
Reality Tourism



5.
Lithium Extraction
Fishing Industries Return
Recreational Tourism



6.
Fishing Industries
Sea Weed Ind/Textile Prod
Re-fertilisation

3. Crisis

As the global warming accelerates, the local situation on mainland deteriorates and renders an unprecedented number of boat refugees. As the situation does not allow a land based camp – the idea of a floating platform is established. And this is where the actual architectural intervention starts.
Initially the camp doesn't diverge much from other camps except that it is floating and benefitting the protection and infrastructure from earlier stages. By organizing the refugees on the camp and utilizing the sites natural resources, the camp will successively achieve a growing self-sufficiency.

4. Symbiosis

Continuation of stage 3, now numerous processes are initiated and running. Bamboo farming, seaweed/fish farm, artificial reef construction. Dwelling column assembly, and dwelling tent units construction. H2 gas harvesting. Starting the lithium extraction facility. Purpose is to reach a higher capacity of the camp, gainiing potential export-income, catalyse local sea-life. Main principle is symbiosis.

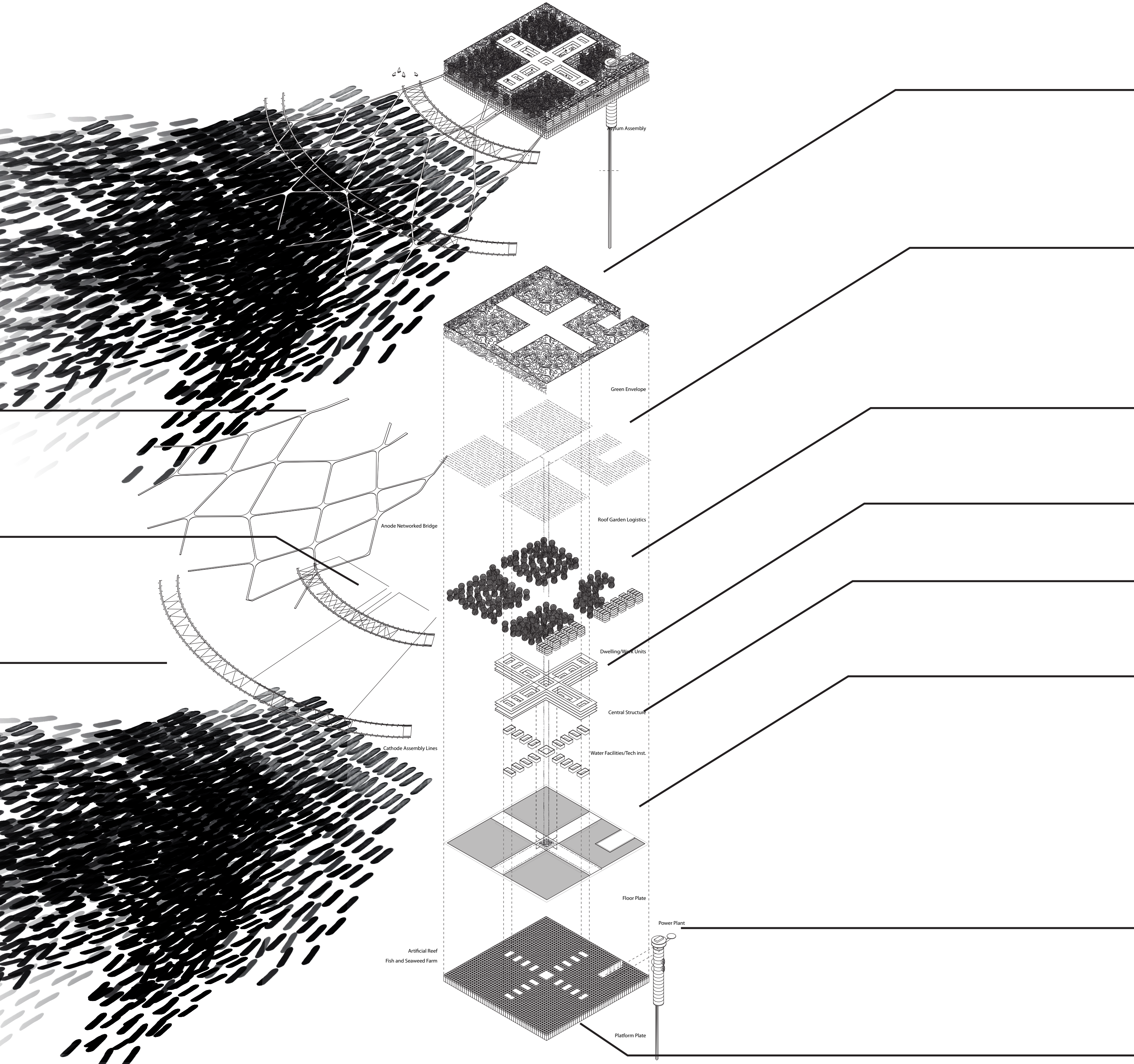
5. Evolution

As the process started in the earlier stage evolves, a new patern emerges. Richer fish water, feeds back to the local economy. The artificial reef has reached a size that is several times larger than the platform it was constructed from. Now the floating structure has captured interest from the tourist industry. The camp can also offer a stable flow of hydrogen gas and lithium to the global market, generating a substantial income. We see an emerging offshore economy. Beneficial for the whole region.

6. Searching a new frontier

As the situation has stabilized in the region, need for hosting the many refugees has dropped. The floating reef is now large enough to host all the needed facilities. Dwellig, production medical facilities etc. And the refugees have during the stay learned various forms of craftsmanship, and received some basic training for transfer to a new home country. Others may want to stay on the reef, and continue building the largest floating structure in the world.
The platform will disembark and set the course for the next refugee crisis.

Asylum Assembly



Data Sheet Asylum:

Capacity: 10 000 refugees
Size: 200x200m (reef excluded)
Energy production: 300MW
(≈1/6 nuclear reactor)
Export: Lithium, Drinkable Water, CO_2-offset. H_2 gas, electrical power.
Import: Iron, Food (at times), bamboo (at times), medicine.

Anode/Access Bridge

Used for accessing the two assembly lines and sea-farm area in-between. Serves as the anode, in the electrochemical construction of the reef.

Recreation Water

Located the void between platform and first assembly line the water is reserved for recreational bath/swimming.

Assembly Line

Two assembly lines are needed for finalising the reef elements.

Artificial Reef

The reef's main purpose is to boost sea life in the region, explained in the research section page 34. Mature reef elements also function as a gas reservoir for H2 that is a byproduct from the reef construction. In its early stages the reef elements are used for the fish and seaweed farm.

Access Hanging Garden
The Hanging garden is accessed from the main structure with logistic paths to the food processing facility. Thin and narrow hang-bridge connects the entire roof surface in the void between the upper and lower structural member of the roof.

Water Facilities.
The camps water installations (WC, water-taps, laundry and wash rooms) are concentrated to the columns of the central elevated cross-shaped structure. This keeps costs low, while providing good hygiene and a clear concept.

Floor Plate
Architecturally this serves as the main public level. Keeping this level free emphasizes the free horizon – the sea should always be present – making orientation easier. Conceptually this could be described as a forest where the dense tree-crowns provides a roof – that filters the light and providing shelter and natural cooling – while the only thing blocking the horizontal view are the tree stems. This design also catalyses a better camp hygiene as cleaning becomes easier.

Power Plant
The power plant extracts energy from temperature difference in the ocean water. Deep cold water and warm surface water. Reed more in the research section.

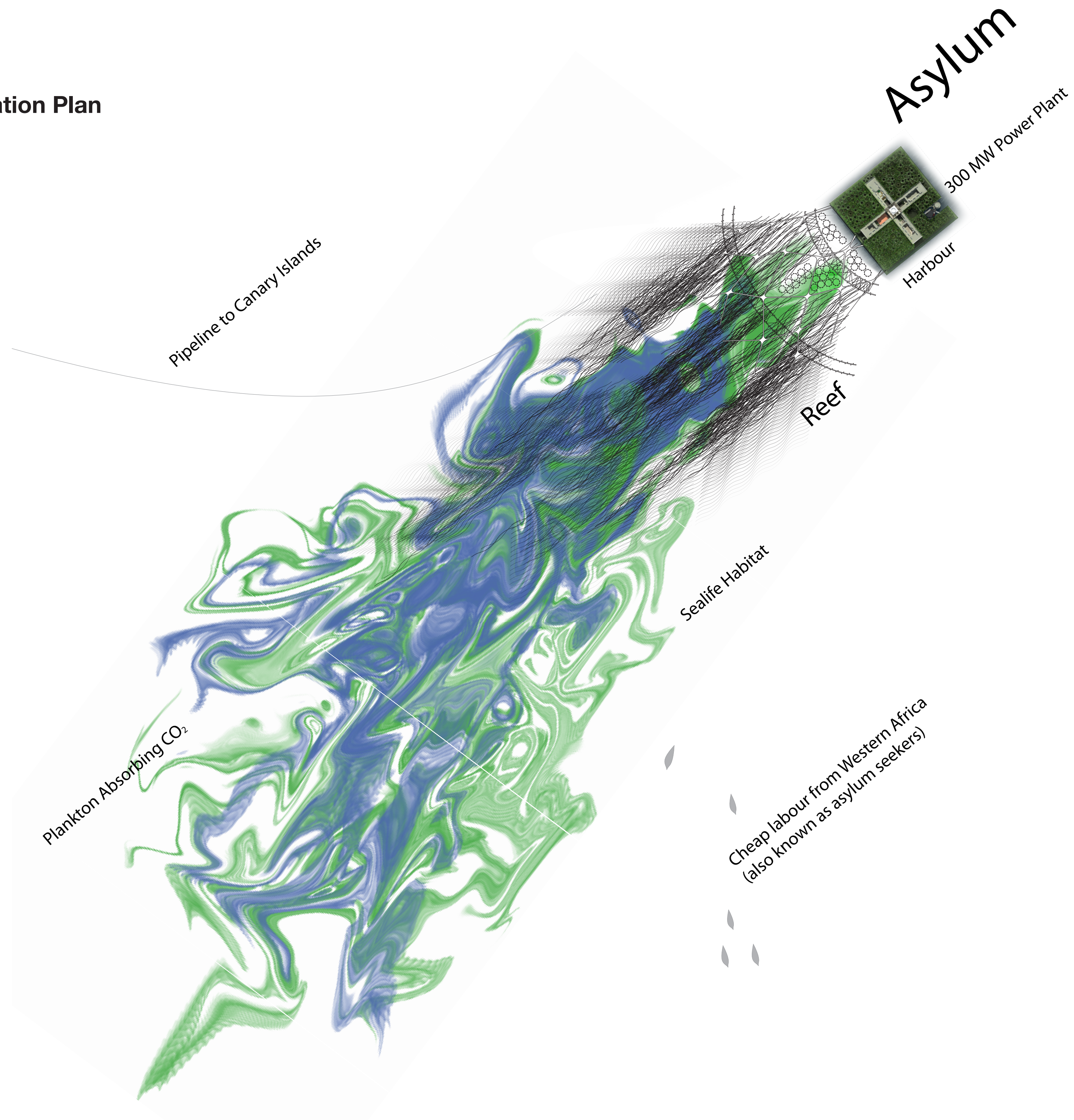
Green Envelope
The green envelope or the “tree crowns” is a networked elevated garden. The garden provides shadow and natural cooling. Further it stands for a part of the caps food production. To keep weight down the plants are not grown in soil but fixed to the support with a special fixture, water and nutrition is applied with a sprayed water-solution (aeroponics). More on this in research section.

Dwelling/Work Units
A conceptual analogy to the dwelling units would be the tree. The units are made of structural elements of bamboo (self grown) and steel. From these, tent-like living capsules are hanged. The structure also carries the hanging garden. “Warehouse” units are stacked along the harbor side of the camp.. Some of these are equipped with production facilities, others are for storage. Since the configuration of these units can be changed over time, the camp has the capability to adapt to different conditions.

