BORDER CONDITIONS
ALONG THE NEW SILK ROAD
GRADUATION STUDIO

2020 – 2021

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GWADAR, PAKISTAN

BORDERS
&TERRITORIES

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DEFINITIONS

DEFINITIONS

We would like to highlight a few aspects that have set-up the basis framework of the analysis for Gwadar. We tried to approach the place the way it is and, objectively, sieve through the different information and form our own position as a group and individually.

BORDERS & TERRITORIES

We would start by defining the themes of 'borders' and 'territories' in relation to our case-study and us a group:

_Borders act to distinguish one element from another . The manner in which they operate can be: permanent, temporal, spatial, qualitative or quantative.

_Territory acts to categorize elements of the same character.

WHY DID WE DEFINE THEM LIKE THIS?

Our motivation to define borders & territories like this lays in the way Gwadar developed as a settlement, developing relations far beyond the town area and that of Pakistan, shaping the territory on the basis element of trading, producing borders distincting the sub-layers of trading.

HOW DID WE DEFINE THE SCALES?

The complexity of relations that defined Gwadar in terms of borders & territories needed to be represented on two different scales to grasp their extent.
Understanding the location and the elements within it, we took a larger view on the region and entaglement of socio-political and economic clashes that form the territories of Gwadar.
These clashes, however, have a direct impact on the city-scale and the borders produced to distinct one element from another in Gwadar.

WHAT ARE THE ADDRESSED AREAS OF INTEREST?

Starting the analysis, each of us have chosen an area of interest to research and bring together on the mega maps focusing on
- global political developments and their effects on Gwadar, human culture and practices, topographical and ecological features of the place.
In the process, each of these themes is further elaborated and took a form in our personal position for the individual work.

WHAT SOURCES OF INFORMATION WE USED?

This year's graduation studio is organized differently and even the choice of location reflects our inability to visit the place. Gwadar is a highly militarized town that is restricted zone for the 'outsiders'. Naturally, our sources were limited and had to be cross-checked to come as close as we can to the truest version of Gwadar.
The tools we used were:
1.) Google Maps, Google Earth, Zoom Earth
- seeing Gwadar only from a top view and no possibility to virtually walk the streets of the town.
2.) First-hand information from out tutor
- Nishat Awan who visited the town on multiple occasions and have researched it for years. We have also used her documentation in photos and maps of Gwadar.
3.) Another source was YouTube and various vloggers who documented and showed different aspects of the lifestyle and atmosphere of the place.
4.) Our last resource was articles and papers written for Gwadar, the region and the new developments of the area.

INTRODUCTION

THE NEW SILK ROADS

The Belt and Road Initiative (BRI) is the largest infrastructure development at present. It constitutes of a network of inland routes along the historic Silk Roads and a seasborne component of the Maritime Silk Roads connecting South Asia to the Arabian Sea and beyond. It also generates a series of large-scale urban projects altering the logics of relation to resources, cultures and geographies. As such producing intriguing array of spatial transformations in the areas between the current developments in the border-territories. Therefore, special attention is given to these landscapes, lives and cultures and the potential impacts - economic, political, social, environmental - of such projects. The graduation studio of B&T centers on the investigation of the emerging spatial complexities that are re-formatting the contemporary territorial and urban landscapes, with an emphasis on the socio-political context(s) of architecture and its contemporary discourse.

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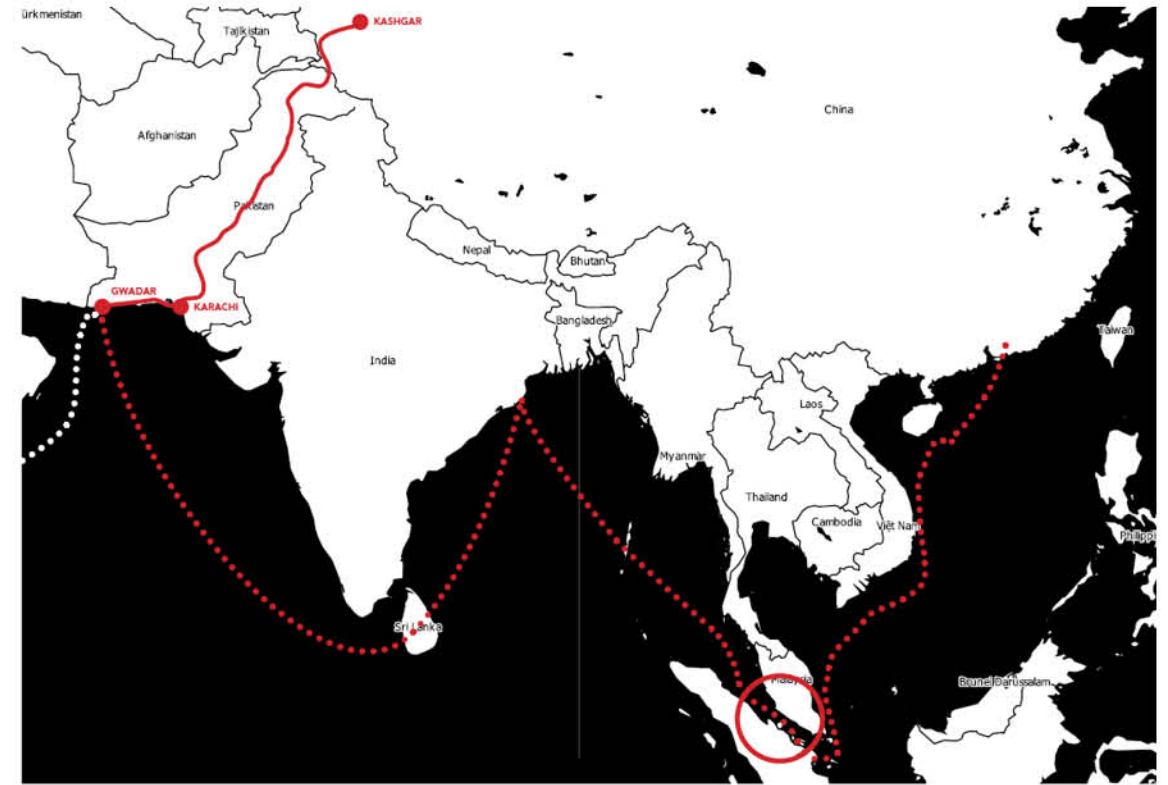
WHY GWADAR

The port city of Gwadar in Pakistan is the terminus point of the China-Pakistan Economic Corridor (CPEC), which is an important North-South link within the wider Belt and Road Initiative. Preceding Chinese interest in the region, it has long been an important free port in the Arabian Sea connecting South Asia, the Gulf and Northern Africa across the Indian Ocean. It is a place where geostrategic interests are producing extractive landscapes that intersect with indigenous lives and knowledge practices as well as a network of informal relations across nation-state and territorial borders. We have investigated these entanglements of speculative development, flows across the Pakistan-Iran border, seasonal and climatic changes as the formation of post-anthropocenic territories.

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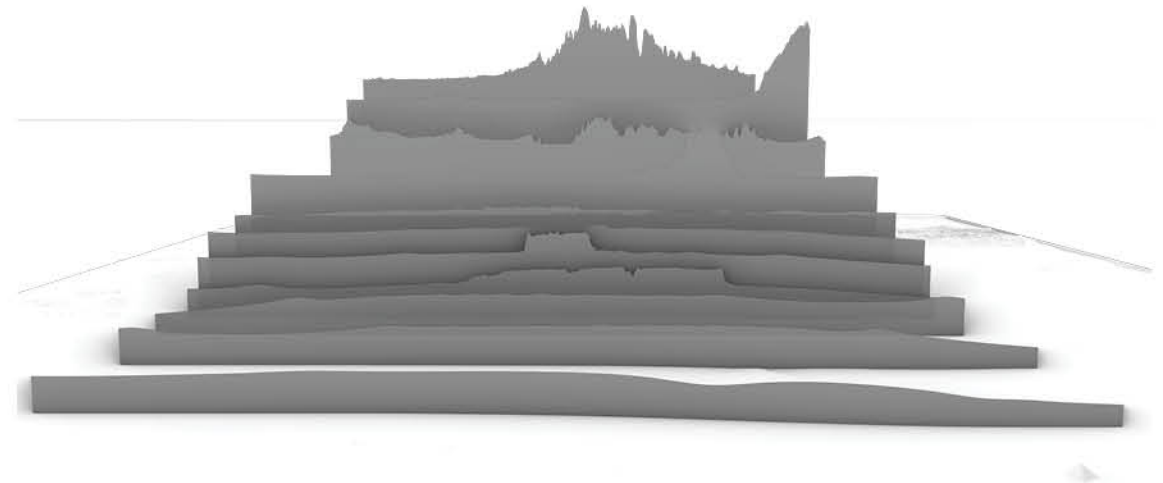1. Awan, Nishat, and Zahra Hussain. "Conflicting Material Imaginaries." e-flux, January 30, 2020. See e-flux.com.
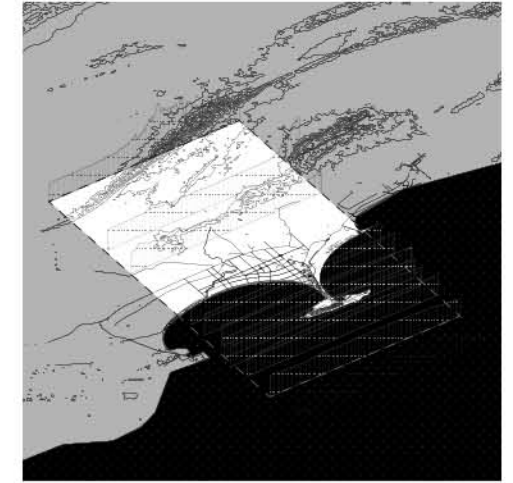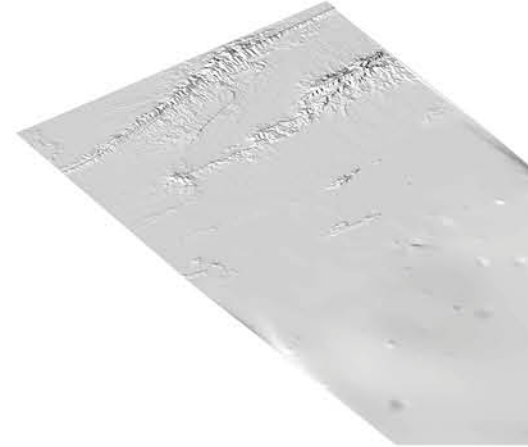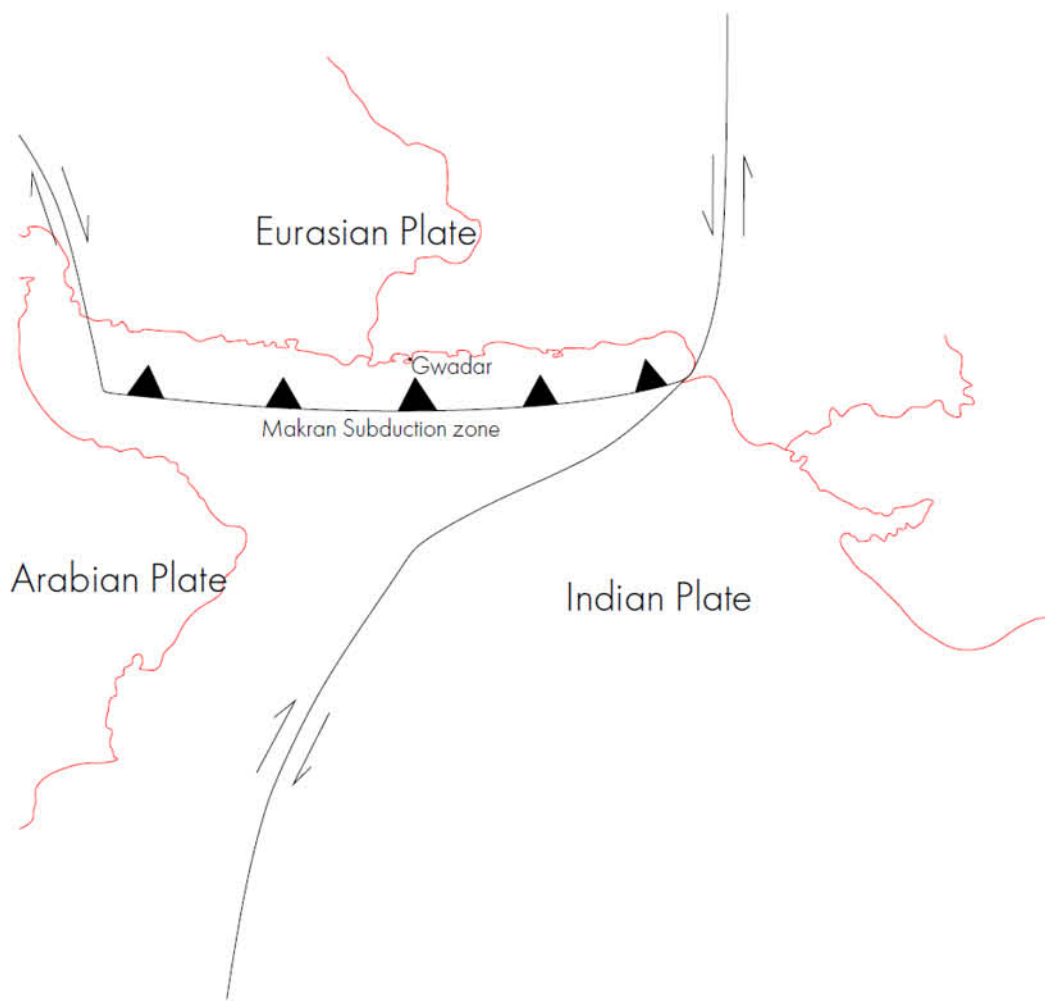
Image: ©Nishat Awan
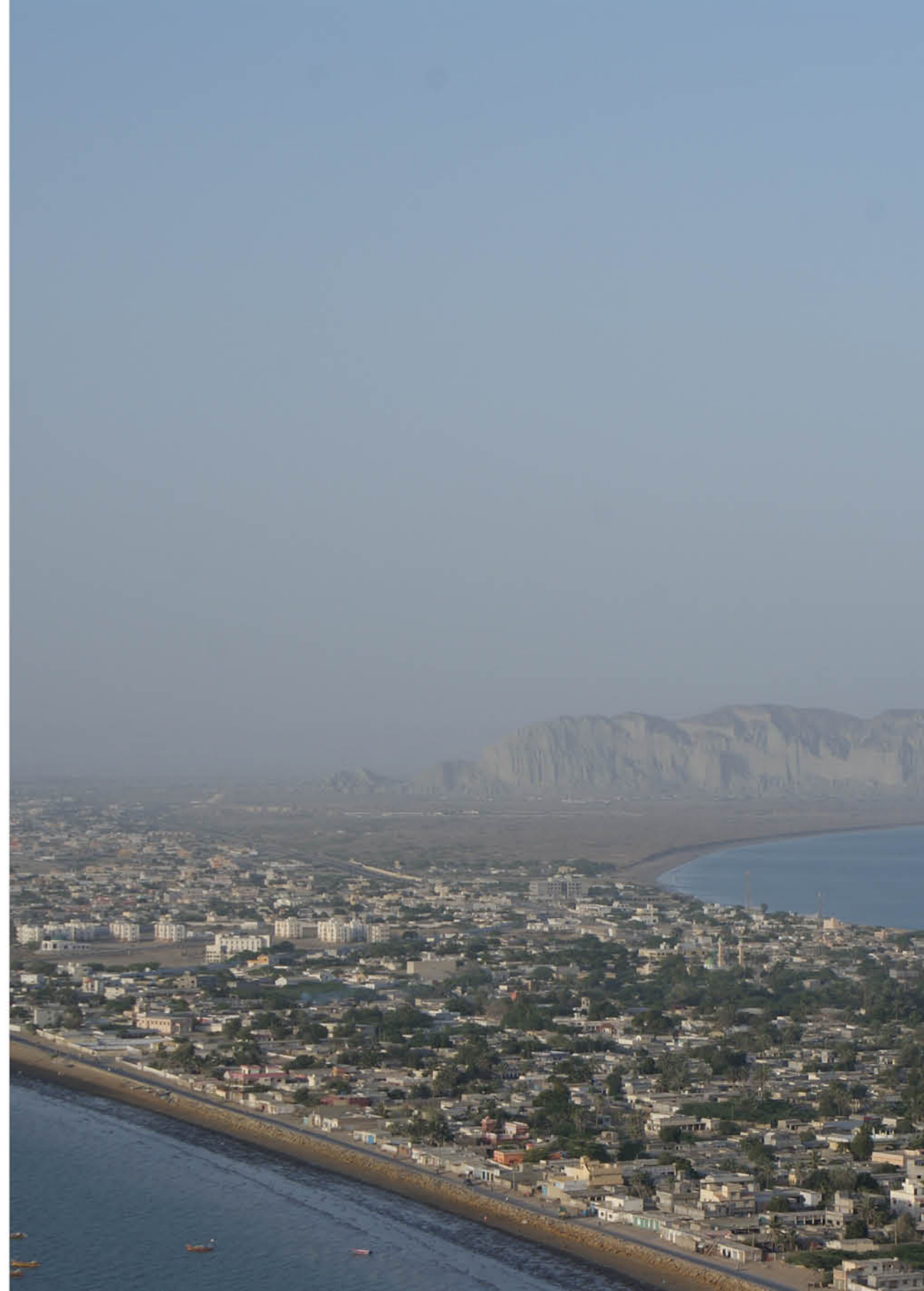
FIRST APPROACH

Before zooming in on Gwadar we had to get a view of the landscape surrounding it and tried different techniques on how to represent this. Using QGIS and open source information we were able to produce a three dimensional model of the surrounding. It became clear the natural formation of Gwadar its landscape has been very important for the development in and around Gwadar. We definitely had to incorporate these findings within one of the maps, but how to graphicly present this natural landscape and formation of the surrounding landscape became a quest.

Eurasian Plate

Gwadar

Makran Subduction zone

Arabian Plate

Indian Plate

TECTONIC PLATE MOVEMENT

Gwadar is located on the Eurasian plate just tens of kilometers north of the Makran Subduction zone. The subduction zone is the plate boundary where the Arabian plate which is pushing north meets the Eurasian plate. This boundary takes the form of a subduction zone in which the Arabian plate pushes itself under the Euriasian plate causing the area where Gwadar is to rise in elevation slowly but continuously over a long period has caused the formation of mountains. Ths subduction zone also makes it a place of volcanic activity caused by the hot melted material of the subducting plate which moves down into the earth's mantle. In Gwadar these have resulted in an area of mud volcanoes and the formation of a temporary island. The island, (Zalzala Koh/Earthquake Island) was formed by these subduction activity resultant gasses, which were trapped under harder impermeable geological layers, being released by an earthquake.

Not far to the west is another plate boundary. This time between the Eurasian plate and the Indian plate. This boundary takes form as a strike slip fault. The two plates move in a parallel direction. In this case, the movement is less continuous as the subduction zones movement was, the energy of the plate movement is built up and released in events where the plates slip. These cause earthquakes and thanks to this Gwadar is a location with a high risk of earthquakes. There have be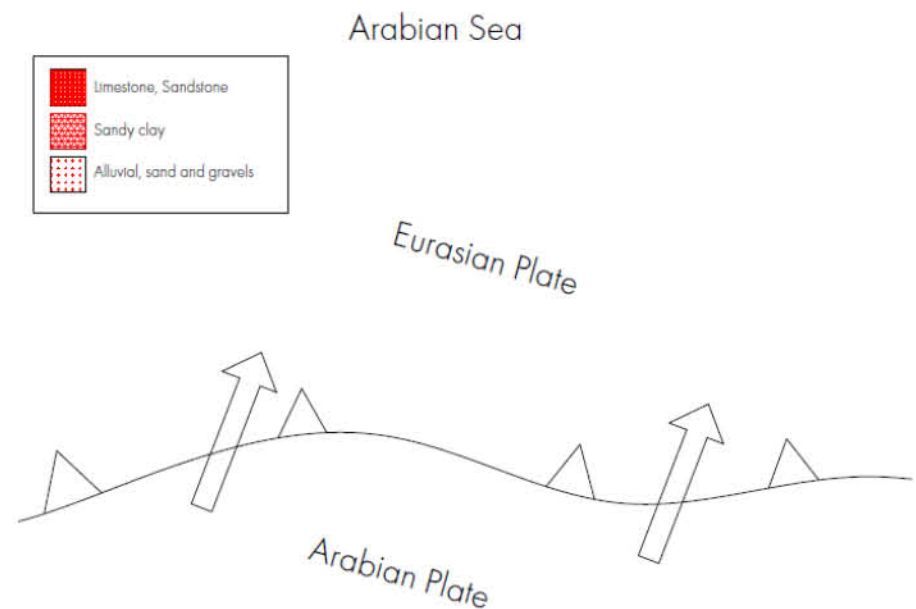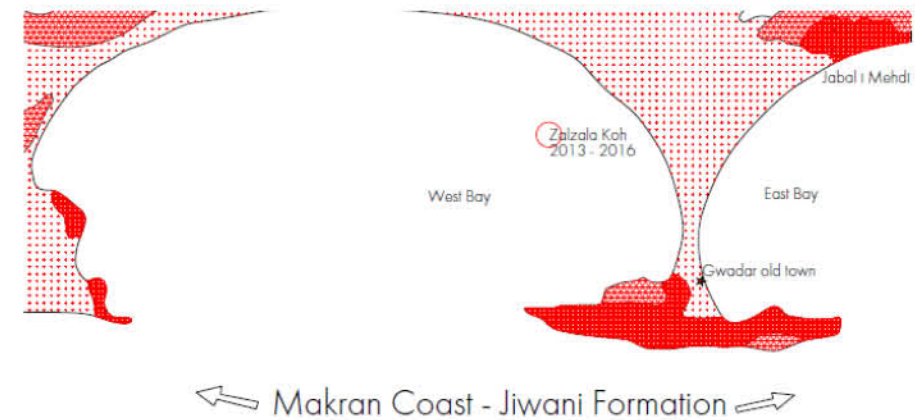en several major earthquakes over the years some of which have also caused Tsunamis that hit the Makran coast, the coastal zone which Gwadar is a part of.

Jabal I Mehdi

Zalzala Koh 2013 - 2016

West Bay

East Bay

Gwadar old town

Makran Coast - Jiwani Formation

Arabian Sea

Limestone, Sandstone

Sandy clay

Alluvial, sand and gravels

Eurasian Plate

Arabian Plate

GEOLOGY

In the diagram showing the type of rock which parts of gwadar is made of show that the hammerhead is made largely of hard sedimentary rock such as limestone and sandstone. This hammerhead is part of the larger Jiwani formation which stretches along the Makran coast. As we can see in the map, to the north of this formation is sandy and other looser forms or rock. These are easily eroded. It appears that the hammerhead was formed as a leftover part in this larger Jiwani formation in which to the east and west of the hammerhead have been eroded away over a long time causing the creation of two large bays, however the sandy strip of land to the north of the hammerhead, being shielded by the hammerhead has been able to survive until now from the harsher erosive forces that created the two bays. The geological condition has resulted in the unique hammerhead formation that Gwadar is.
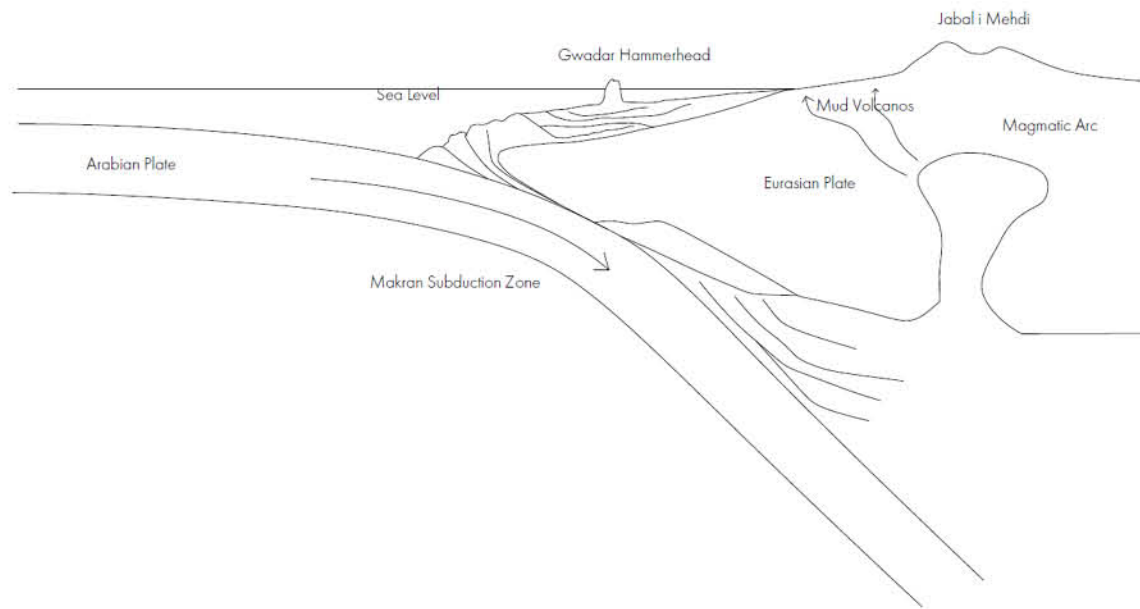

Image: ©Nishat Awan

Jabal i Mehdi

Gwadar Hammerhead

Sea Level

Mud Volcanos

Magmatic Arc

Arabian Plate

Eurasian Plate

Makran Subduction Zone

HISTORICAL BACKGROUND
GWADAR

One of the basis for the research is to analyze the history of the place and its geopolitical importance. Gwadar is currently a point of interest as a terminus point along the CPEC providing access of China to the Arabian sea affirming its position as a place with strategic position to the Gulf and Northern Africa. Going back in time, Gwadar has a history of conquerors claiming it for their own through the centuries but none stayed to establish a rule. A leading factor for the terrain to remain less developed was its extreme inhospitability and harsh weather conditions. However, a few events have shaped Gwadar the way it is, and we will highlight four of them:

1.) Gwadar and the Mekran area are first historically documented with the invasion of Alexander the Great (325BC). In the account it is also highlighted the extreme inhospitality of the terrain that is still a factor in the development of the area.
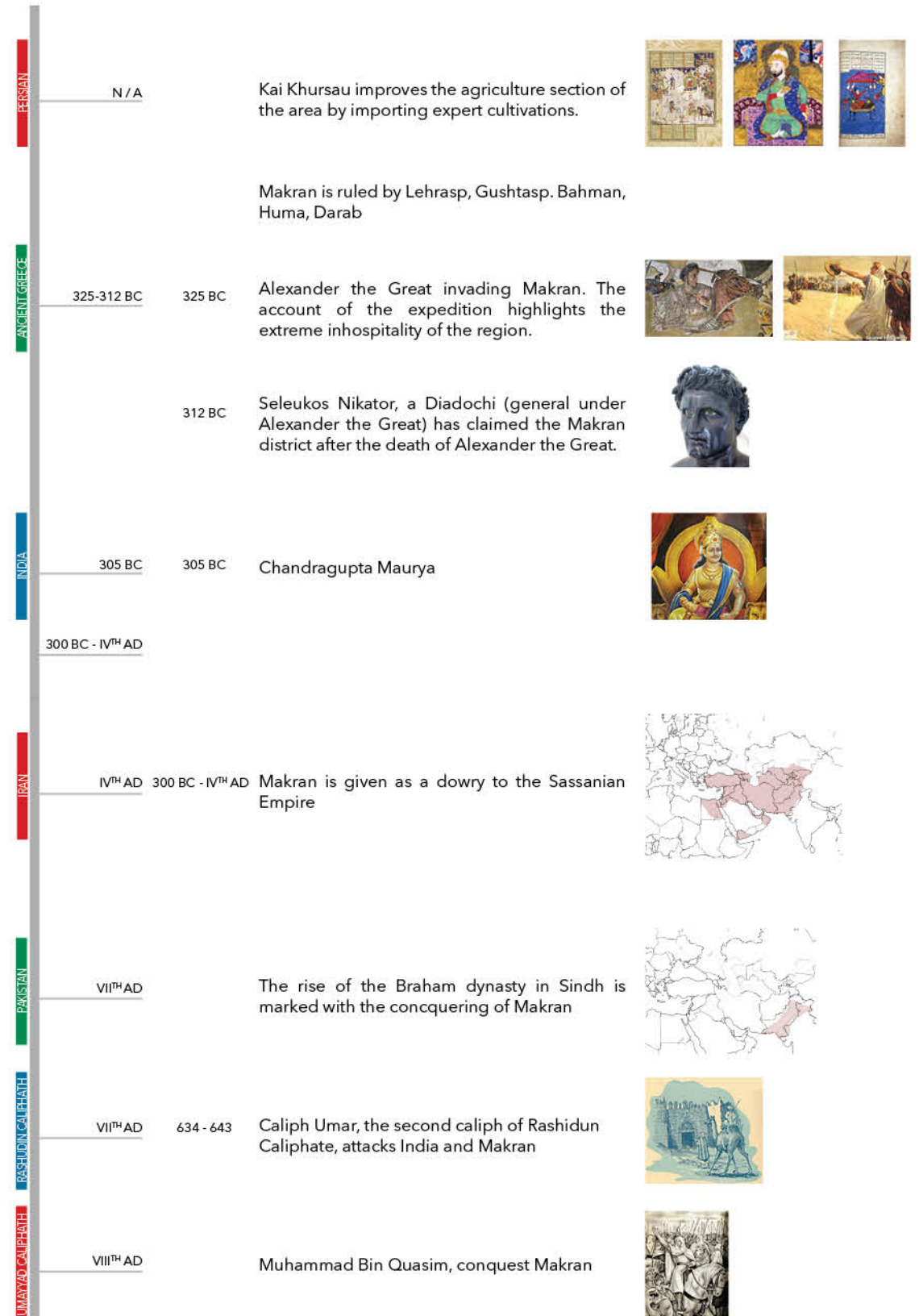
2.) Gwadar was part of the Kingdom of Kalat (Baloch Khanate) and was given to the prince of Muscat (Oman). The Balochi population and mentality has remained present in Gwadar through time and even with the newly-developed relations across the sea to Oman.

3.) Gwadar achieved strategic importance when the British decided to lay the first Indo-Europe telegraph through the city connecting it to Karachi. (1863)

4.) Pakistan purchased Gwadar from Oman for $10mln. with the permission of Britian. The town, however, remained remote in distance and mentality to Pakistan.

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1. Ahmad, Azhar. "Gwadar: A Historical Kaleidoscope." Policy Perspectives: The Journal of the Institute of Policy Studies 13, no. 2, 2016.

PERSIAN	N/A	Kai Khursau improves the agriculture section of the area by importing expert cultivations.
		Makran is ruled by Lehrasp, Gushtasp. Bahman, Huma, Darab
ANCIENT GREECE	325-312 BC / 325 BC	Alexander the Great invading Makran. The account of the expedition highlights the extreme inhospitality of the region.
	312 BC	Seleukos Nikator, a Diadochi (general under Alexander the Great) has claimed the Makran district after the death of Alexander the Great.
INDIA	305 BC / 305 BC	Chandragupta Maurya
	300 BC - IVTH AD	
IRAN	IVTH AD / 300 BC - IVTH AD	Makran is given as a dowry to the Sassanian Empire
PAKISTAN	VIITH AD	The rise of the Braham dynasty in Sindh is marked with the concquering of Makran
RASHIDUN CALIPHATH	VIITH AD / 634 - 643	Caliph Umar, the second caliph of Rashidun Caliphate, attacks India and Makran
UMAYYAD CALIPHATH	VIIITH AD	Muhammad Bin Quasim, conquest Makran

Left column (timeline)

X-XVIITH AD — (PORTUGAL)

Dynasties ruling Makran: Deilamis, the Seljuks, the Chaznivids, the Ghorids, the Mongols. Meanwhile locals enjoyed internal authority as no ruler stayed

1581

Portogese invasions in India. The cities of Gwadar and Pasni are burnt

XVTH AD — (KINGDOM OF KALAT)

Great Baloch migration eastwards is attributed to the tyranical rule of Malik Muzaffar Shah

1758 — (OMAN)

Prince Saiad Sultan bin Ahmad received Gwadar after his brother sat on the Throne of Muscat

(KALAT / OMAN)

Struggle for the rule of Gwadar by the heirs of the Kingdom of Kalat and Oman. British had to intervene

1863 — (BRITIAN)

Gwadar achieved strategic importance when the British decided to lay the first Indo-Europe telegraph through the city connecting to Karachi

Gwadar became:
A port for the steamers of the British India Steam Navigation Company
Flying Boat Base for British (until 1938)

1903

Historic account show that Gwadar was the chief port on the entire Makran coast and handled all the trade of th area

1938

Britian diverted their base in Pasni and Gwadar lost a significant share of its trade

1863-1879

Gwadar is headquarters of the Assistant Political Agent of Britian

'...the hinterland possessed oil bearing prosperities and that there is, therefore, a long term possibility that Gwadar may become an important port'

(INDIA)

The Jain community in India offered to purchase Gwadar for 1.5mln of great wealth

Right column (timeline)

1939 — (BRITIAN)

British hoped to find an oil in Balochistan British-American company, Indian Oil Concessions Limited exploration Concession Rights

XXTH AD — (PAKISTAN)

Pakistan realized that geographically and historically, Gwadar is part of the country

1ST of August 1958

Pakistan purchased Gwadar for $10mln with the permission of Britian

1971-1974 — (PAKISTAN / INDIA)

1971

After the Pak-India war - the government of Pakistan made a proposal for an extra port along the Makran coast, with Gwadar as the preferred option

1974

Pakistan offered the U.S. to build a port in Gwadar and use it as a naval base but the U.S. refused

1988-1992 — (PAKISTAN)

Small 'Fish Harbour cum Miniport' is built in Gwadar

1991-1994 — (PAKISTAN)

It is proposed Gwadar to be a location for deep water port. It is approved 3 years later

1995-1996 — (PAKISTAN)

Pakistan instructs Karachi Port Trust to finance the development to the extend of Rs. 1bln, and later to Rs. 2bln

2002 — (PAKISTAN)

In March 2002, the Sino-Pak Agreement was signed under which China Harbour Engineering Company was settled to built Phase I of the deep water port
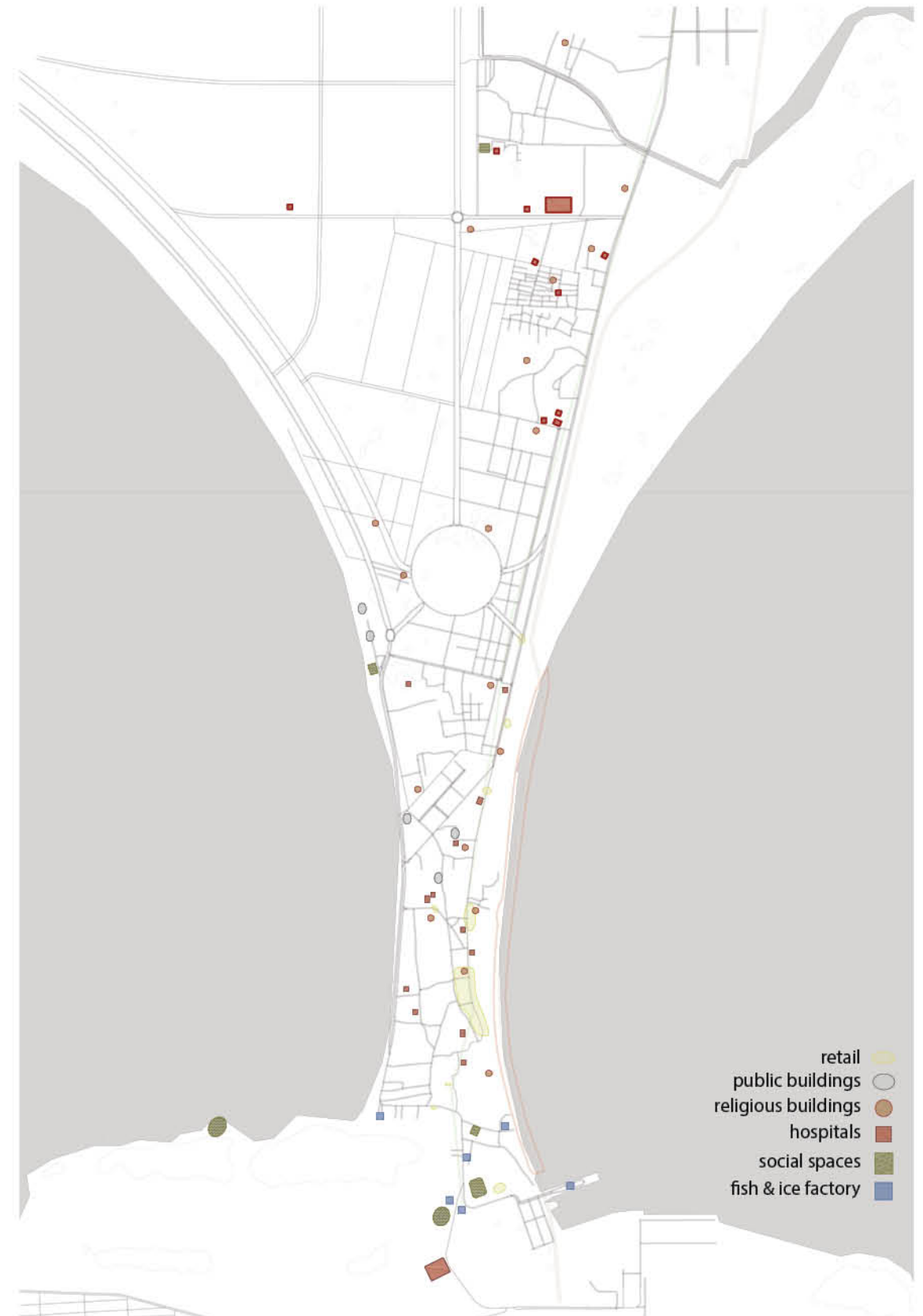
INFORMATION ON THE TOWN

Getting an insight of the city, we have mapped the various public spaces as they are presented to us on Google Maps, trying to grasp the organization of the town and the flows that unfold from it. We have categorized them in six groups: retail, public buildings, religious buildings, hospitals, social space, fish & ice factories. (map on the right)

Gwadar is established as a fishermen's town finding its nourishment from the sea and the fishing industry. Therefore, we found striking that the fishing shops and factories (blue colour) are scarce in quantity compared to the hospitals/clinics (red colour), according to the information of Google Maps, as one of

the few sources we could use. However, we have further researched and consulted with our tutor, coming to the

Conclusion that in reality the town and human movement within it is compacted along the stripe of land of the old town focused mainly on the fishing industry, retail and social sites like the shrine and the mosques.

small scale social spaces

big scale social spaces

retail
public buildings
religious buildings
hospitals
social spaces
fish & ice factory

GWADAR SEA PORT

The first phase of construction of new deep-sea port in Gwadar was finalized in 2007. After the announcement of further development under CPEC its extension was continued

until its offcial oppening in June 2016. The port is leased to China until 2059.

Through our research we started mapping the situation and current

arrangement of the port facilities including their further development, such as ex. deepening the seabed in order to host the largest ships.

CHANGES OVER THE TME

Tracing the historical satelite photographs, we observed the development of either port area or Gwadar center area through time. Starting from 2005, therefore during the construction works,

we were observing the morphological changes in urban tissue up to 2020. This let us encounter that the biggest changes of the Gwadar old town at the peninsula occured at the

2005 - 2010 period, contrary to the next decade that did not introduce further major development.