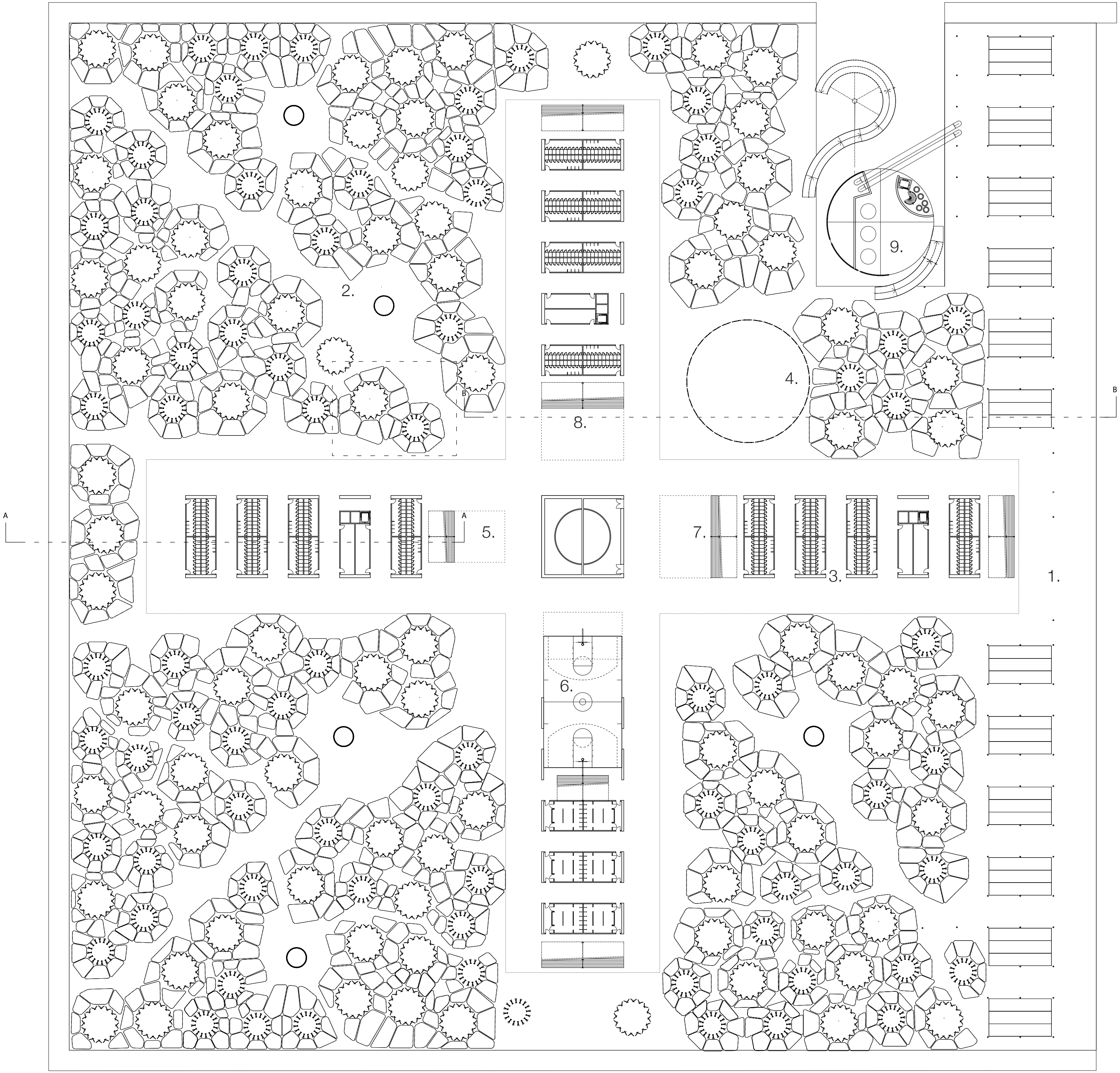
Central Structure
The cross shaped central structure gives the platform greater stability. Securing the camp from the 100 year storm. While serving a structural purpose, this part of the platform also hosts a hospital, a school, administrative spaces and farming/food processing facilities (for the hanging garden).

Platform Plate
The main structure that makes up the floating structure of the platform. Assembled of prefabricated concrete units measuring 4m x 4m on its surface. Joint together the platform measures 200m x 200m. Featuring a networked valve system for equalizing internal-tensions caused by wave progression.