2005   2010   2015   2020
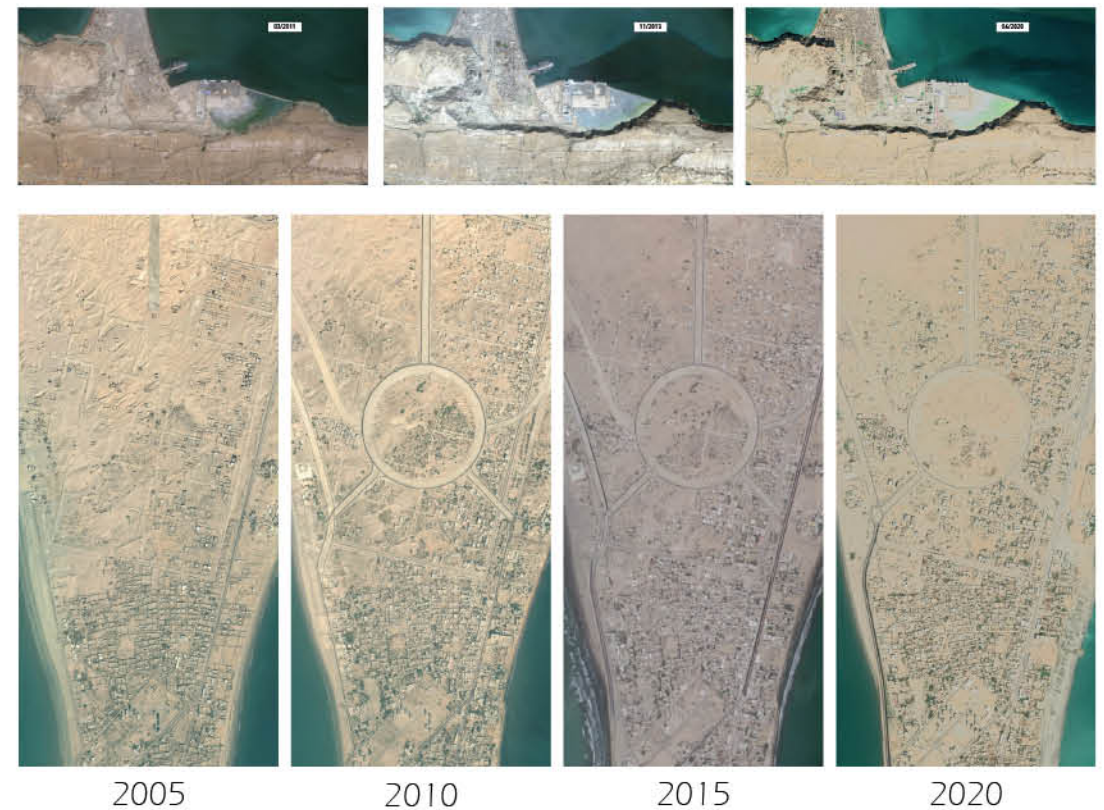
BORDERS MAP DEVELOPING

Developing the borders map, we defined three categories of border types to be represented: natural, local, new developments. We have developed the map through a series of variations of it and experimenting on how to visualize the information.
The three maps show the main changes of the map.

1.) A series of sections through the map trace the gradual changing of the landscape from North to South and visually bind the map together. It showed the topography of Gwadar along with marking the new developments and how they affect this landscape.

2.) In the process, we have come to the conclusion that most information is repetitive through the sections and we can optimise the map by keeping only the sections that are at key locations. Another layer of the map was to visualize the meteriological conditions that influence and act as barriers to the movement of people.

3.) We have implemented the geological formation of Gwadar to visualize the unseen processes that shape the landscape as it is but are also closely connected to the formation of the town.

As a group, through making and adapting the maps, we have deepened our knowledge and understanding of the place.
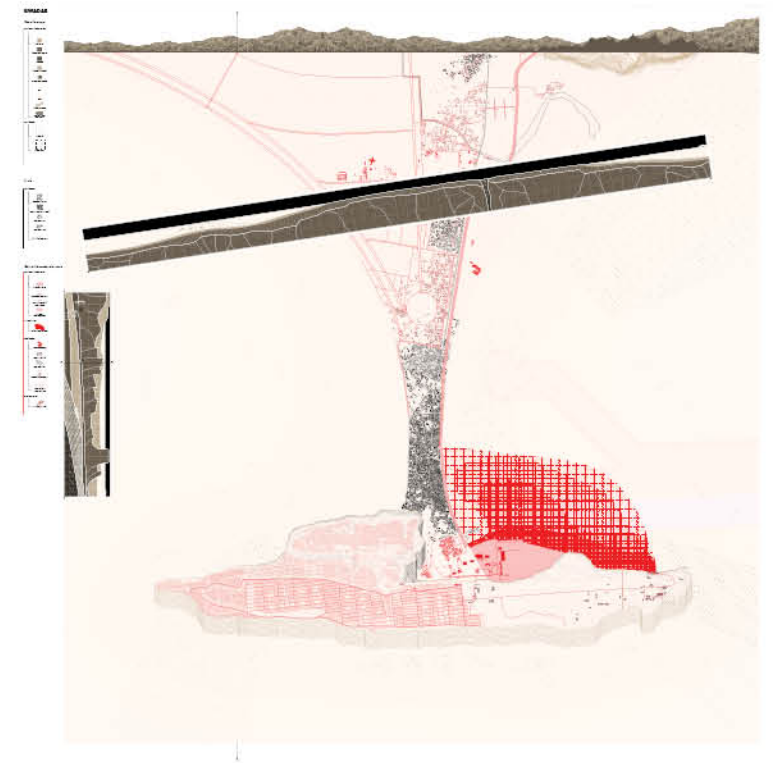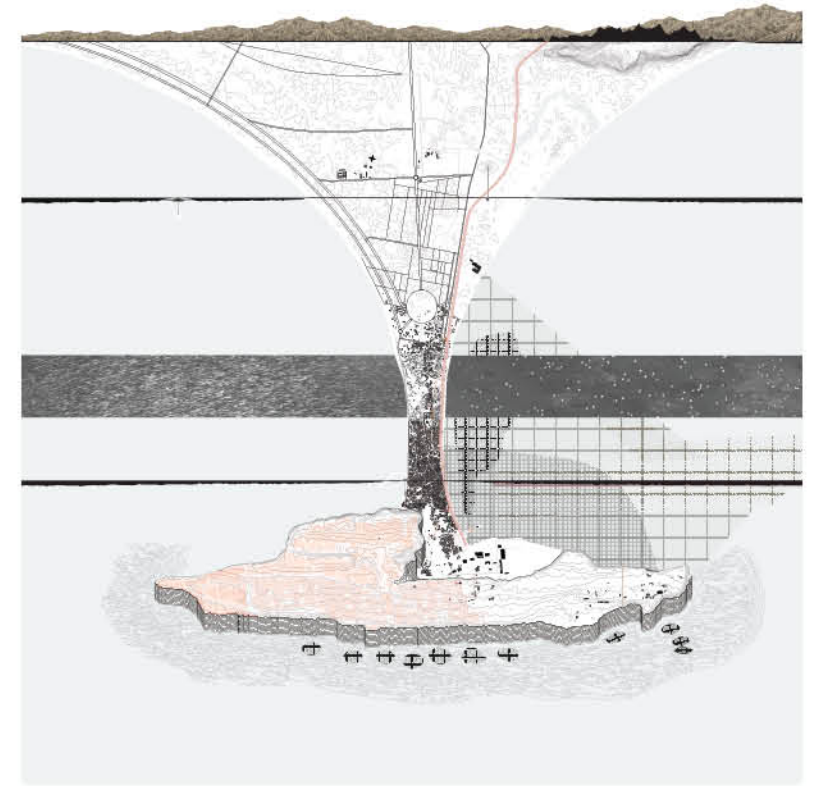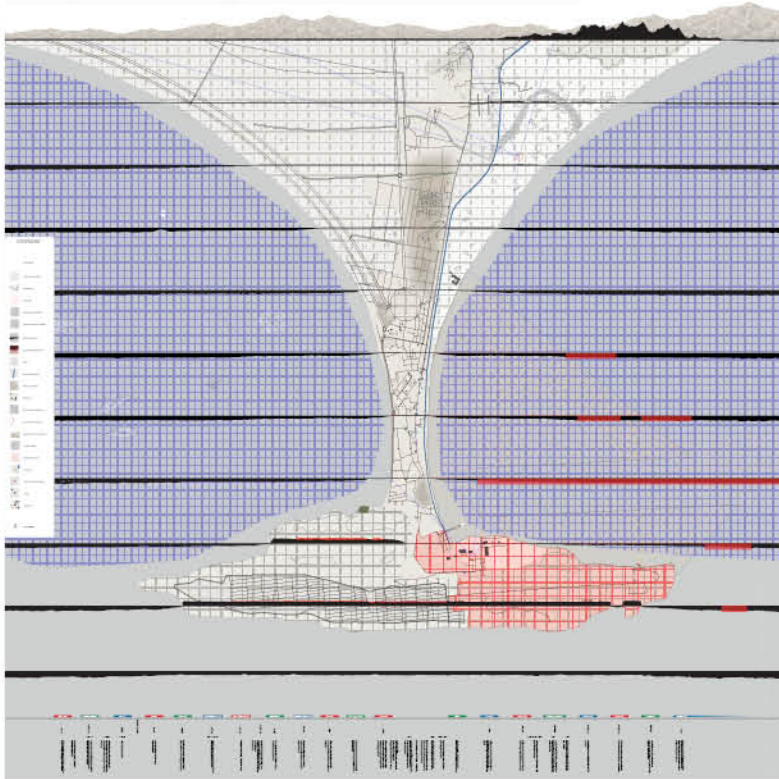
COLLECTIVE RESEARCH

INFRASTRUCTURAL AND EXTRACTIVE TERRITORIES

In approaching the notion of territories, we found that due to the complexity of different political and economic connections, Gwadar needs to be presented and understood through, at least, the regional scale.
In order to grasp a proper understanding of Gwadar as a place, we decided to emphasize particular territories where we found the most crucial phenomena.

These are:

a.) sea as a territory of both global and regional trade, as well as territory of resource extraction - which is mainly tied to the fishing industry.
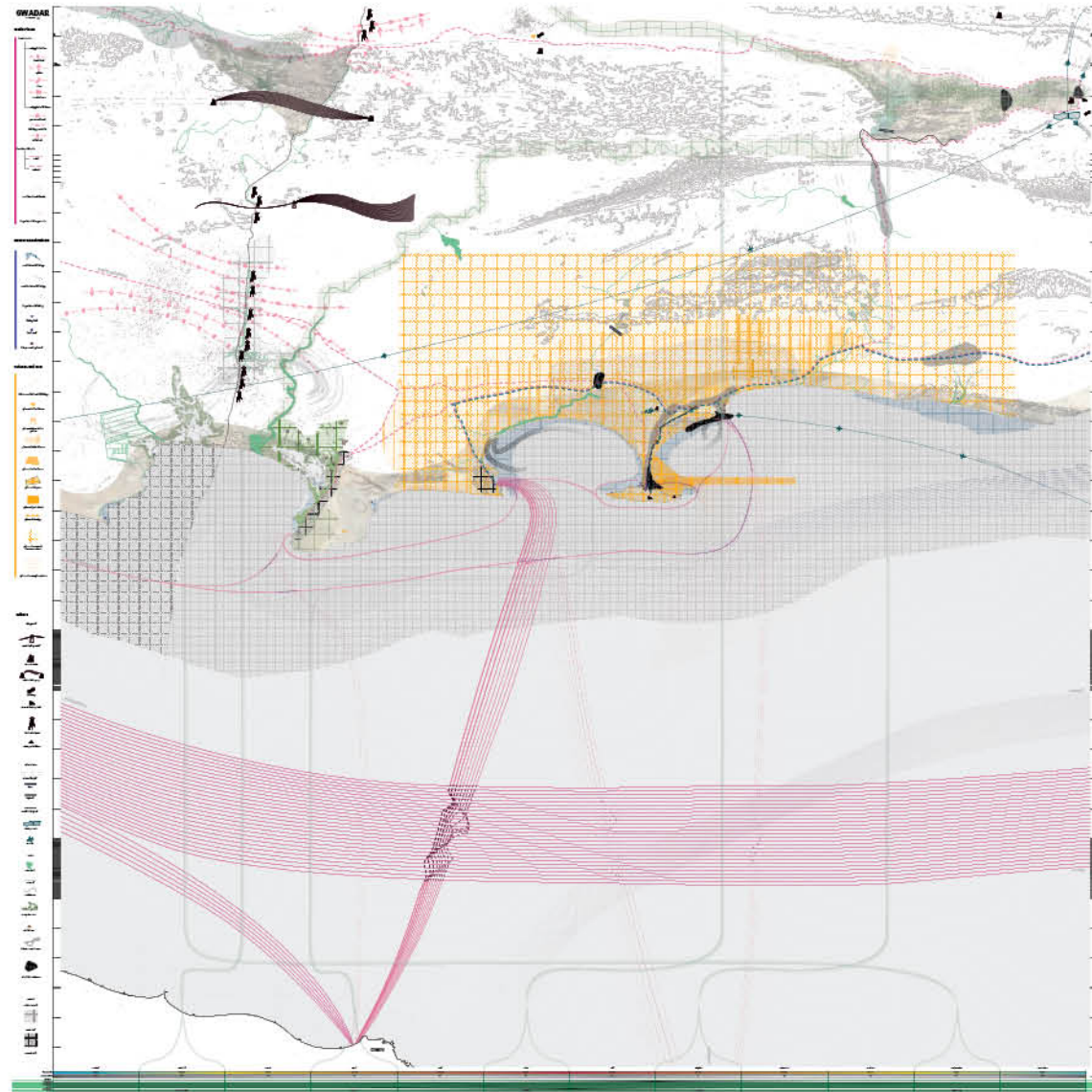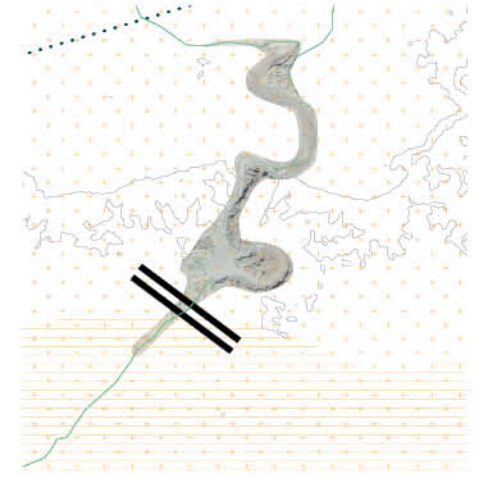
water reservoirs

b.) Pakistani-Iran border zone, where the smuggling is occurring. Pakistani Balochs smuggle mainly oil & diesel, building materials or processed food from Iran. In return they sell much more basic resources such as fresh food or cereals. They also transit opium originating from Afghanistan.