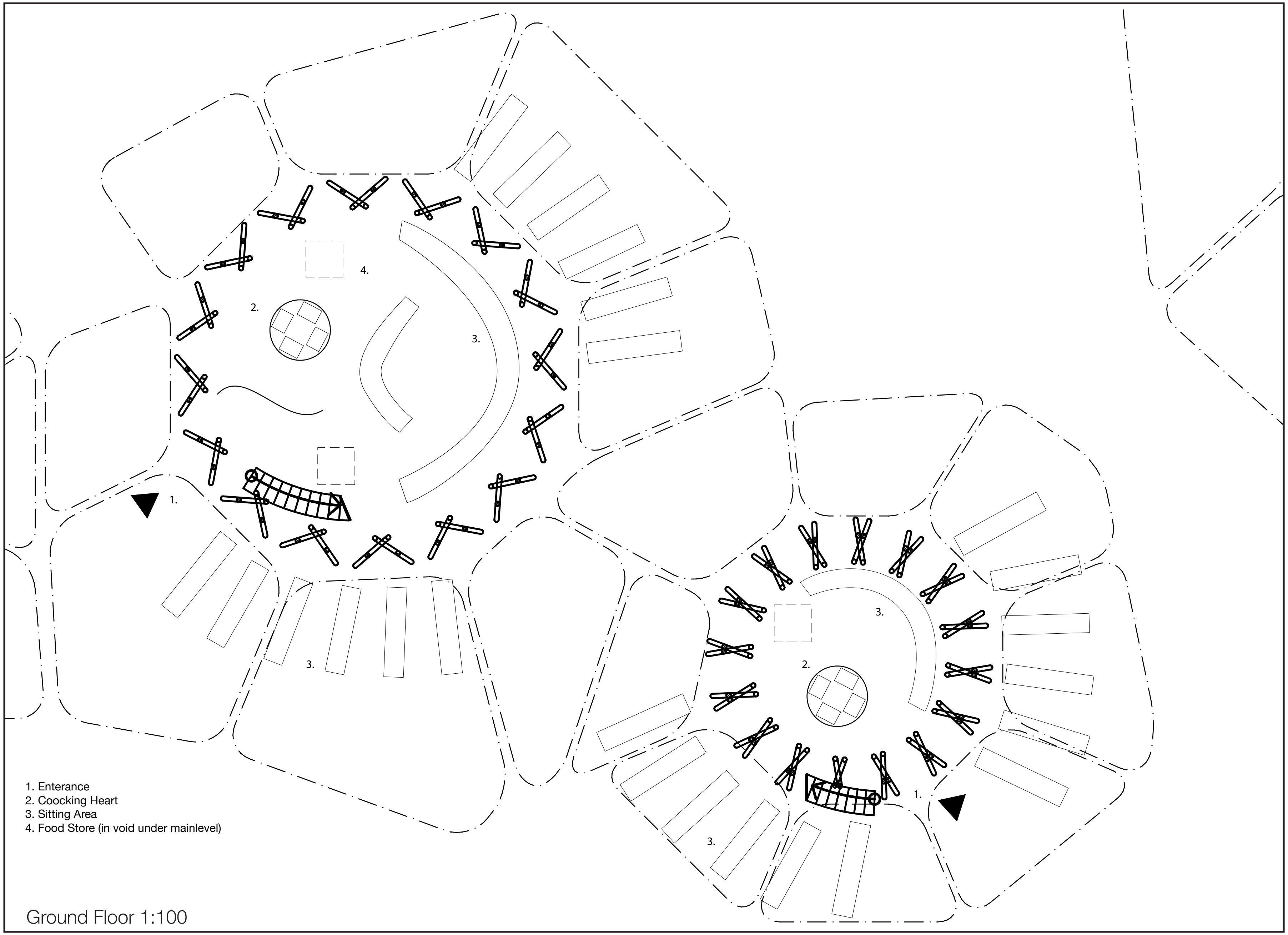
Situation Plan



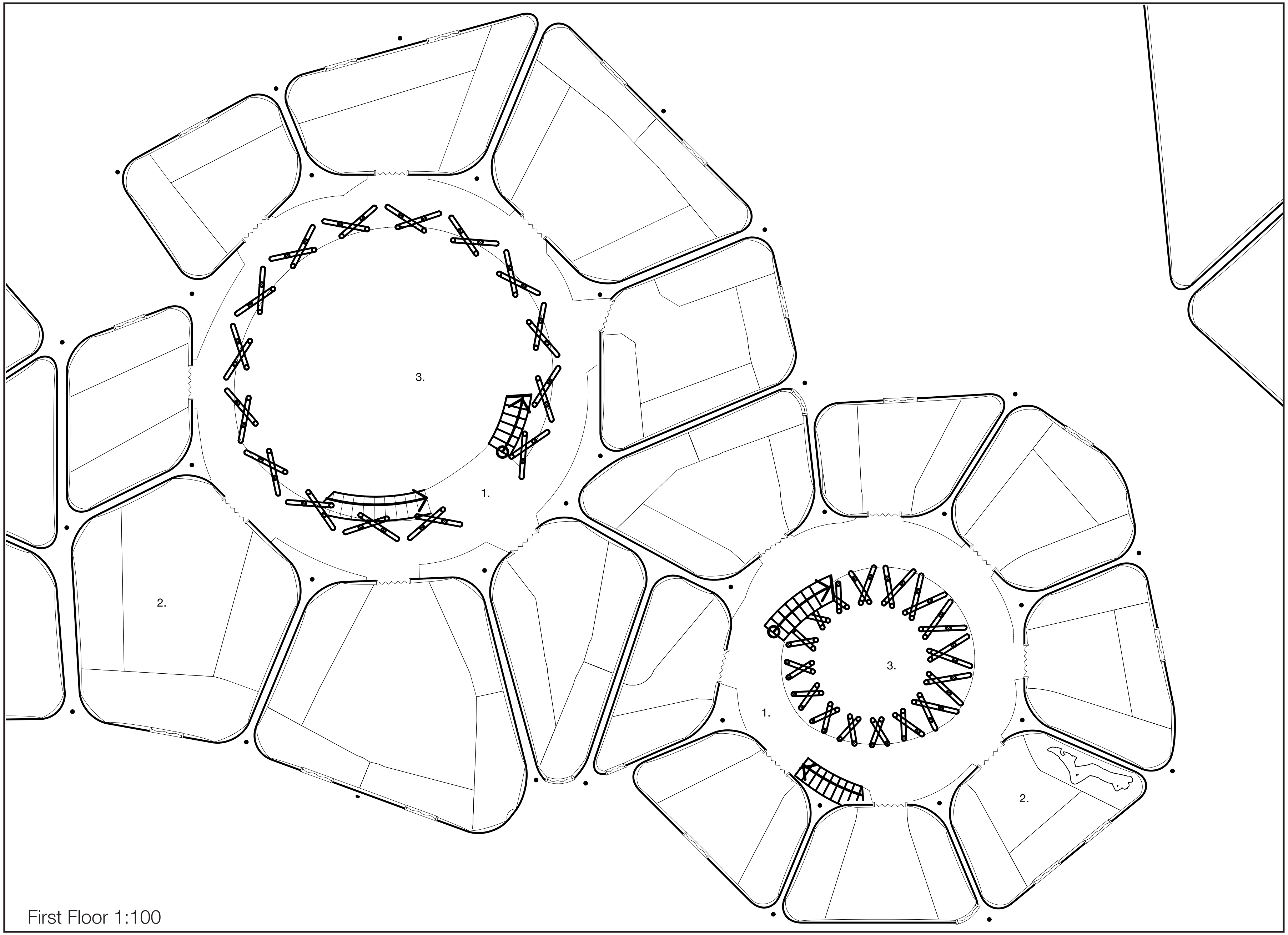
Ground Floor
Plan 1:1000



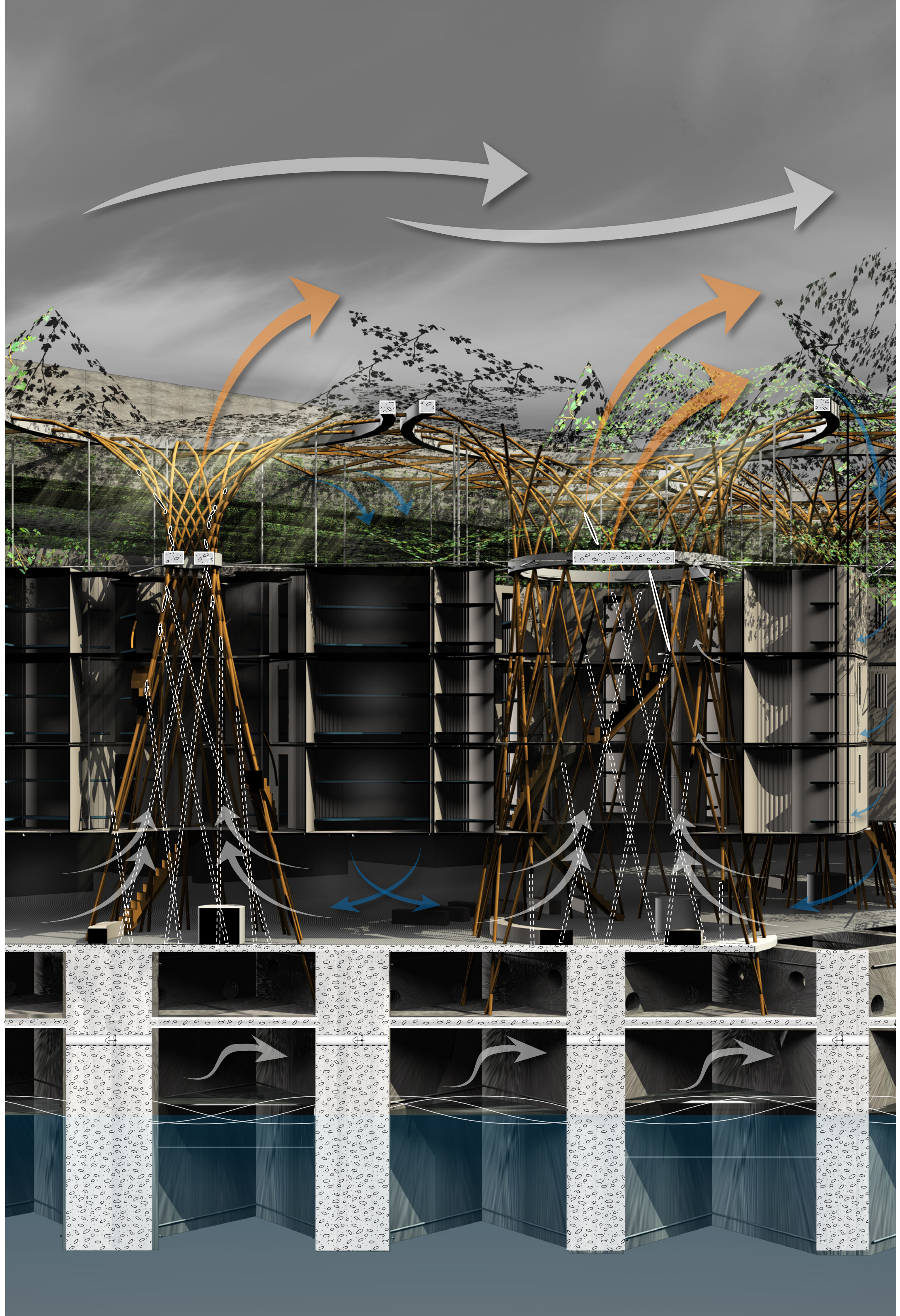
1. Harbour
2. Dwelling Units
3. Water facilities
4. Public square
5. Education centre (upstairs)
6. Production Hall/ Athletics
7. Medical Centre (upstairs)
8. Food Processing (upstairs)
9. Power Plant



Ground Floor 1:100

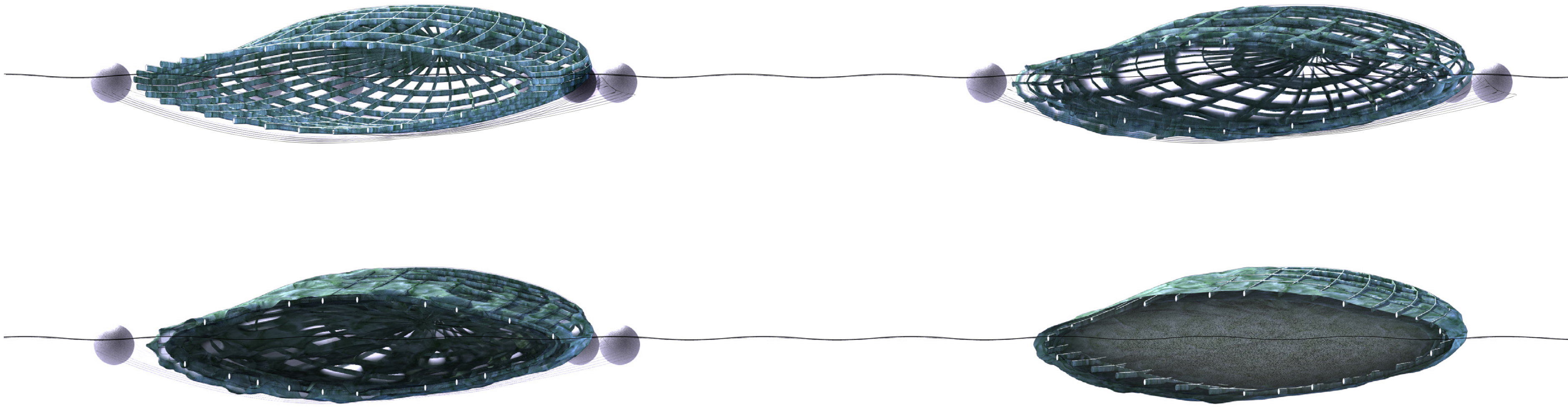


First Floor 1:100



Dwelling module. Section, showing the self ventilation principle. And the self stabilization floating system

The Reef



Stages of a reef element.

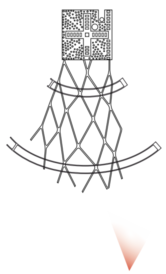
The artificial Reef will be constructed electrolytically. By applying a weak electric current in seawater mineral material will build up on the cathode – the negative pole. Chemically this material is equivalent to limestone or coral and will be an excellent host for catalysing sea-life.

Using a wired steel mesh/es as cathode/s would simultaneously act as reinforcement for the structure. Zero weight (in water) can be achieved when the element has become gas tight – then the element also serves as a gas-tank.

During the “growth process” hydrogen gas will be a chemical byproduct emerging around the cathodes. “Harvesting” this gas will be a way of reducing the energy loss for building the reef. A strategy for optimal energy economy would be to power up the system at nights when the need of energy is low. The days would then be used to collect the gas (perhaps using gas-proof covers over the structure), ad reinforcements/and voids and expand the cathodes to further grow the reef. As energy cannot be stored with less than using an energy carrier such as H_2 gas or electrochemically with a battery, this strategy – if successful, could actually be a way of storing energy that otherwise would be lost.

Designing the reef will be a successive process, as the reef grows slow. Starting the reef growth from the two southern corners would initially create two independent structures with a void in between, leaving room for the fish/seaweed farm. As the structure grows it starts to serve some of its biological purposes. Most of it's structure will be underwater. Optimal operational depths are in the range of 10 to 30 m. This is also convenient as the structure then will be less vulnerable to damages in storms. Should damage occur the structure will "heal" if electrical power is reapplied.

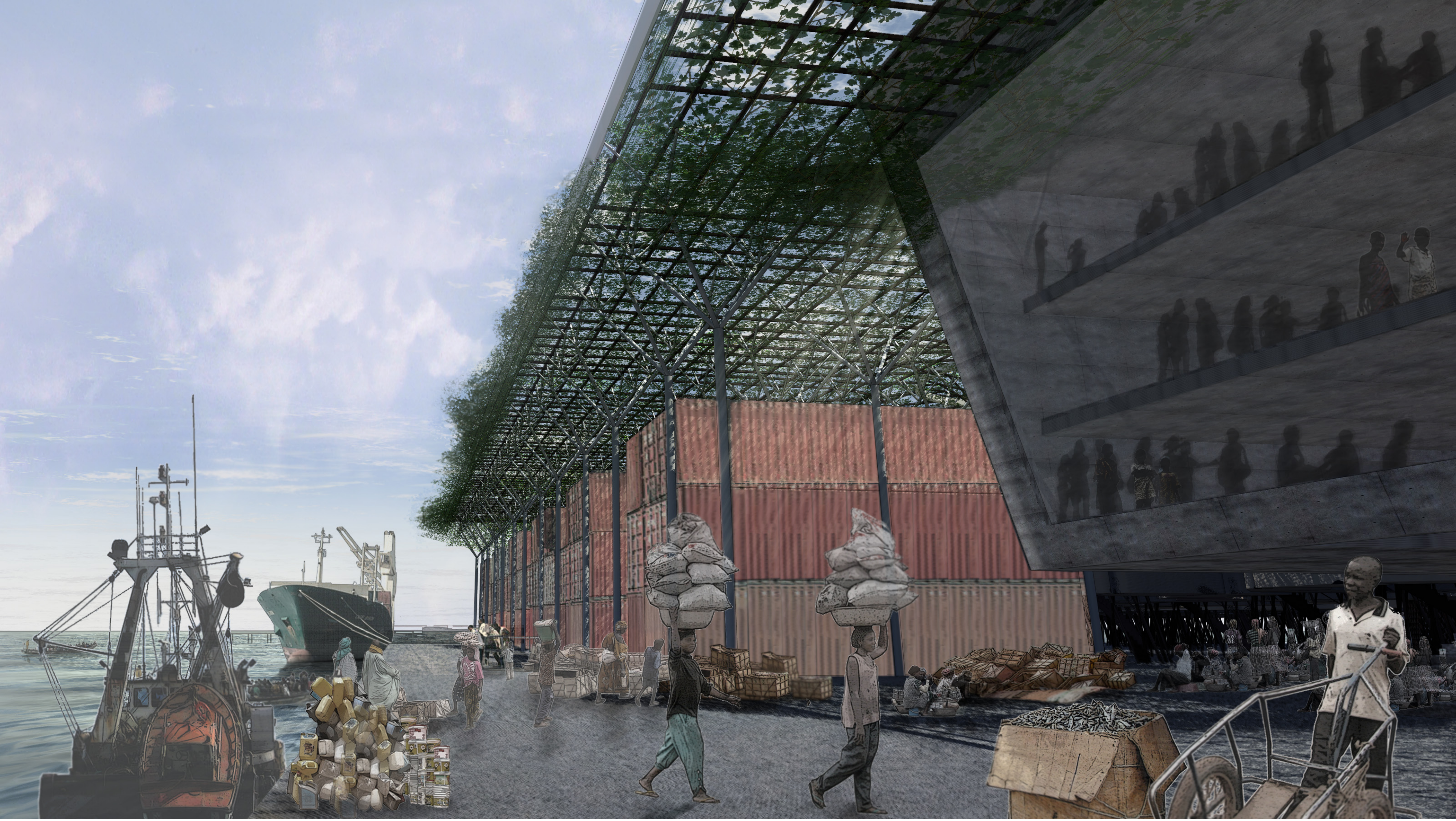
Shaping the structure to serve different purposes will be a vital part of the construction. The first priority is as already mentioned the biologic-catalytic one. Having a structure that can span thousands of meters could of course serve other means as well. A structure of this size and depth will for instance work as a wave breaker. This could be a potential for tourism, if you can guarantee waves of a certain size that surfers from all over the world would be interested in. A rich sealife will also be a paradise for scuba divers. The structure will also be a physical guide for new boatrefuges. And as several of them travel without even the simplest instrument, this structure could increase their chances of surviving.



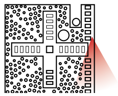
Experience Asylum

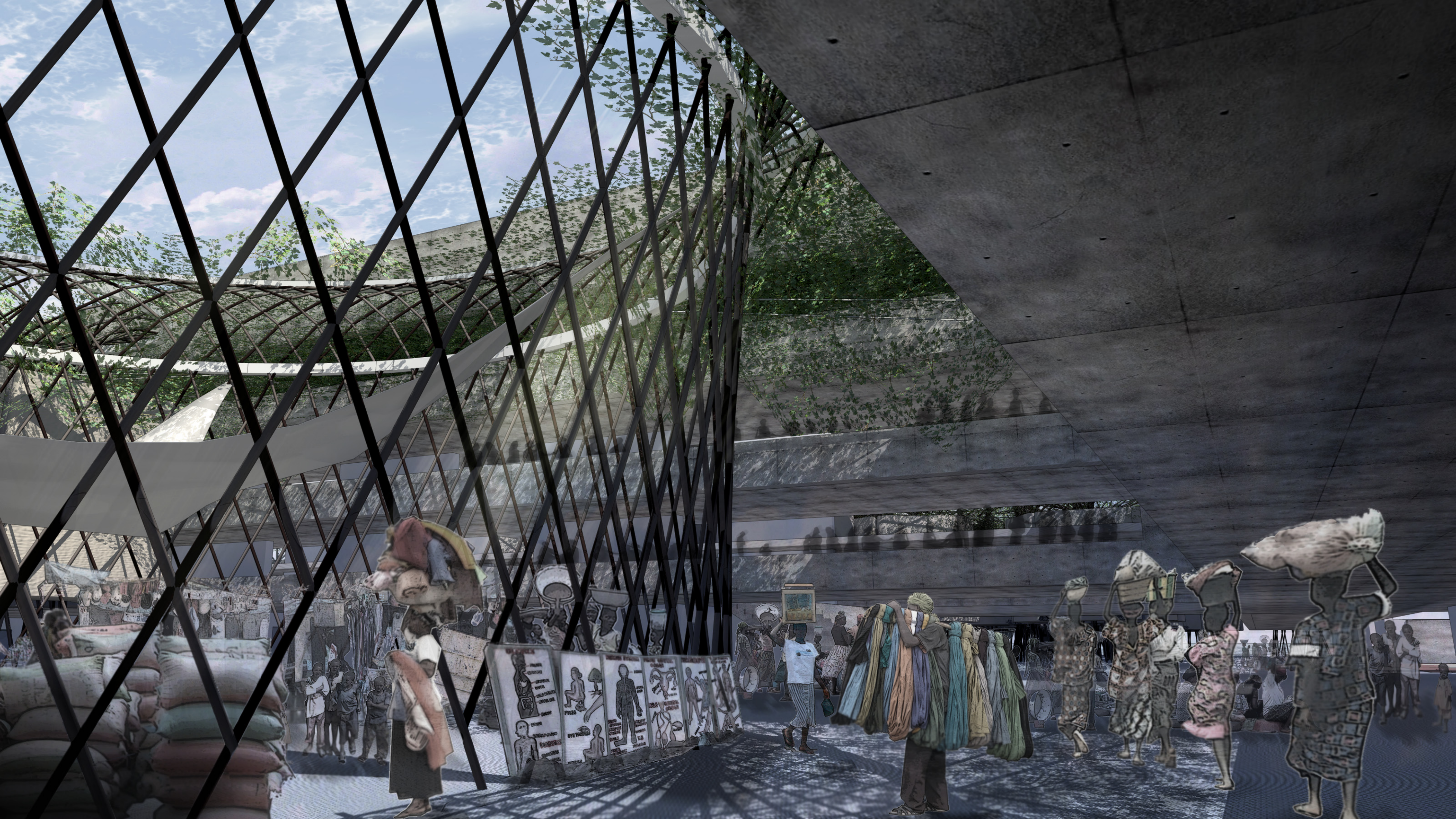
In this sequence of views from different sites of the project, we get a glimpse of what the camp life could be like at Asylum.

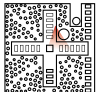
Above. Approaching from the south. This is the trajectory that most boat refuges have. And likely the first view they will see. On the right hand parts of the artificial reef is visible, it will also help guiding boats to Asylum. In the background we see the main platform, in between the thin assembly bridges.



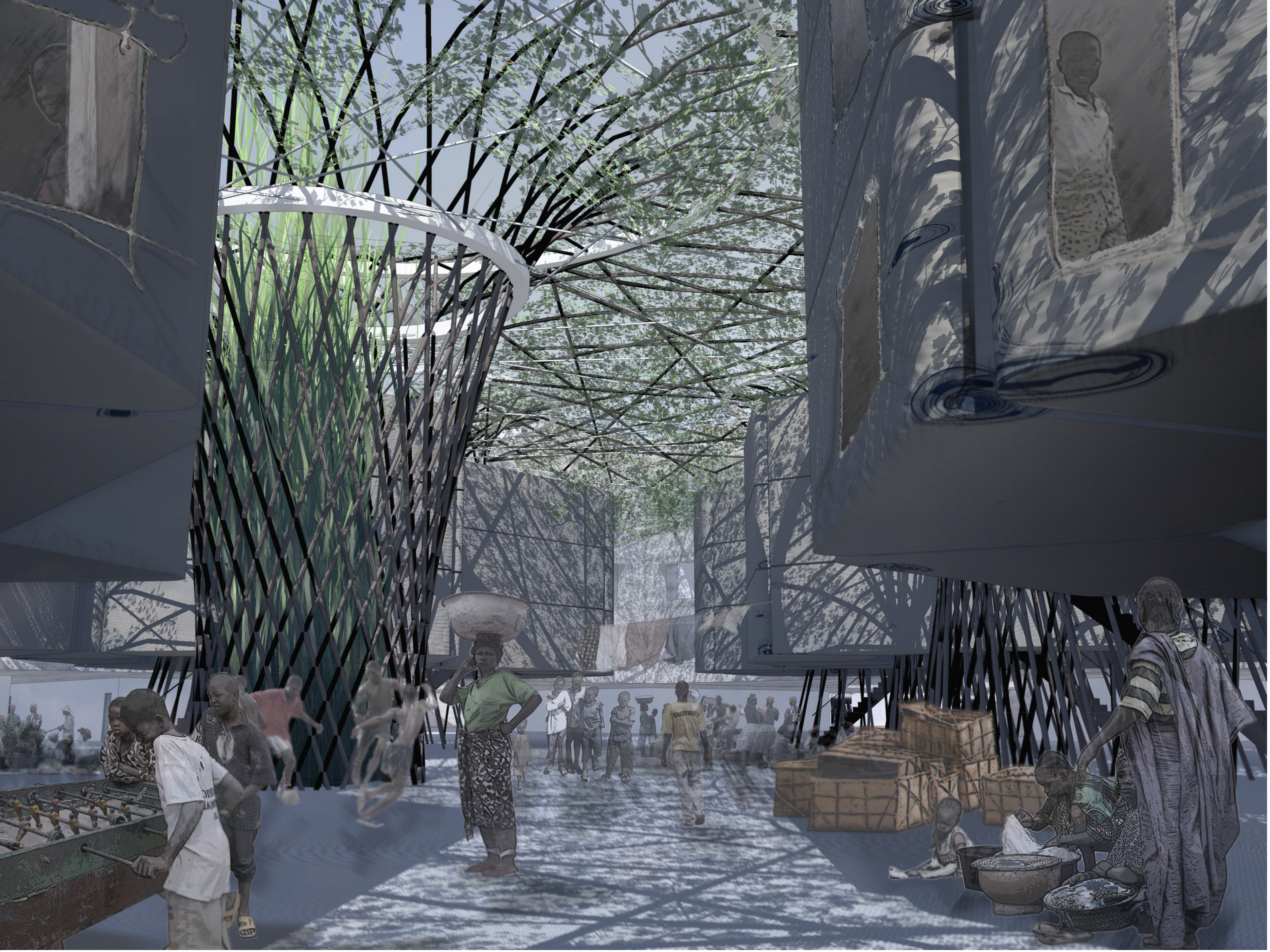
Harbour area. Refugees arrive here. Stacked containers form warehouses. Adjacent to the right we see the medical centre.



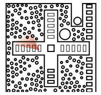




Plaza, marketplace and arrival point. Much of the activities on Asylum starts from here.

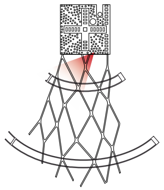


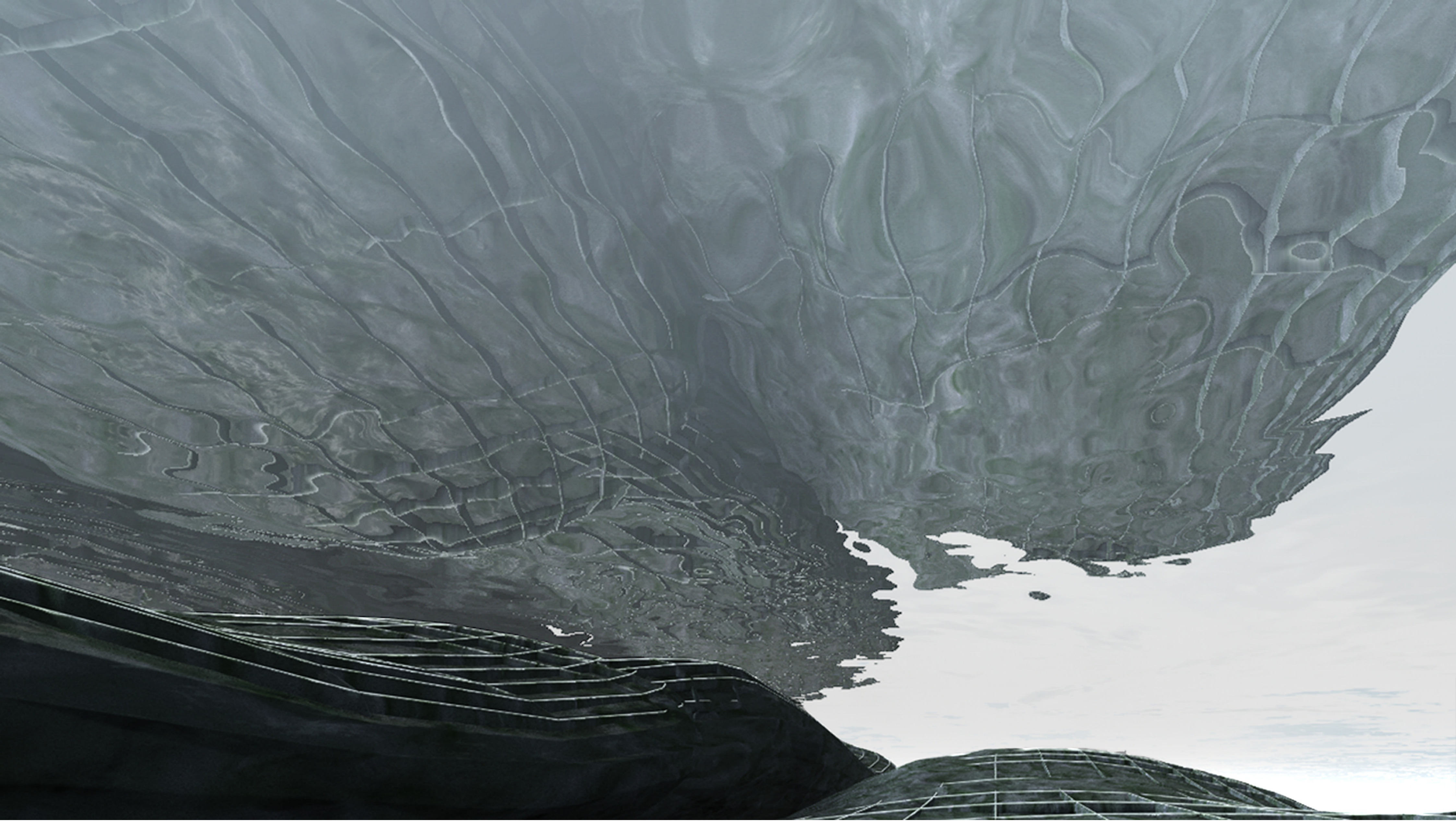
Life along one of the pathways of asylum.

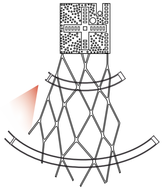


Educational facility. Following a courtyard principle. Wide stairs can double as teaching theatre.

The reef. During the nights when energy demand is low the reef is grown electrolytically using surplus energy from the power plant. White gas proof sheets harvest H_2 gas that is a by-product from this process.







The reef. The underwater world. Providing excellent play and hiding places for fish. The reef helps the re-establishment of out fished species.