c.) water reservoirs, which are crucial from the infrastructural point of view, supplying Gwadar and other human settlements with water, as well as from the ecological point of view, being an oasis of biodiversity, allowing, for instance, mangroves to grow.

d.) coastline, being a transition zone, from where fish resources are being exploited by fishermen heading everyday from multiple small jetties along the shore. From an ecological perspective it is where oil pollution and garbage waste infiltrates, and where mangroves are becoming extinct, as a result of extensive camel breeding. The decreasing population of mangroves ruins biodiversity and ultimately leads to gradual land erosion by the sea.
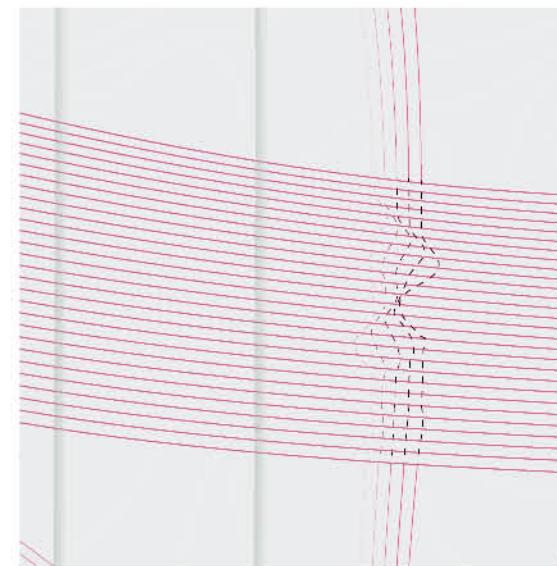
final map

border zone

The outcomes of all the territorial conditions that we mapped above define the everyday life of the native Baloch people in the political, economic, social contexts, and, more importantly, reveal clashes that provoke several conflicts of interests. In order to extract these conflicts, we segregated the most crucial phenomena that describe Gwadar into three categories, which are:
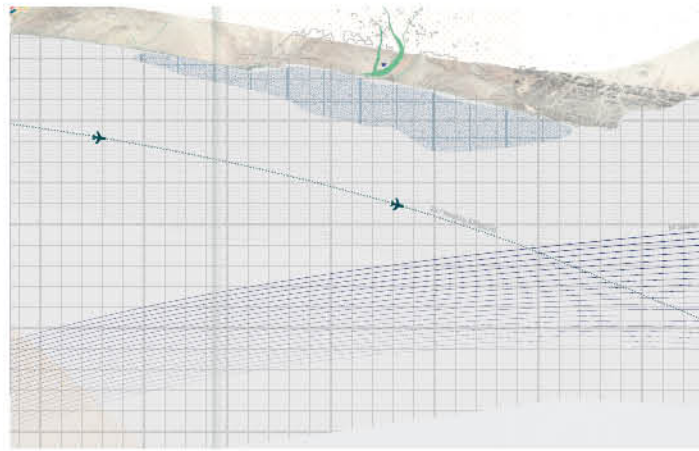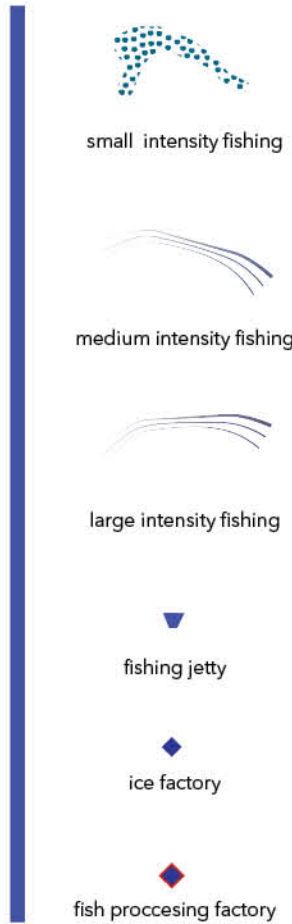
- trade flows,
- resource extraction,
- future land use

1. Trade flows, (pink) with subdivision on different characteristic and intensity:

a.) main large cargo flow coming to the Persian Gulf which still remains unconnected to Gwadar, coming in clash with medium intensity trade, practiced by bigger oil smugglers, heading to Oman or Somalia

b.) The latter one however, clashes with lowest intensity smuggling, practiced by ordinary people who look for any ways to earn as their livelihood. They ussually come from Iranian Chabahar port and reach Gwadar and neighbouring smaller jetties.

medium intensity trade

large intensity cargo trade

low intensity trade

naval

onland

(a)

(b)

small intensity fishing

medium intensity fishing

large intensity fishing

fishing jetty

ice factory

fish proccesing factory

(a), (b)

(c)

3. Future land use, (orange) visualising the range of Chinese investments:
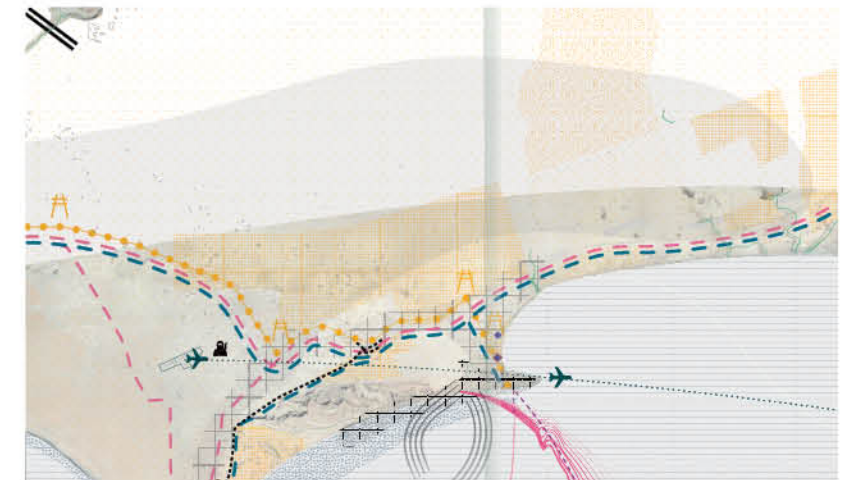
a.) Within the context of Gwadar settlement, the Chinese planned an extension of the New Deep Water port which obviously deprived the locals of the more fertile half of their fishing area. The massive ship flux departing and coming to Gwadar port will evidently disrupt existing smuggling and fishing routes.

b.) speaking of land, the massive planned extension of the building infrastructure will deprive regular Baloch shepherds from the land that they had always used to breed cattle or camels.

future massive intenisty fishing

planned military base

planned observation points

planned industrial area

planned military area

planned airport

planned port extent

planned fencing

planned economic free zone extent

planned masterplan extent

(a)

(b)

2. Resource extraction, (blue) meaning several kinds of fishing areas:

a.) areas where regular fishermen fish everyday, dispersed along the coastline, always connected to small jetty

b.) the interests of local fishermen are being regularly jeopardised by larger fishing trawlers coming from the neighbouring areas. These exploit fishing resources on a much larger scale; slowly destroying the underwater habitats.

c.) even more important fishing extraction is being practiced in deep waters by trawlers coming from Karachi. These ones can stay on the water through weeks or even months, unless they are full of fish. Some of these are directly related to Chinese entities, where fish is being transported to afterwards.

When it comes to Gwadar, both its bays are fertile with fish, and were being used by fishermen living in the town. However, when Chinese investments arrived, the situation started to change.
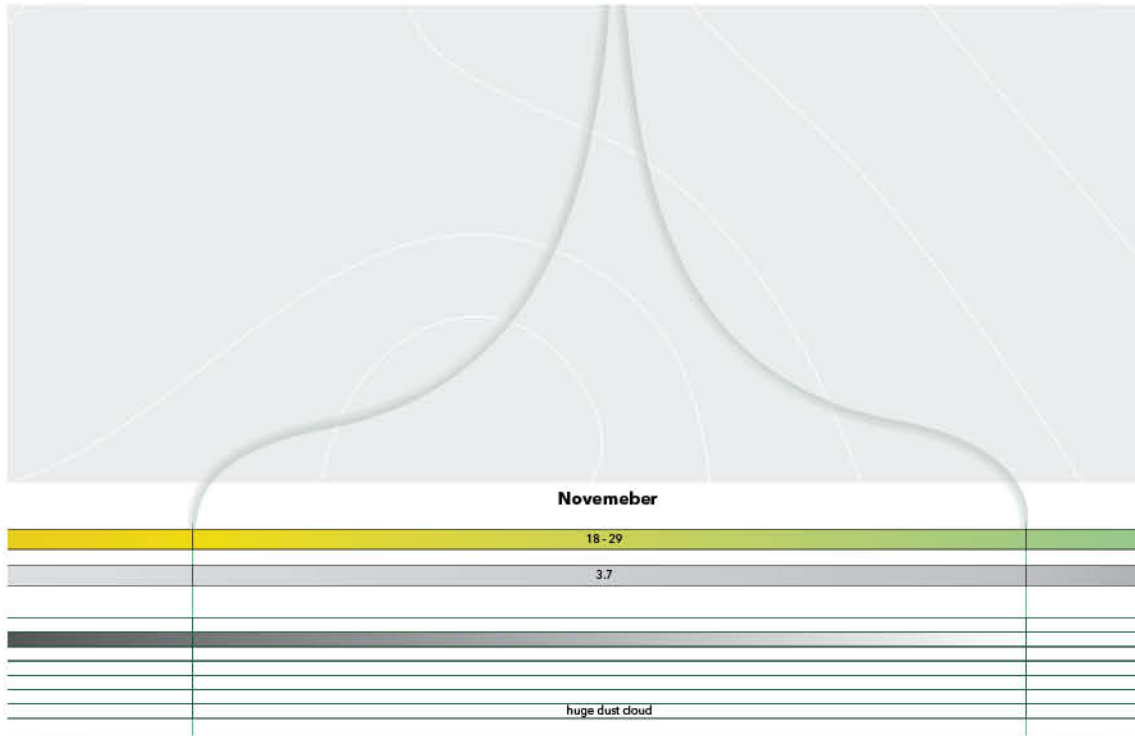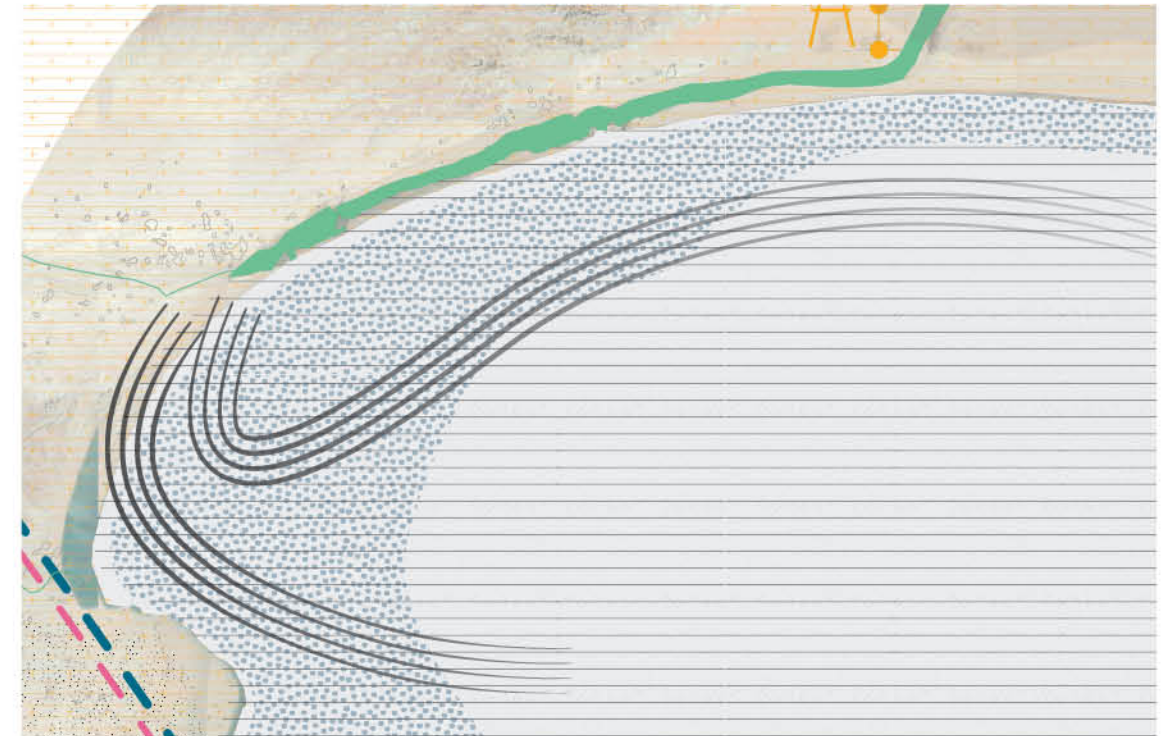
Apart from these main
categories we also marked
the natural phenomena such
as seasonal winds and rains
that then determine: the
occurrence of sandstorms
at the border areas,
directions of coastal erosion
or fish presence (in areas
frequented by fishermen).
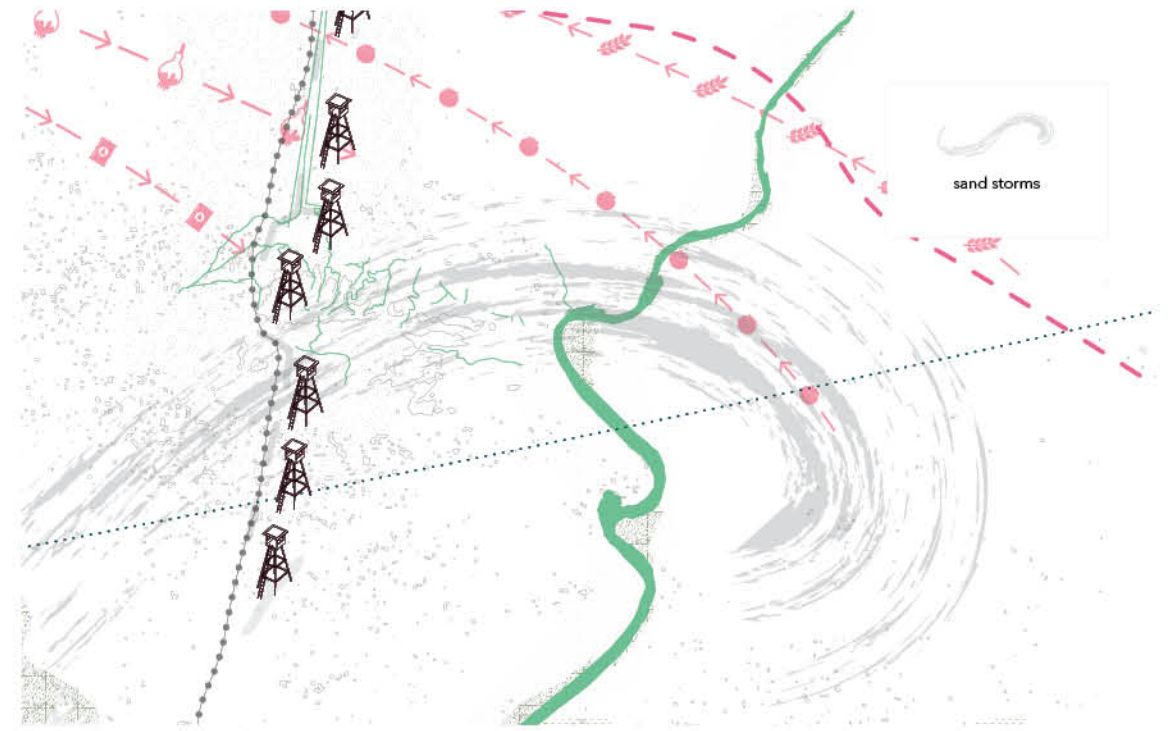
sand storms