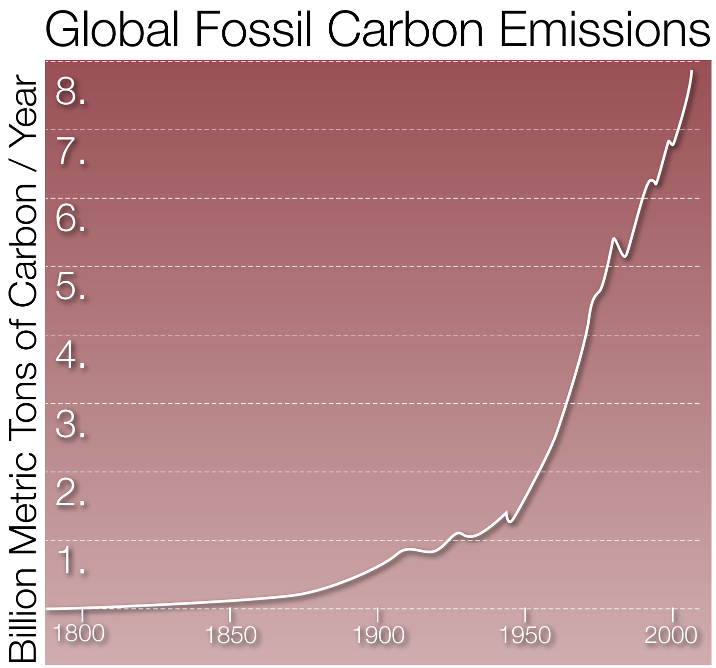
Global Warming

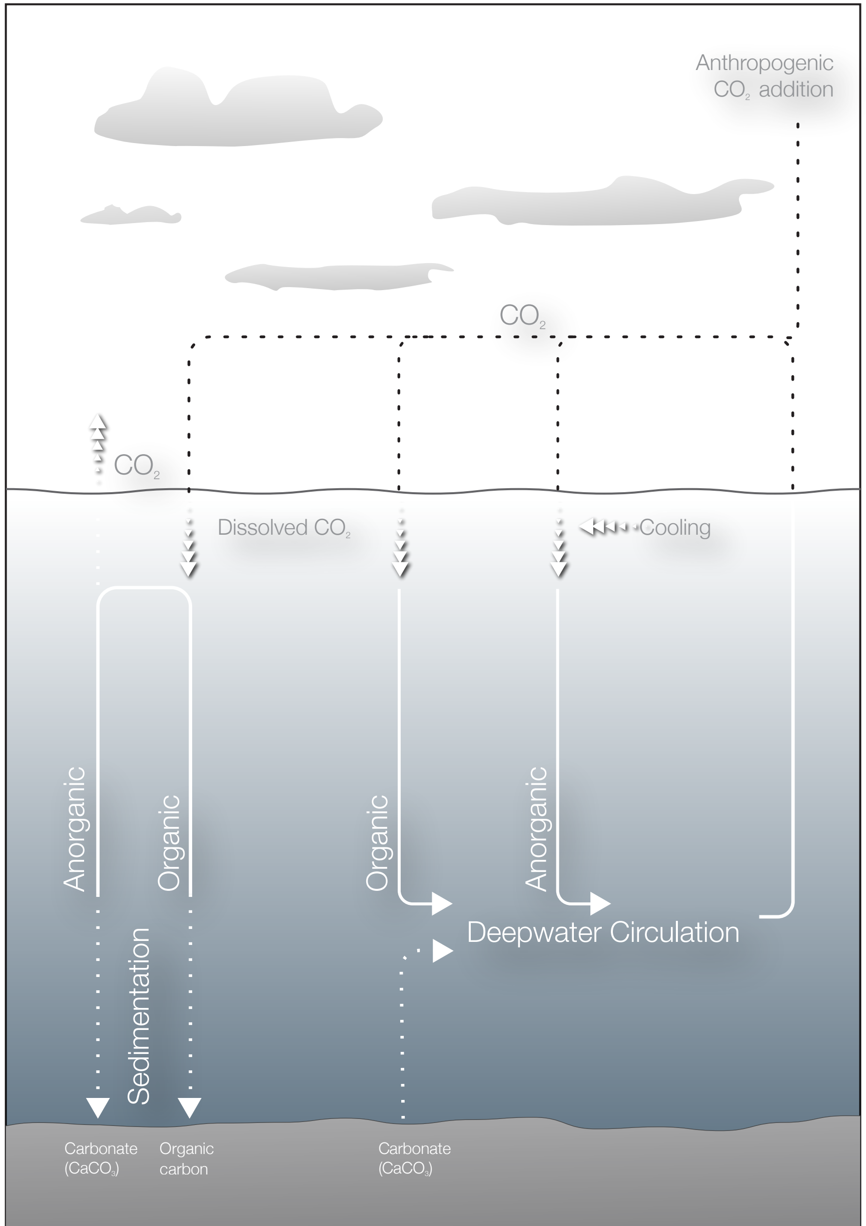
The global warming has been widely debated in recent years. In abstract it is a human induced accelerating global warming that is talked about. The main cause of this development is believed to be the emissions of CO_2 from burning of fossil fuels. Although the Climatic science still deals with great uncertainties it is now a common understanding within the scientific community that the measured changes in our climate have human causes.

Further as the climatic models show that the lead time from emissions to actual changes in climate is long – between 30 to 50 years, the outlook is uncertain. In other words we are now experiencing the climate from emissions made in the 60's and 70's. If we look at the graph of historic carbon emissions we can conclude that we still have half of all fossil carbon emissions – already made – ahead of us. What is still more alarming is that the emission curve is following an almost logarithmic pattern.

Even with this still existing uncertainty it is important to break this development now. Otherwise this could have drastic effects on our climatic system. Changes that threat our ecosystems, causing flooding and drought. And in the end the basis of our own existence.

This is shortly the background for the upcoming Climate Summit in Copenhagen in December 2009.





Biological and physical pumps of carbon dioxide

Principal scheme of Carbon Cycle in Ocean and its atmospheric gas exchange.

Function in mitigation of global warming: Oceans are believed to have absorbed about 50% of historical anthropogenic CO_2 emission. With current emission rates this capacity has decreased to only about 30% of the annual emissions Future risk: with rising ocean temperatures, the carbon pump will slow down – resulting in rapidly growing CO_2 concentrations in the atmosphere – adding yet another positive feedback to an accelerating global warming.

Global Warming and the Oceans

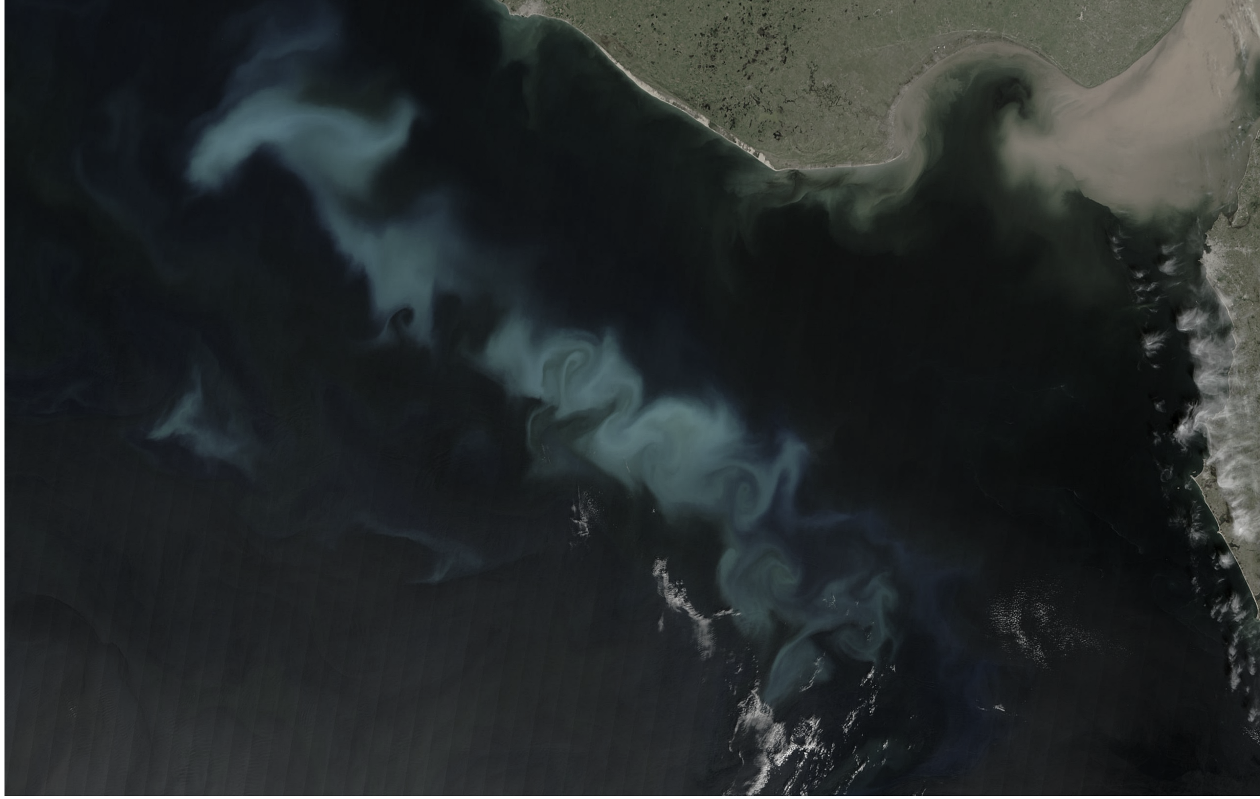
Oceans have a central role in regulating our climate. That is easy to grasp – as they cover almost 70% of the Earths surface and have an average depth of 4000 m. That gives a substantial mass. A mass that can absorb and distribute energy over seasons and between continents.

What is less known is that they also absorb enormous amounts of CO_2. Much more than any other ecosystem. In fact estimates suggest that about half of all historic anthropogenic carbon emissions has been absorbed by the oceans.

Scientist are now fearing that this capacity in the oceans has decreased in recent years. This has to do with chiefly two factors. Both relating to increasing temperatures in the oceans. For the ocean to process the carbon it first needs to be dissolved in the water. This process is most efficient in cold water. With warmer surface water, this becomes a first limitation. Secondly, the water "pump" in the oceans will slow down when the surface water gets warmer (see diagram). This means that the natural sedimentation of carbon will slow down – the same process that gave us fossil fuel in the first place.

This could result in a massive positive feedback adding to the accelerating global warming.

Methods of Mitigating Global Warming



An oceanic phytoplankton bloom

The best way of fighting global warming would be to stop the emissions of greenhouse gases – of which CO_2 is one. But as the inner dynamics of our economy seem to make substantial reductions in CO_2 emissions difficult and expensive – something that illustrates the difficulties in reaching global commitments on this matter. Therefore other methods have been considered.

In recent years, the purchase of offset from fossil carbon emissions has been populirised – for instance for flying. This is commonly done through the growing of biomass in the equivalent amount of the carbon emissions. Would this be done in a massive scale we would need to offset so much land that food production would fall dramatically. Leading to starvation for large parts of the population.

Instead scientists have explored geo-engineering approaches to the problem. In plane words this is grand scale project to either cool the planet or to catch the emissions before they are made.

Here are some examples:

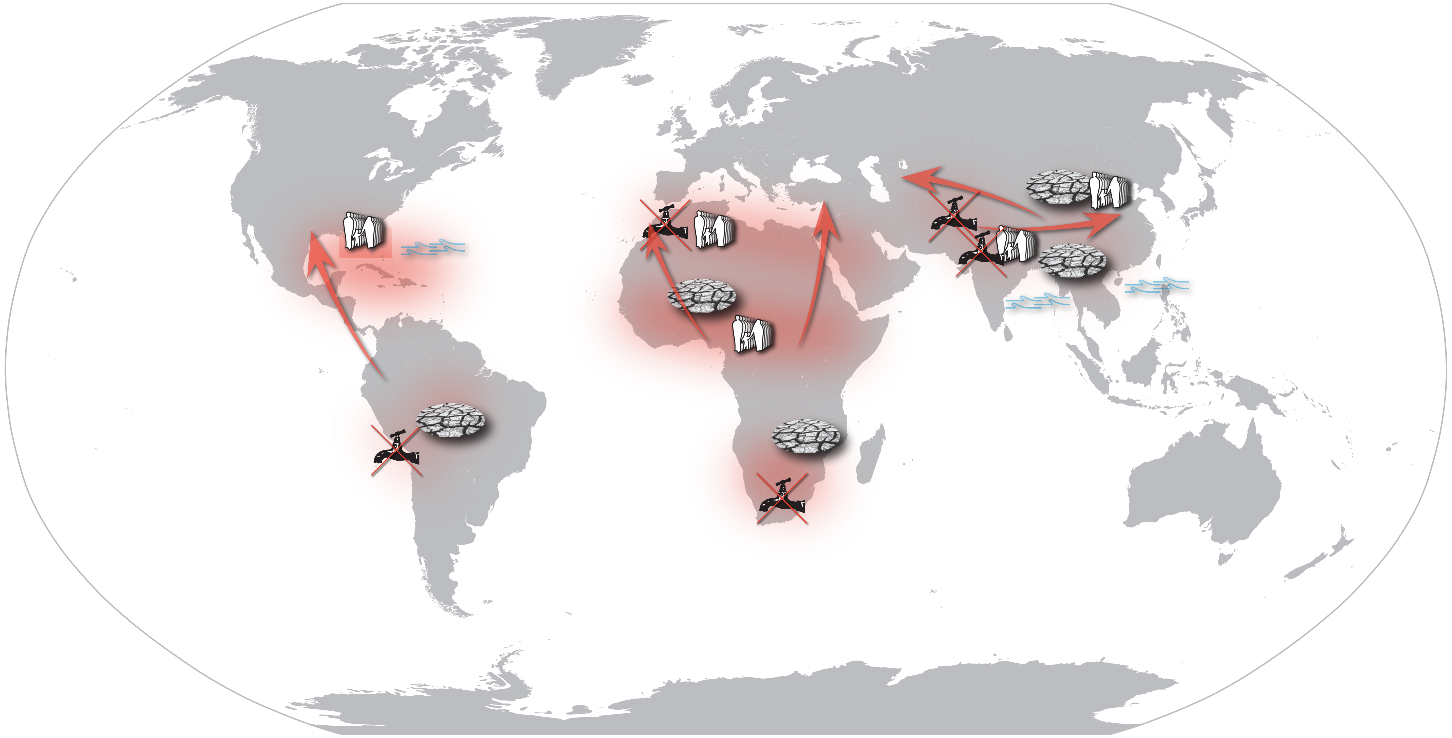
Spacial sun deflector
A science-fiction solution that deflects sun from the earth and this way reduces sun radiation to reach the planet. Except from being extremely expensive, it is extremely controversial as it is almost impossible to predict it's effects on our ecosystems. It should be considered only as a last resort.

Carbon catch and storage in ground
Is a technology that is being developed intensively. Could be used to clean coal and gas driven power plants.

Carbon catch and deep ocean storage
Same as above, but here the CO_2 is injected into the deep ocean – where the gas will be forming "floating lakes" below the water due to high pressure. The method is more cost efficient but disputed as it risks to add further to the acidification of the oceans.

Artificial Cloud Production
As low level clouds have proved to have a cooling impact on the earth, it has been suggested that producing artificial clouds covering large parts of the oceans would help cooling our planet.

Ocean Fertilisation
An often limiting factor in the oceans capacity of absorbing carbon emissions are nutrients needed for plankton growth. This method aims to boost the oceans productivity by adding fertilisation (primarily iron).



Conflict Constellation and Vulnerable Regions to Climate Change.

- Climate-induced degradation of freshwater resources
- Climate-induced increased frequency in storms and flood disasters
- Climate-induced decrease in food production
- Climate-induced migration
- Hotspot
- Main trajectories

Refugees and Global Warming

As few scientists now believe that the UN target of keeping the global warming under 2°C over the next 100 years – which is considered the safe-zone – is realistic, efforts have been made to assess the negative effects that a more accelerating climate change will cause. Here several humanitarian organisations have made estimates on how and where the effects will strike the hardest. The diagram above shows the regions that are identified as especially vulnerable. In a report from 2008 the Norwegian Refugee Council estimates that the world now has 20 million displaced people due to global warming – larger than any other refugee group. This is most likely only the beginning of what is yet to come. Christian Aid suggests that this number could be counted in hundreds of million people towards 2050. We could stand on the verge to an unprecedented refugee crisis.

The Oceans as a renewable Energy Source

Finding renewable energy sources is a necessary step, shall we ever manage to reduce the fossil CO_2 emissions. More than a hundred years ago the theoretical concept of how one could extract an almost infinite energy source from the vast oceans was developed. This concept is called OTEC – Ocean Thermal Energy Conversion.

It utilises the temperature difference in oceans. Warm surface water and cold deep ocean water. As the ocean surface then would act as an enormous sun collector, the source of energy is almost infinite.

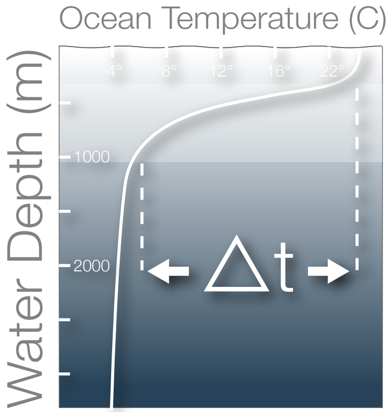
Until now this technology has not been deployed in full scale. The main reason for this is that it works most efficiently in tropical climate – few industrial nations are found in this zone. This seems to be changing now as India is investing much development in this technic.

Particularly interesting with OTEC are the byproducts that it can produce:

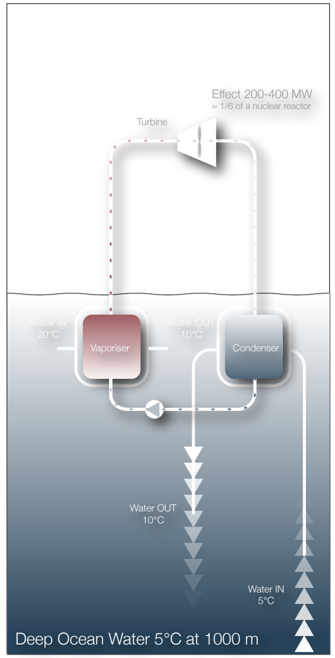
Mineral extraction, from ocean water is normally an expensive process. As OTEC provides pumped water "freely" the additional cost would then only be the extracting facility itself. As demand for Lithium is building up with the emerging battery technology, price will likely rise as well. And with 90% of the worlds known assets of lithium dissolved into the Oceans this could be an interesting resource in the future.

Desalination, one step in the OTEC process contains vaporising water, it is a simple step to tap some of this vapor and condense drinkable water from it. As shortage of drinkable water will become a growing problem following the global warming, a facility that produce such water is likely to be a key resource.

Aqua culture, using the nutritious deep ocean water OTEC can provide an excellent environment for sea-farming.



The temperature difference in the thermocline zone is the source of energy in the OTEC-plant.



Principle of Ocean Thermal Energy Conversion (OTEC).

OTEC in relation to global warming

Further than only being a renewable energy source, OTEC-plants could help mitigating the global warming by fertilizing the ocean (see page 29-30). It also acts as an artificial pump in the ocean – speeding up the natural segmentation process in the oceans helping to offset even more carbon from the atmosphere.

Aeroponics

Originally developed by Nasa for space farming, Aeroponics is the technic of growing plants i the air. Instead of through the soil the plant is provided minerals and nutrients through a sprayed water solution. This technic would fit very well combined with the pneumatic system already present by the OTEC plant. Nutrients would be extracted from the sanitation water system.

Bamboo Farming and Construction

Bamboo is the fastest growing plant in the world. It can grow up to 60cm in the leaps of one day. It is also an excellent construction material. Used in large parts of Asia and parts of Africa. It is a flexible yet strong material. Making it ideal for

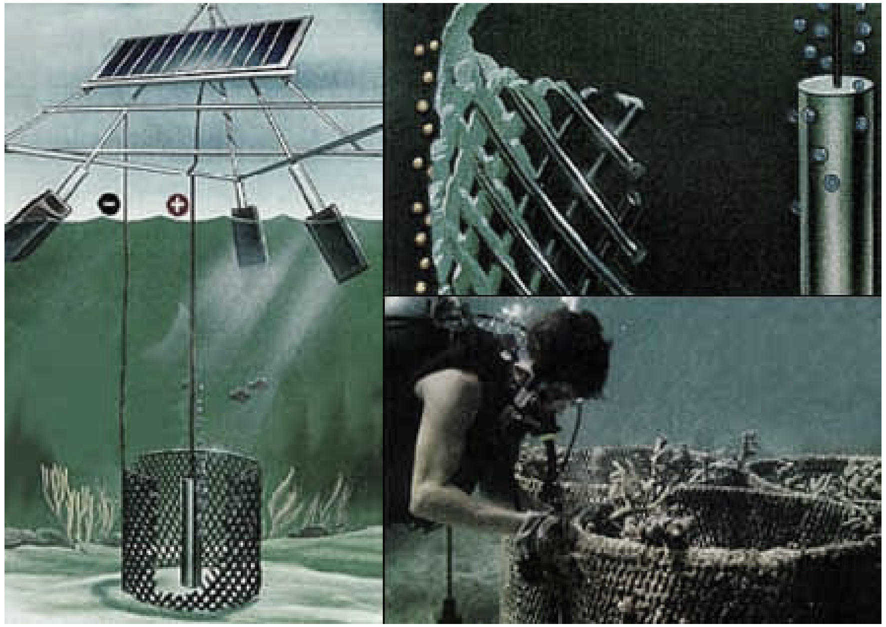
Methods of Re-establishing Sea life.

As briefly mentioned in the Final Proposal section, the site for Asylum used to be a rich fishing water – after a couple of decades with visits from the European fishing fleet – not any longer. Out-fishing is a growing problem in our oceans. It is important to take actions before the fish is entirely exterminated. When action is taken before it is too late, chances are that the fish can recover.

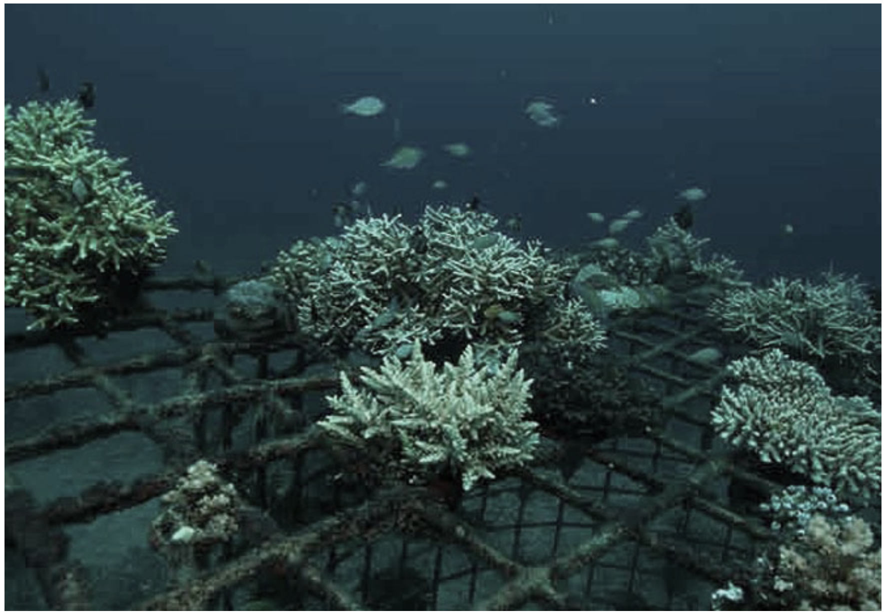
Several fish habitat restoration projects has been carried out. One successful method is by constructing artificial reefs. The reef provide shelter for smaller fish so that it can grow and not be an easy pray for larger fish. The reefs also provide some protection against trawling.

Different methods for constructing these reefs has been attempted. One is by dumping old iron junk: such as burned or crashed cars, or by dumping old tires. The best methods for reef construction are the ones that come the closest to natural mineral structures. For instance concrete blocks. Still better is extracting the material from the ocean itself – trough an electrolytic process. The chemical structure that is the result from this process is very similar to what you find in a coral reef.

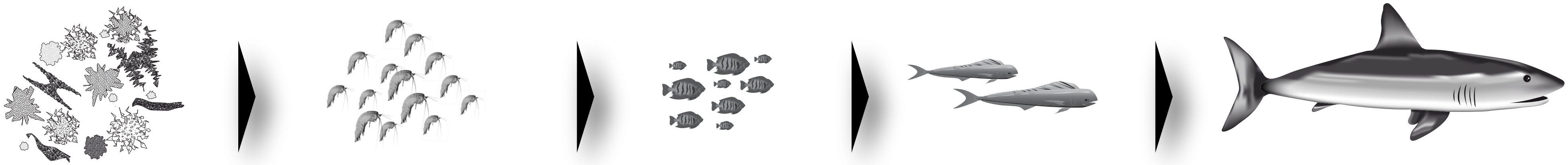
A good reef design should form voids and openings and span a certain depth. 20 to 50 meters of depth is be lived to be the most productive range for sea-life.