sandstorms occuring at border zone

Novemeber

18 - 29

3.7

huge dust cloud

seasonality timeline

coastal erosion determined by sea currents

The important side of interests constitues for the Baloch militants that manifest their opposition to Chinese exploitation by several insurgency acts. We discovered that these occur mainly at the areas of vital infrastructure - for instance Gwadar seaport, main road from Iran to Quetta, Gwadar airport or Turbat airport.

These layers of different actor's interests reveal the complexities that this territory is a stage of. It reveals the essence of our understanding of Gwadar: as a place that has been exploited by several agents since years: Pakistani state, neighbouring industry entities, recently Chinese. In parallel to this ongoing external exploitation, there are Balochs, who as a result of economical and political negligence have difficulties to getting by, facing the limitation of being either fishermen or smuggler. This, in our opinnion, explains the fact of growing in power the insurgency fighting for an independent Balochistan and therefore introducing additional political tension.

isurgency

spotted spying activity

terrorists seizure

soldiers kidnapping

bombing

terrorist shooting attack

border checkpoint

existing military base

insurgency acts at the areas of crucial infrastructure
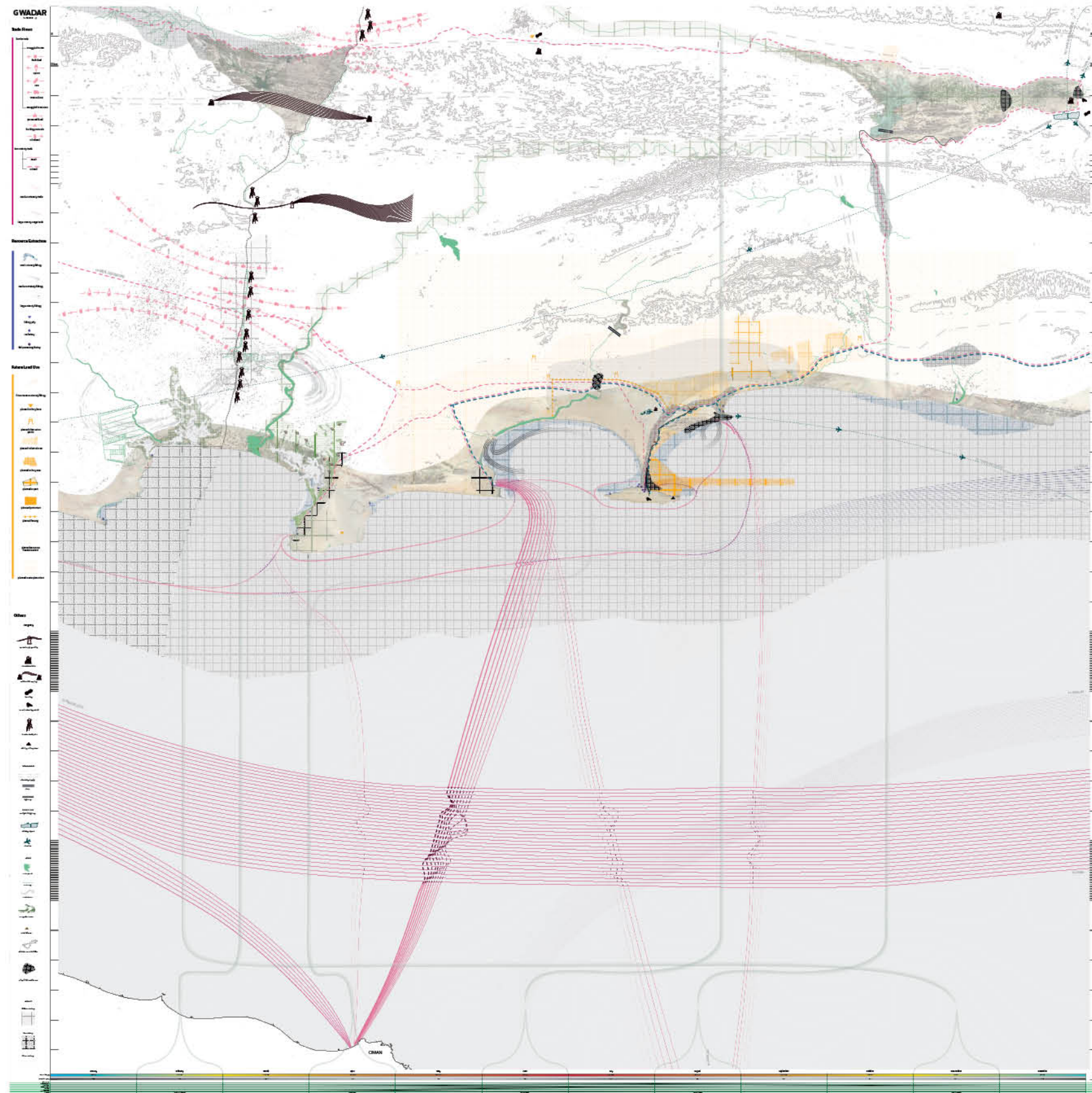
THE BORDERED SPACES OF INDIGENOUS LIVES

The overlays of different interests on a territory scale have a direct impact on the urban tissue. This produces border conditions evident in the town, therefore, we have zoomed-in from the regional scale and looked closely at the relations formed in Gwadar. Exploring the notion of borders through the three main factors that we defined influencing the spatiality of Gwadar: the natural landscape (brown-beige) defines Gwadar's geographical borders The old town and the indigenous population (black) produce spatial and temporal borders with their settlements and local practices and the new infrastructural developments (red) introduce new permanent and temporal border conditions, re-orienting Gwadar to the North through a network of infrastructures.

The outcome of the border conditions produced by those three entities narrates and organizes the human flows within the city, exposing the disconnection of the existing urban structure and the one led by infrastructural development and the logistical supply chain. We have further divided those factors into subcategories of their nature and temporalities through which they operate.

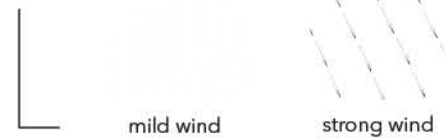## TECTONIC PLATE MOVEMENT
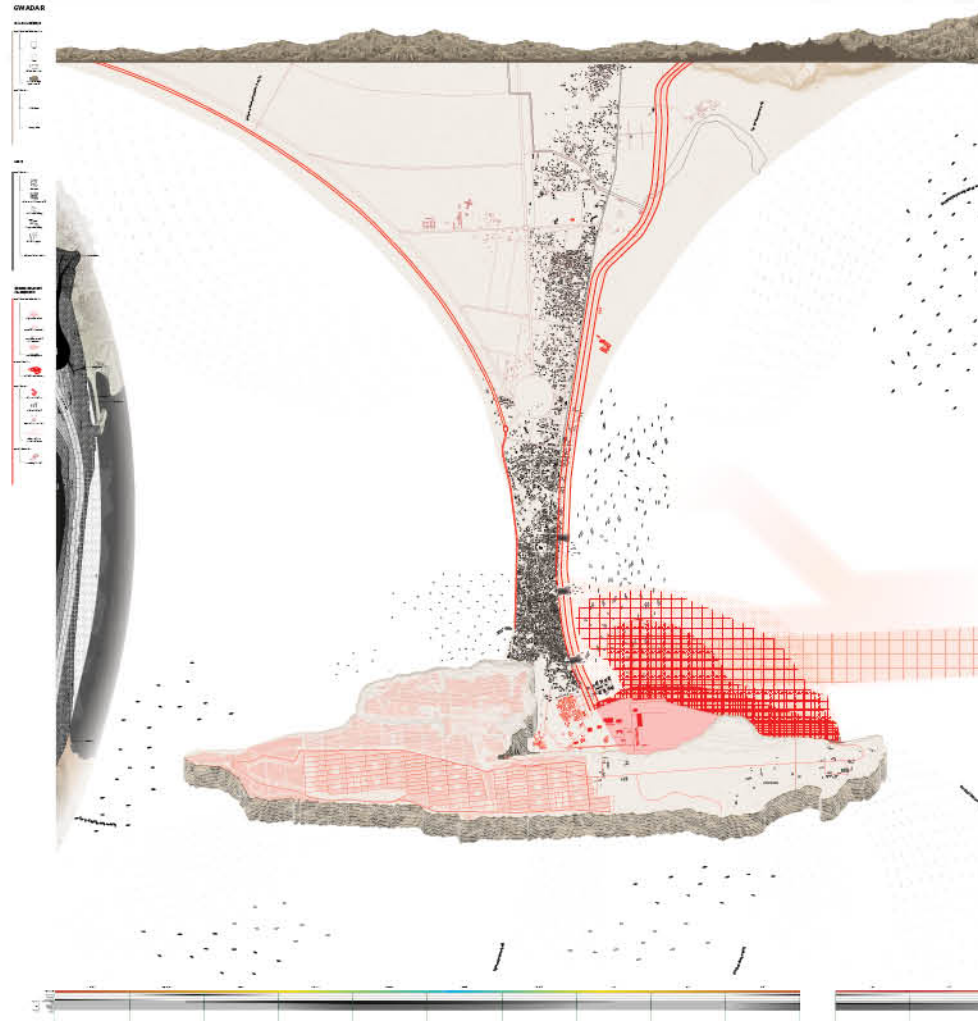
Wind directionality re-
defines the borders of the
sea and the rich fishing
grounds, narrating the
movement of the fisherfolk
communities around it.

NATURAL LANDSCAPE

The natural borders are of
permanent and temporal
nature expressed through
the ever-lasting process
of the formation of the
mountain ridges and cliffs
formed by the tectonic plate
movement of the Arabian
plate subducting under

the Eurasian plate. This
produces mud volcanoes on
the landscape, and restricts
access around the area
causing possible eruptions
and earthquakes.

spatial and qualitative borders

sea   land   cliffs to the South   mountain ridge to the North

spatial border

mild wind   strong wind

LOCALS VS CHINESE INFLUENCED DEVELOPMENT

The people of Gwadar have lived in a place that has its own unique culture and economic activities. The lives and livelihoods of the people are built around their daily activities in Gwadar. Chinese infrastructural developments under CPEC and Chinese influenced developments, put these livelihoods at stake.