Small-scale electrolytic reef construction



Plankton | Zoo Plankton | Small Fish | Predator Fish | Top Predator



10 000x | 1000x | 100x | 10x | 1x

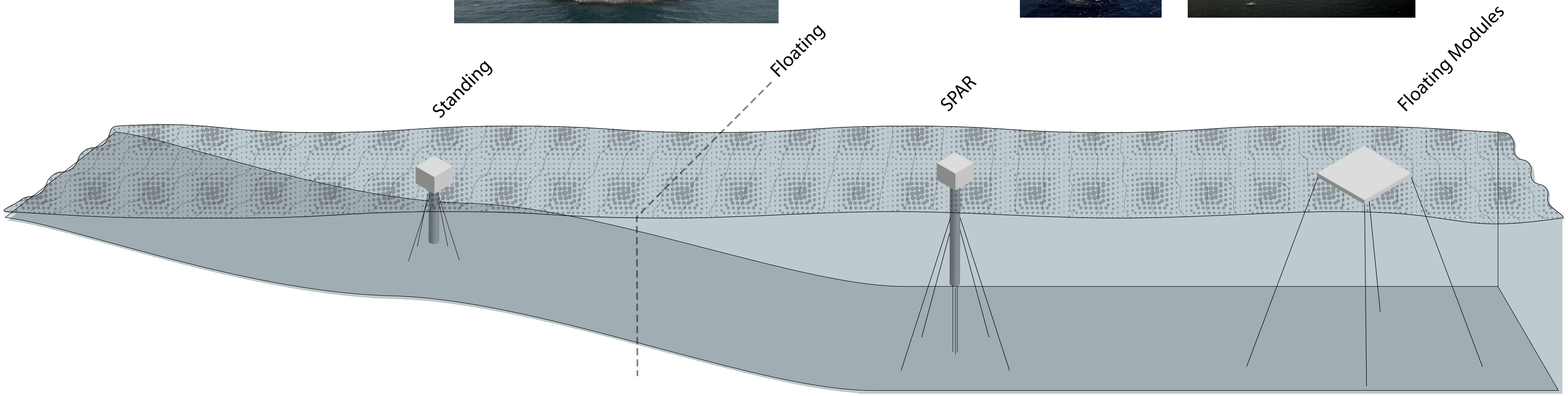
Plankton	Zoo Plankton	Small Fish	Predator Fish	Top Predator
nutrients (fertilising), O_2 (some)	Plankton, O_2	Zooplankton, O_2 , Hiding-place	Zooplankton, Fish, O_2 hiding-place	Fish, O_2

HABITAT

Giving:
– shelter and play (the Reef)
– nutrients from deep Ocean (OTEC)
– Oxygen from Surface

Returning:
- food
- Re-establishing wild fish life
- CO_2 offset (plankton sediment)

Reference Study of Offshore Platforms



General:	Standing Platforms are often the best option in shallow waters. Stability, and low maintenance are it's main assets	On higher depths floating platforms are the only option.	The SPAR platform is one of the most used in the oil-industry. It can operate on great depths and has the stability for safe operation in hard weather conditions. It floats on a vertical pontoons digging several hundred meters deep into the ocean – and then anchored to the sea floor. This provides the platform its stability.	Unlike the SPARs this type floats on the surface, pretty much like a normal ship. What gives this platform its stability, is its shear size. As it has dimensions that are much larger than any normal wave-length, the platform doesn't move up and down like a ship. However it can not take to high spot loads, so what you put on top can't be too high or heavy.
Suitable For:	any purpose		oil/gas drilling	airports/ports/cities

Design Study: Platforms

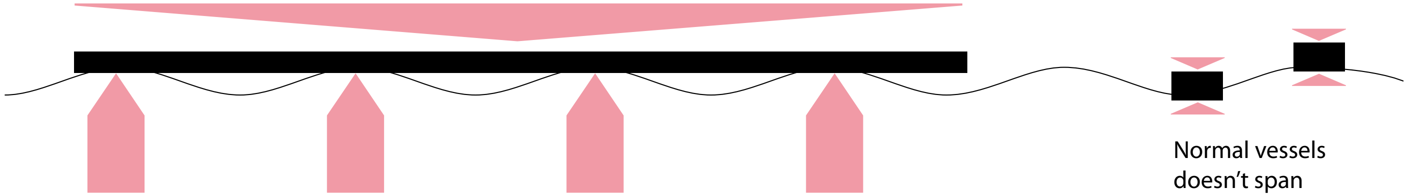
Strip	Tower	Circle	Square
- poor logistics = inflexible - low tech = less expensive - good for ship docking - limited spot loads	- poor logistics = inflexible - hi-tech = very expensive - bad for ship docking - high spot loads	- good logistics = flexible - low tech, not generic = expensive - not so good for ship docking - limited spot loads	- good logistics = flexible - low tech = less expensive - good for ship docking - limited spot loads

Lineup of floating platform shapes.

After evaluation – a square platform seemed to have the most advantages. With higher flexibility both in terms of internal communication and it's ability to dock with ships or additional platforms. Further it is a relatively simple technology, making it reliable with cheaper maintenance and easier to deploy.

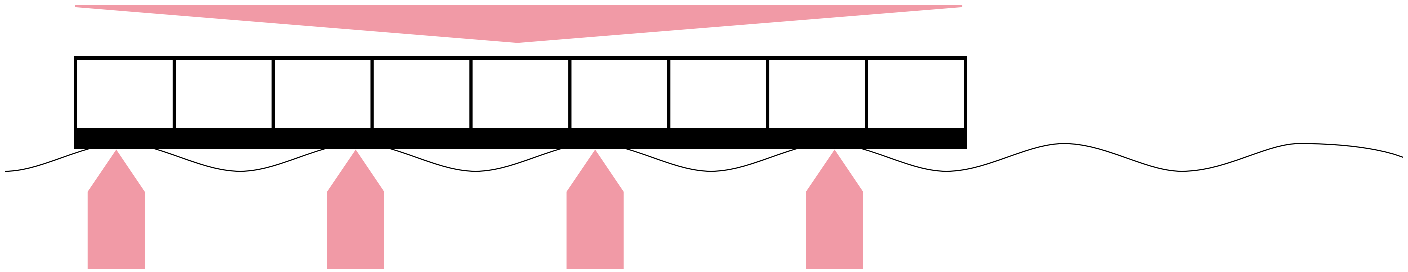
Very Large Floating Structure (VLFS)

Problem: Symmetrical Loads + Assymetric Water Pressure ➧ Internal Tensions In Platform

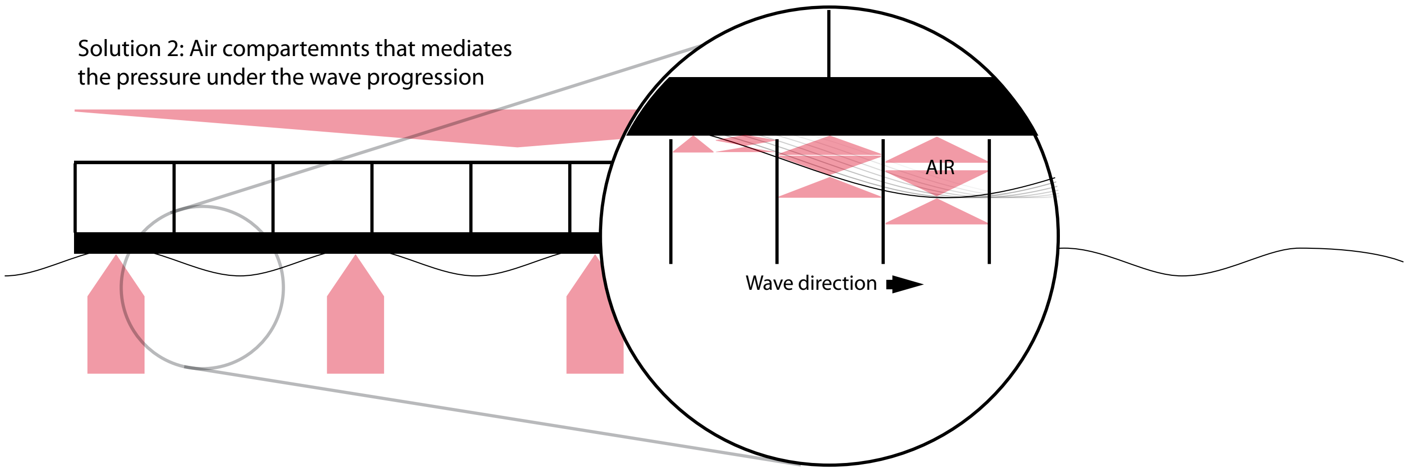


Normal vessels
doesn't span
several wave-lengths

Solution 1: Stiffer structure that can redistribute the uneven and changing lifting force caused by wave progression.



Solution 2: Air compartemnts that mediates
the pressure under the wave progression



Camps

Camps as a spacial phenomenon cover a wide range of areas. Camps usually have that in common that they are temporary constructions – weather that is a military camp, festival camp, a scout camp or a refugee camp.

Sociologically they occur in the periphery of the society, giving them extra space of breaking normal conventions. For god and bad one might say: we all know the names of Triblinka, Auschwtiz and Gulag, and the awful crimes that where committed there. Unfortunately new examples adds to the list: Guantánamo. Although hard to compare the underling logic is very similar.

For pretty much the same reason emerging youth generations have made the camp it's own arena. Giving them a freedom hardly possible under the normal society's framework – opening a paralell world where everything is possible.

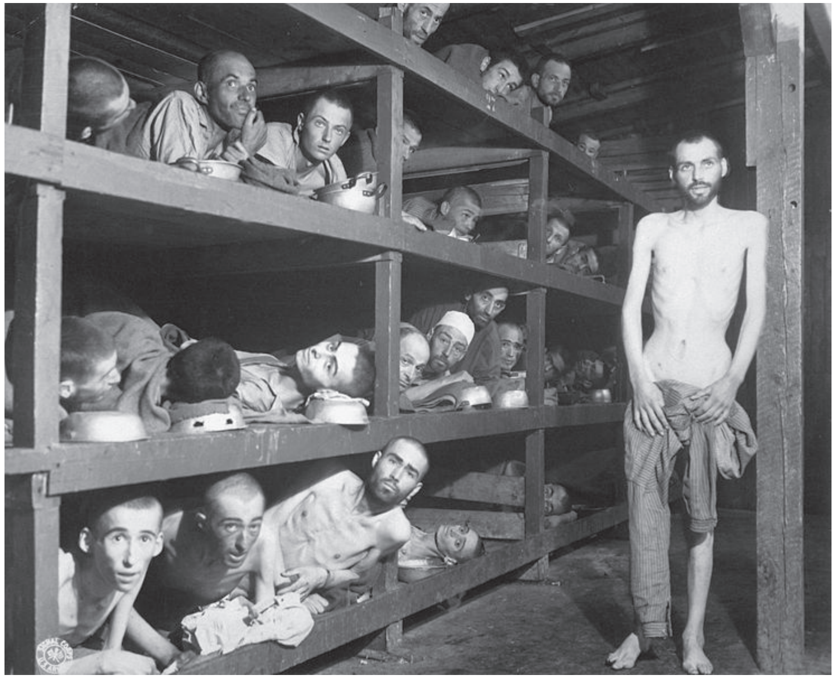
So what can we say of camps more than that they are more or less temporary? Can we at all compare them?

One thing that they all seem to share is that they provide some very essential conditions for what is needed to support life itself. They solve some logistical problems fro providing water, food, shelter and at best also some organised sanitation facility.

As for refugee camps there are international agreements regulating minimum standards etc. Still by the nature of these camps they easily get pushed out of our awareness. Making these standards worth not much more than the paper they're printed on.

For this project I have adopted UNHCRs environmental guidlines.

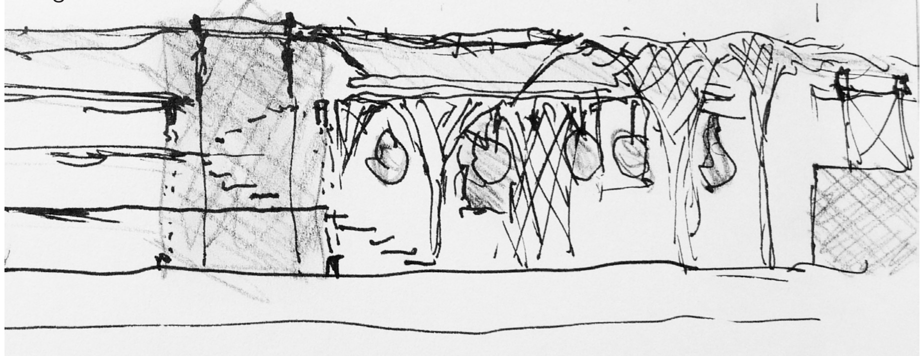
Woodstock festival and Birkenau. Two camps with a lot in common?



Design Process

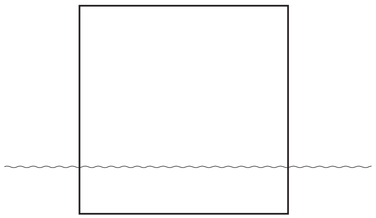
The process for this project had to navigate the sensitive terrain of a very complicated landscape. The question was if it was a commentary project, a solution oriented project or a research project. An utopia or a dystopia.

Rough sketches

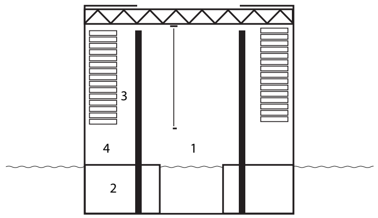


A moment when the camp was a Tower producing clouds for mitigating the global warming.

A little more dystopian vision.