These infrastructural developments appropriate land away from use by the locals. They introduce borders to the daily lives of the local people and in some cases displace and replace them. From the demographic perspective, the local people that have been displaced are replaced by workers who have been brought in from outside of Gwadar to work on the construction of this infrastructure. The displacements are
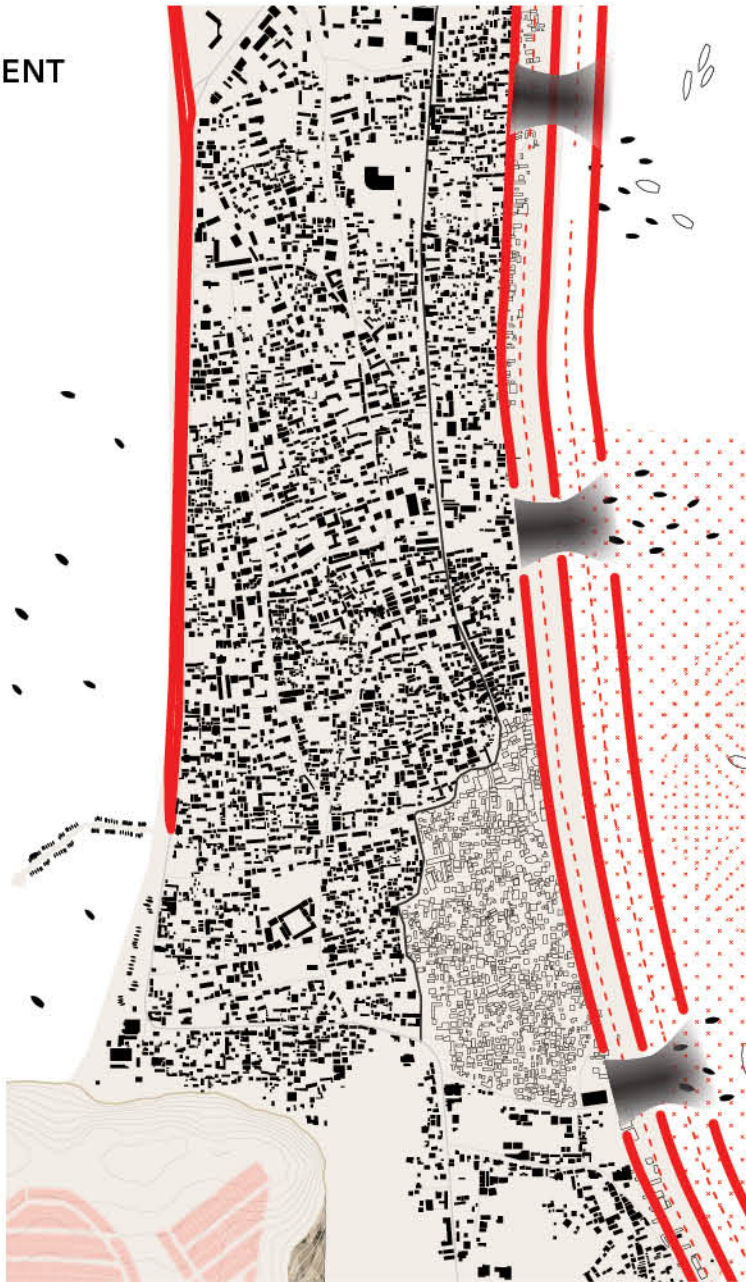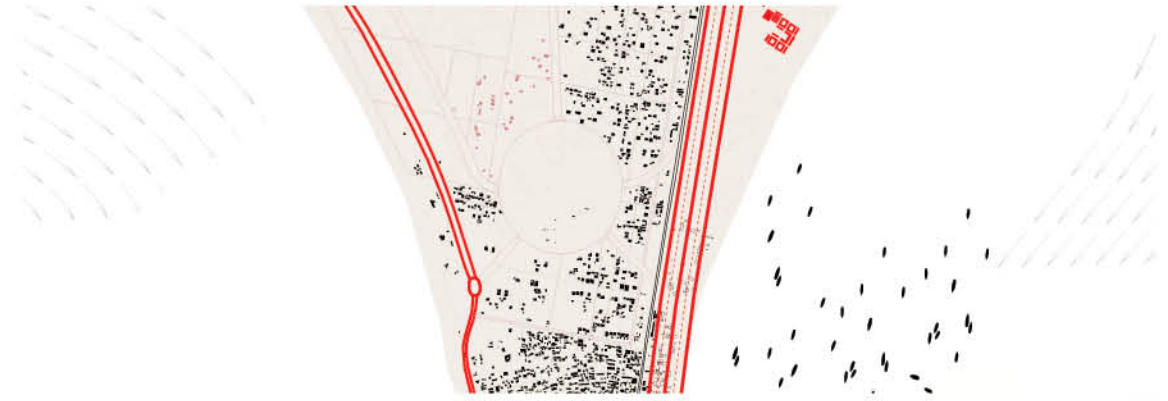
in favor of infrastructural developments that are built or planned to be built in the areas where those locals used to live. Aside from physically occupying the land that used to be places of local livelihood, these infrastructures create borders for the local

domains that are left. These infrastructural consist, but are not limited to, the roads, the expressway and the port docks.

Much of the same goes for other Chinese influenced developments in other areas such as the planned

housing schemes which also appropriate lands.

These developments threaten local livelihoods such as the fishing industry which is very important for Gwadar.
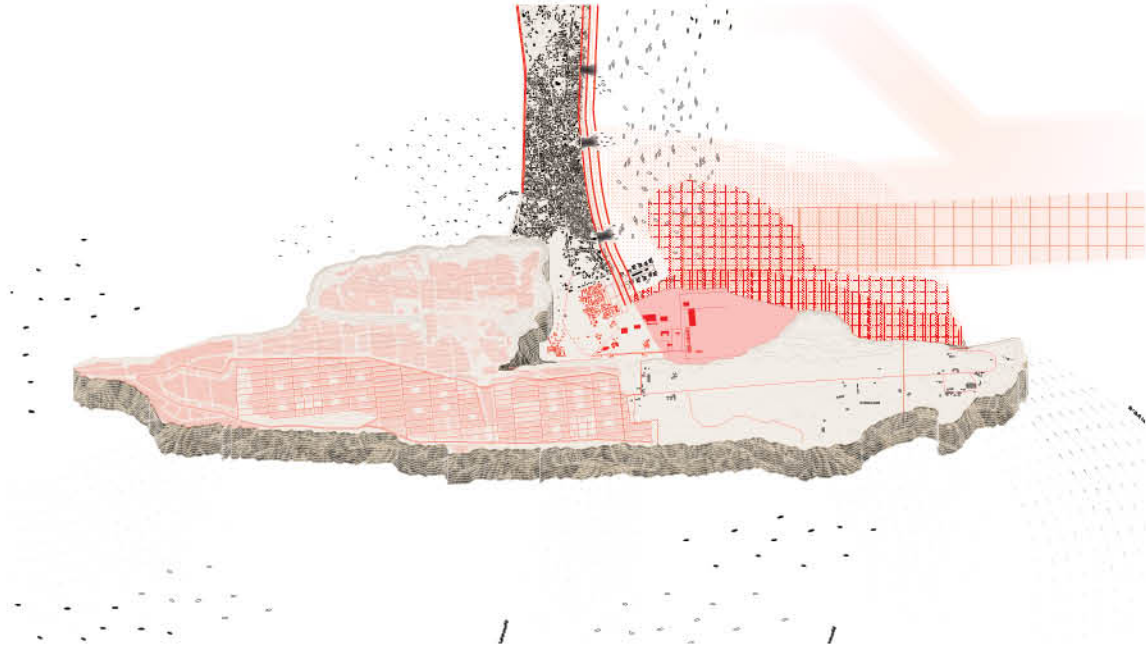

spatial border

old town   evicted Ismaili community   old town infrastructure

spatial and qualitative border

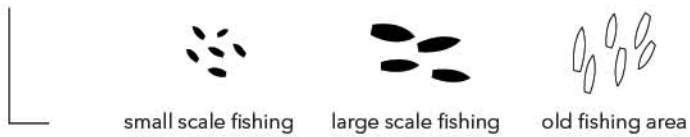highway to China   new city infrastructure   new city secondary infrastructure   port area, restricting access
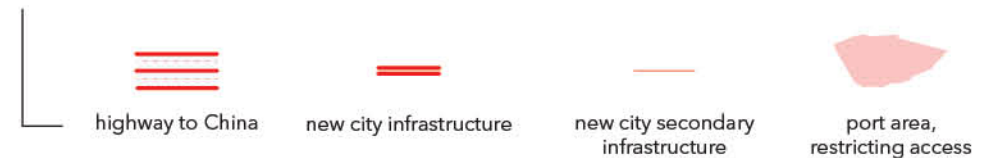
FISHING INDUSTRY

Everyday life in Gwadar revolved around the fishing industry, naturally situated in the local population along the isthmus of the peninsula, in-between the waters of the Arabian sea.

A direct connection between the port, Karachi and China is introduced by the construction of the East Bay Expressway, simultaneously, cutting off the access of the local people to the sea on the East side, relocating them to the more sheltered, but less fertile fish waters on the West. With three key underpasses partially allowing the movement of the locals to the East bay.

The intangible border is further emphasized introducing a military patrolled zone around the new port of Gwadar and restricting the access in the sea for a period of time.

spatial border

small scale fishing   large scale fishing   old fishing area

temporal border

military patrolled zone
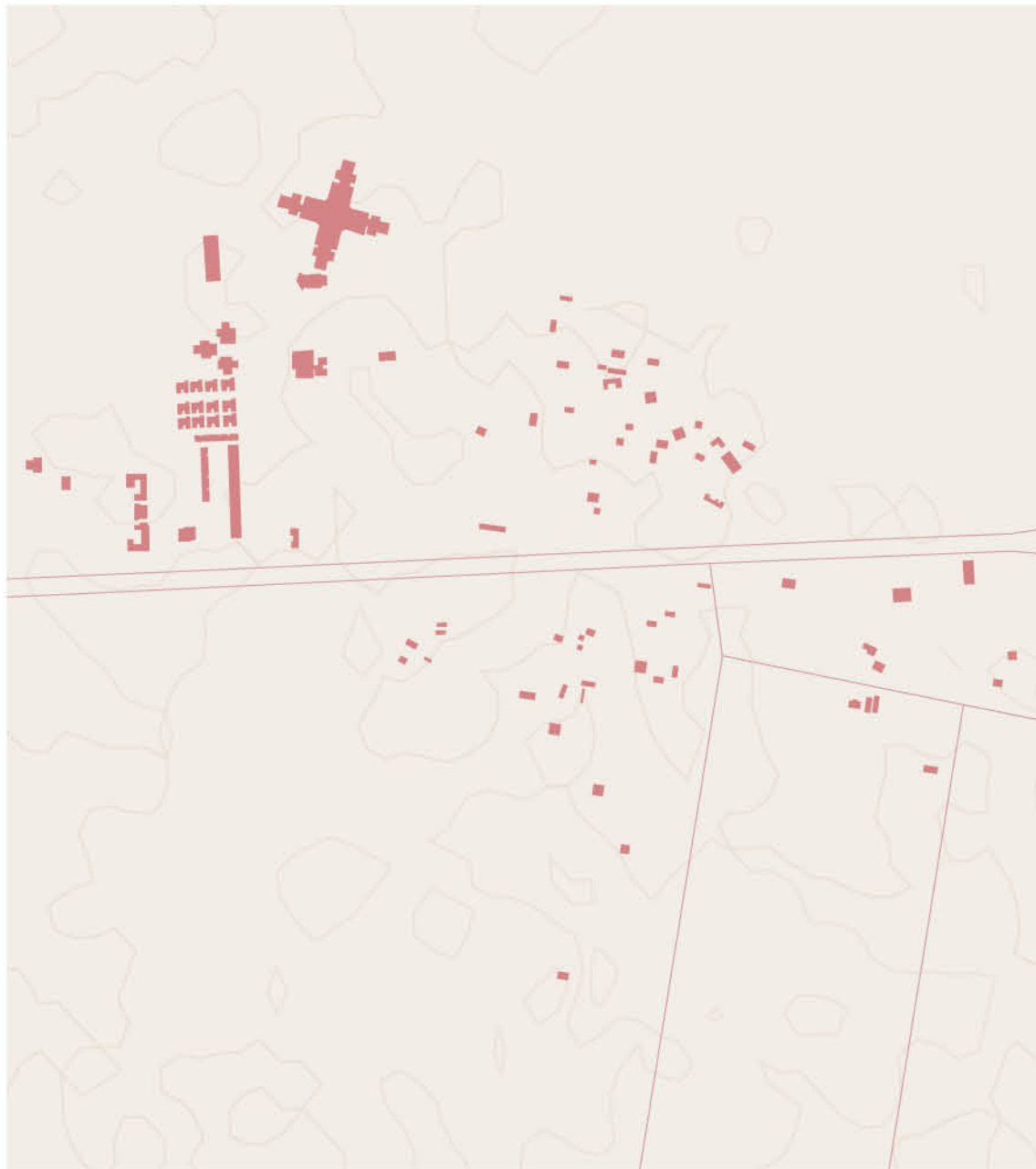
CHINESE INFLUENCED DEVELOPMENT

There are several types of developments happening in Gwadar. Apart from the infrastructure of the port these include, pictured clockwise from top: a chinese military facility, housing for Chinese workers, buildings for companies and other facilities that are/ will be established in the free zone, Pakistan Navy buildings of PNS Akram and the singhar housing scheme.

The chinese military base is a sign that a heavier chinese military presence is coming in Gwadar. This base is located in the area allocated to the freezone in the latest masterplan. Furthermore demographic changes that will come can be seen in the housing that has been made for the Chinese workers.