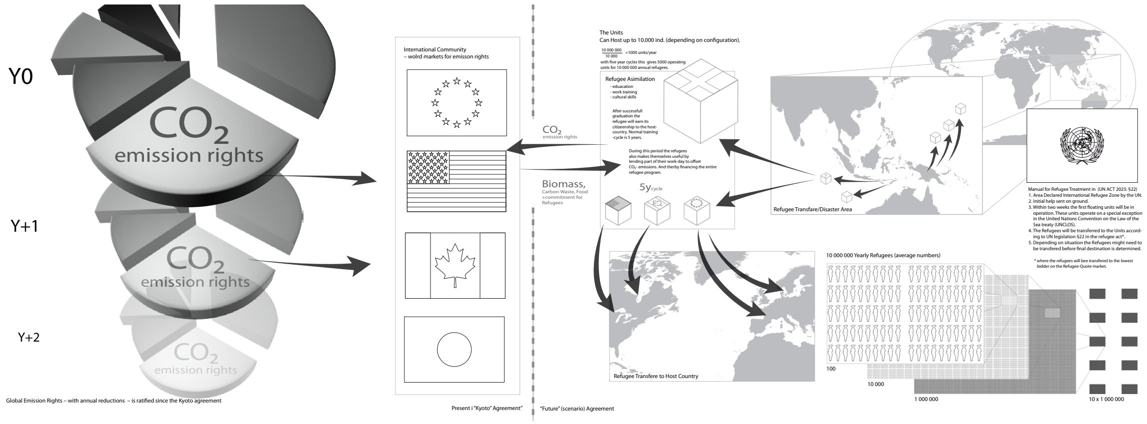


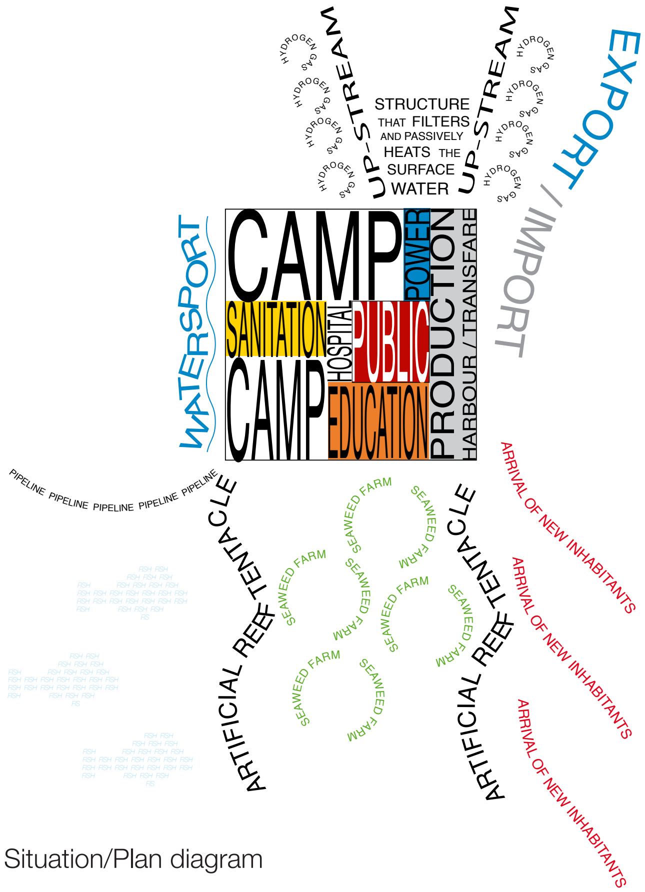
Elevation



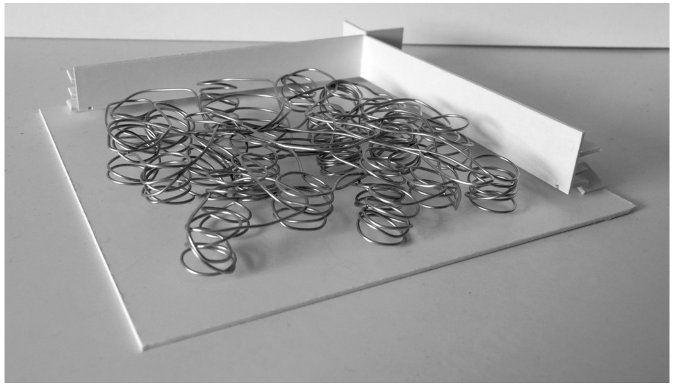
Section

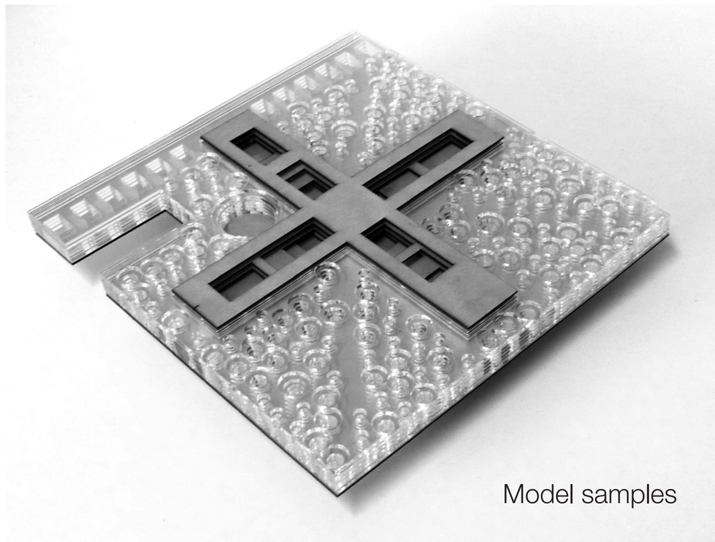
Geo-political analysis.



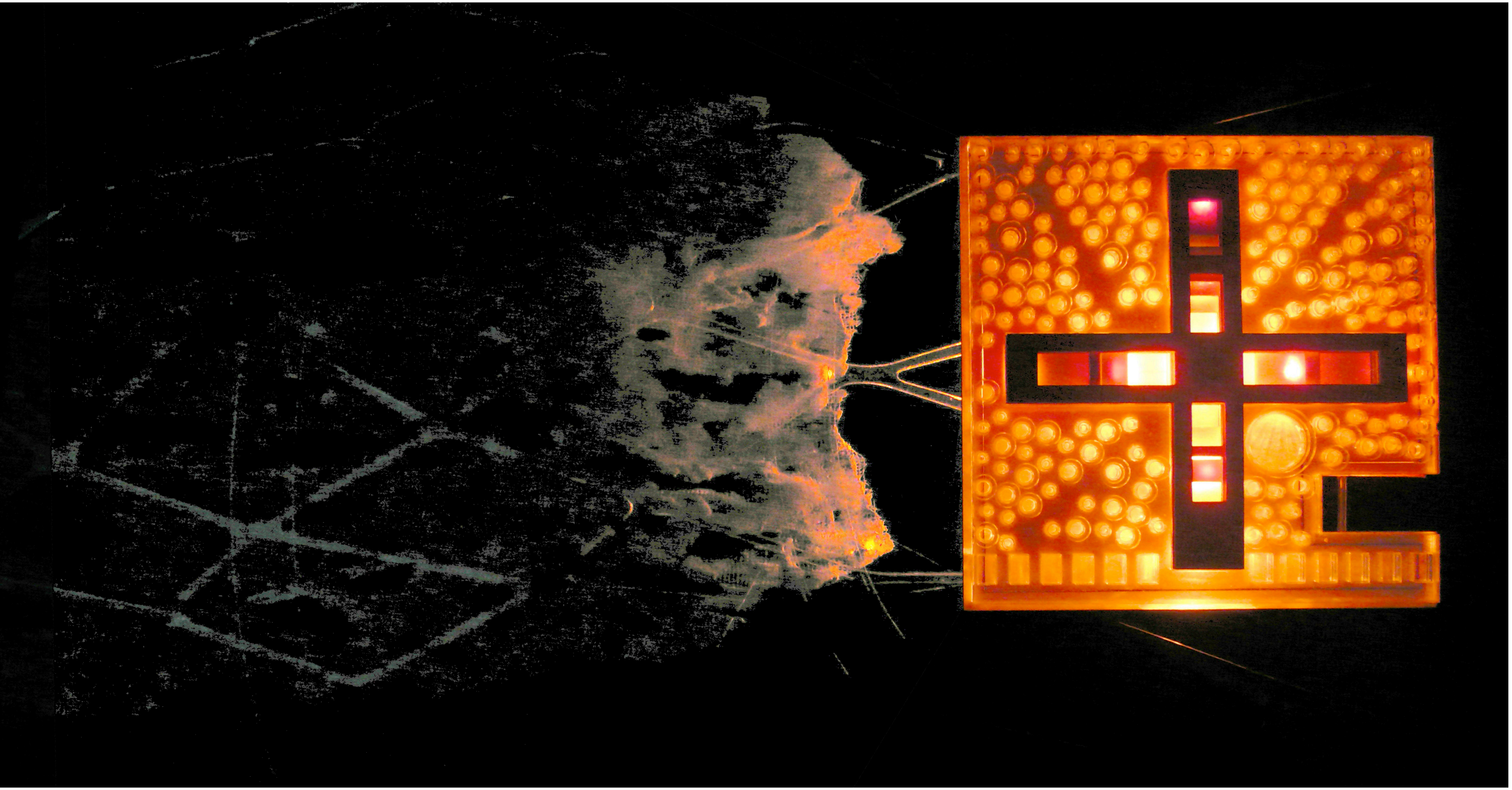


Situation/Plan diagram





Model samples



Model: “night view”

Bibliography

Camps

Camps: A Guide to 21st-Century Space, Charlie Hailey, The MIT Press, 2009 (ISBN 0262512874, 9780262512879)

UNHCR Environmental Guidlines

UNHCR Operational Protection in Camps and Settlements –
A reference guide of good practices in the protection of refugees and other persons of concern

Global Warming:

Bates, B.C., Z.W. Kundzewicz, S. Wu and J.P. Palutikof, Eds., 2008: Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, 210 pp. © 2008, Intergovernmental Panel on Climate Change, ISBN: 978-92-9169-123-4 http://www.hm-treasury.gov.uk/sternreview_index.htm

Climate crunch: A burden beyond bearing, Richard Monastersky, Nature 458, 1091-1091 (29 April 2009) doi:10.1038/4581091a News Feature

Global sea–air CO_2 flux based on climatological surface ocean pCO2, and seasonal biological and temperature effects, Taro Takahashi, , a, Stewart C. Sutherlanda, Colm Sweeneya, Alain Poissonb, Nicolas Metzlb, Bronte Tilbrookc, Nicolas Batesd, Rik Wanninkhofe, Richard A. Feelyf, Christopher Sabinef, Jon Olafssong and Yukihiro Nojirih

2009 :STATE OF THE WORLD, Into a Warming World, Worldwatch Institute

Here comes the flood, Janos Bogardi and KoKo Warner, Nature January 2009,

The Economics of Climate Change: The Stern Review, Nicholas Stern, Cambridge University Press 978-0-521-70080-1

Local Architecture

Tropical Architeture – Sustainable and Humane Building in Africa, Latin America and South-east Aisia , Wolfgan Lauber. Prestel Verlag 2005. ISBN 3-7913-3135-3
Tents – Architecture of the Nomads, Torwald Faegre. John Murray Publichers London 1979.

Ocean Biology

http://en.wikipedia.org/wiki/Biological_pump (aug 2009)

Offshore Platforms

Building Large Floating Structures, Ben C. Gerwick, Jr, CRC Press, Taylor & Francis Group, LLC, New York 2007. ISBN-13: 978-0-8493-3052-0

HYDROELASTIC ANALYSIS OF VERY LARGE FLOATING STRUCTURES, Alexey Andrianov

http://en.wikipedia.org/wiki/Offshore_concrete_structure (aug 2009)

http://en.wikipedia.org/wiki/Very_large_floating_structure (aug 2009)

http://www.floatinc.com (aug 2009)

Energy and Water Production

An Energy Alternative. (Book Reviews: Renewable Energy from the Ocean. A Guide to OTEC.) , Avery, William H.; Wu, Chih, Review Author:
Abelson, Philip H. Publication: Science, Volume 265, Issue 5170, pp. 419-420 Publication Date: 07/1994.

http://en.wikipedia.org/wiki/Ocean_thermal_energy_conversion (aug 2009)

Reef

Coral reef restoration handbook, William F. Precht, Taylor & Francis Group 2006 (ISBN-13: 978-0-8493-2073-6)

http://www.cdnn.info/news/eco/e090620.html (aug 2009)

http://www.globalcoral.org/third_generation_artificial_reef.htm (aug 2009)

Refugess

Human Tide: the real migration crisis, a Cristian Aid Report, 2007

Norwegian Refugee Council Annual Report 2008.
http://www.dw-world.de/dw/article/0,2144,1941393,00.html

http://www.noborder.org/
Race, culture, and mental disorder, Philip Rack