PNS Akram is the Pakistan Navy base located on the east side of the hammerhead. It consists of a large part of the east hammerhead which is sealed off. Within that area there are facilities such as buildings, helipads, and a jetty for Navy ships in the east bay.
The Singhar housing scheme was originally started in 1992 and was going to be a place that locals of Gwadar, including the fisherfolk, would be able to live in subsidised housing. With the development of the port and the increasing of prices in the scheme following it almost none of the plots in the housing scheme have actually been given to or are allotted to the local people of Gwadar. As of today, almost 30 years later, the plots are still largely empty. However, the roads demarcating the blocks of the scheme have already been there since at least 2005.
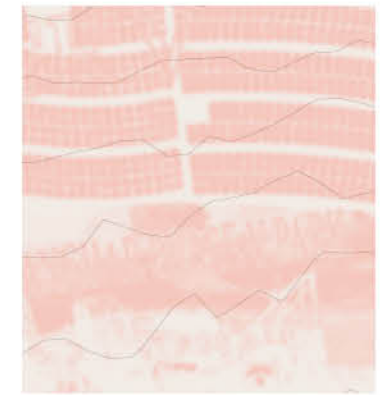
spatial border

Chinese buildings   Pakistani military   expansion 2006-2020   planned future residential areas

CONCLUSION

Gwadar finds itself in a position strained between different purposes. In the eyes of the locals it is an old city with longstanding traditions and trades. In the eyes of the Chinese it is an opportunity to expand influence and trade and in the eyes of Pakistan it is an economic opportunity. What will happen with Gwadar in the future is uncertain but we can see that it is in constant motion.

At first glance it seemed to be a deserted town on a special geological formation, but through research we can conclude that Gwadar is much more than just a fisherman's town. It reveals its global potential when analysed within the question of trade and politics. However, the unsuccessful, partially realised investments still question the exploitation probability of this potential and introduce an inevitable condition of constant temporality.
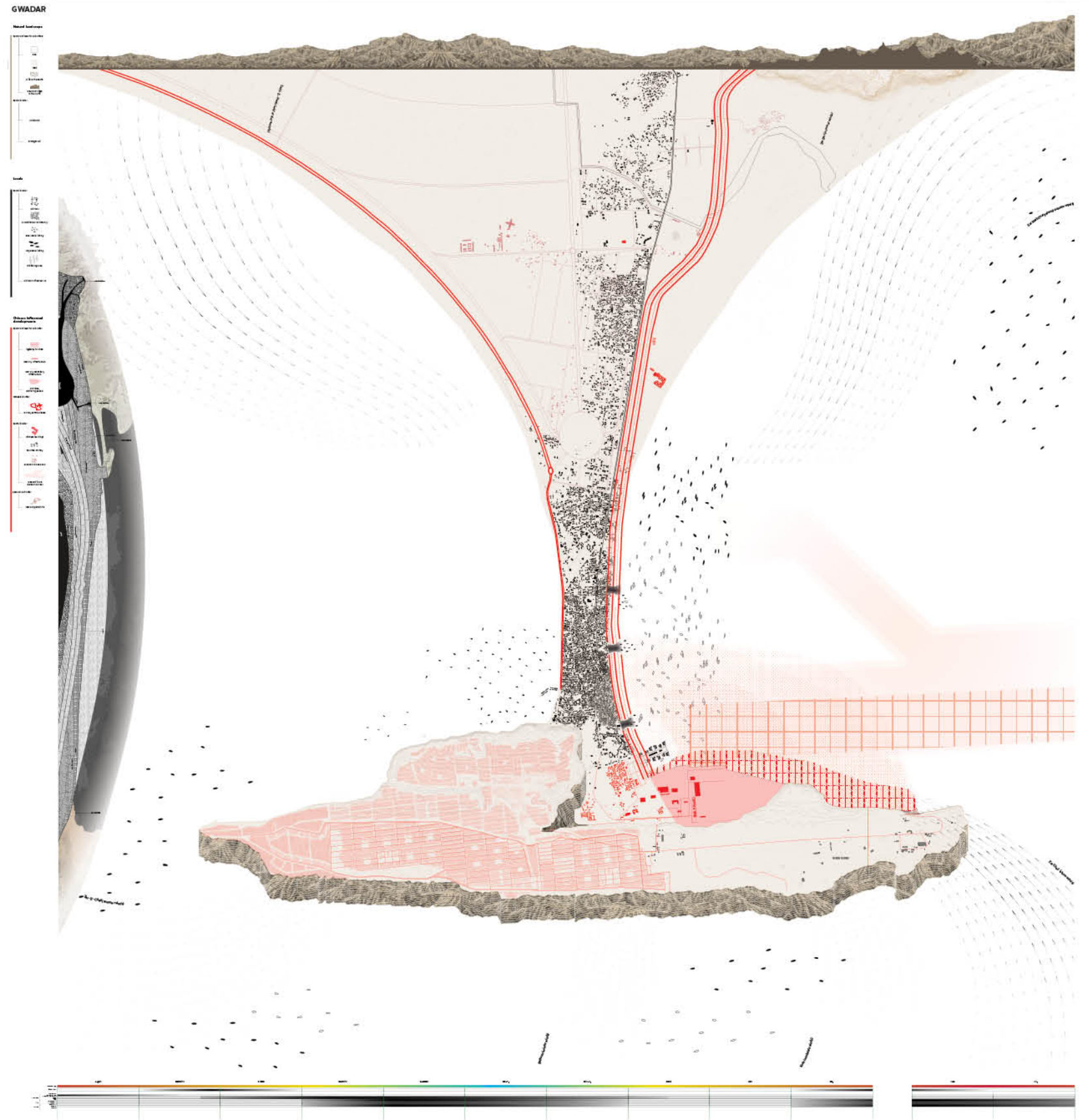
TUTORS

Nishat Awan
Oscar Rommens
Mauro Parravicini

INTRODUCTION

In the collective work,
we have tried to give
a comprehensive
understanding of the town
through the two concepts of
borders & territories and our
definitions of it. The results
of the research led each
of us to form an individual
interest and take a personal
position on the issues
addressed in the case-study
of Gwadar.
The following chapter gives
an insight in the indiviual,
developed architectural
positions and strategies,
which is further used as the
base for the next phase; the
design phase.

LANDSCAPE IN FLUX

PRECISION AND ERROR OF THE
NATURAL PHENOMENA AFFECTING
THE COASTLINE

Casper Liam Lie

Introduction

Before starting the research I had never heard of Gwadar, I haven't experienced the indigenous ways of living in a landscape Gwadar finds itself in and didn't know about the magnitude the New Silk Road has reached. I must say I started as a layman, but pretty fast saw the importance the research about Gwadar could bring. At first sight Gwadar looks like a small fisherman's village with large scale infrastructure along the north. There wasn't much to find in the nearby surroundings, apart from the Iranian border around 70 kilometres to the West and the capital of Pakistan, Karachi, about 10 times that distance to the East.

After a bit more research it became clear the infrastructure was build by Chinese investments to make Gwadar into a world trade port along the New Silk Road. The Chinese investments have promised a better future for Gwadar, but momentarily are only affecting the lives of the locals in a negative sense. Gwadar could always rely on its fishing industry in the Arabic Sea, but the newly build infrastructure is cutting off access to the sea and securitizing the whole area. Next to this, the whole area of Balochistan is also affected by constant natural phenomena such as sandstorms, erosion and drought; shrinking the peninsula of Gwadar and slowly running out of drinking water.

The way Gwadar is researched upon, we have to take into account the place is observed through the lenses of open source imagery and with a rather biased view of my Western perspective. The mentality of my perspective is focused a lot on improving situations which are in essence already progressively developed. In the situation as Gwadar, where the way of living goes its own way, from hearing the need for drastic change isn't much present. And there's definitely no demand for a developer who looks from a far and transforms the whole region.

With the use of Google Earth's satellite imagery it is possible to look back in time at a place form above and you can see beneath Gwadar has been undergoing drastic changes in the last 15-20 years.

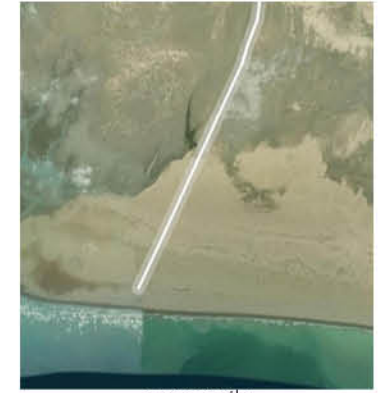2005   2010   2015   2020
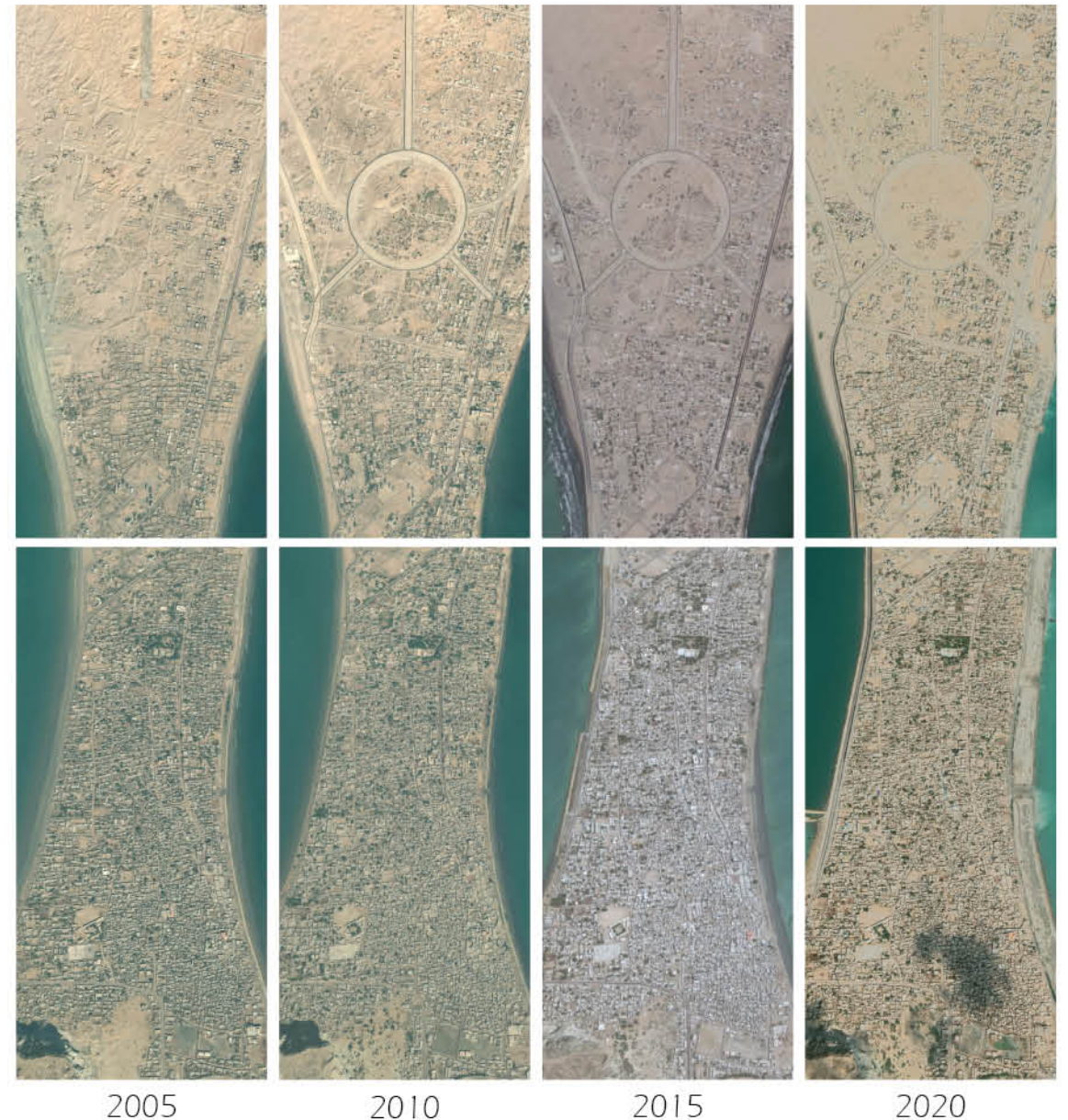
google.maps

satellite.pro

zoom.earth

Looking at the surrounding landscape from above without any references, only the scale bar at the bottom, I felt lost. I couldn't really grasp what is the real and what is now. Linking the satellite images with photographs of the area was useful, but through an image you don't get a sense of depth without reference points. The area around Gwadar being very empty made it difficult, almost impossible to get a view of the place with a human scale to it. While starting on the big maps about the place and zooming in on Gwadar itself the question was raised about in which state do we show Gwadar? Do we show it in a state of its indigenous being or its state, if development continues, after the completion of the masterplan from the Chinese. Or the state of now? Being in the middle of developments. My interest went on to getting to know the place as most accurate to its state of now, so I went on looking at different sources. I found that different sources show different 'realities' even when addressing the political borderline.

How do we map out a place in development with constant natural phenomena sculpting the landscape?

Italian Limes Project

Water has always been a divider or indicator of territories. Going back in time, a large river has been the end of one's territory, because the lack of resources make it impossible to cross. Crossing it would enter someone else's. A stream of water would indicate vital grounds surrounding it to use as agricultural land, even claiming the land up until the source. The most clear separation is the ocean or sea dividing land and water. In mountainous areas the deviation is indicated by the absence of water, meaning the watershed line. Due to the constant motion of water, there have been lots

The watershed and the coinciding national border on Piz Lat Mathaun, on the border between Italy and Austria, 1929 (Istituto Geografico Militare).

The drawing machine–an automated pantograph controlled by an Arduino board and programmed with Processing–translates the coordinates received from the sensors on the glacier into a real-time representation of the shifts in the border.

The measuring units installed on the glacier are solar-powered devices based on an Arduino micro-controller. They have been designed to record precise changes in altitude as wells as a range of other environmental data, useful to understand the weather conditions on the glacier.

An overview of the installation setup inside the Arsenale. Monditalia, 14th International Architecture Exhibition, la Biennale di Venezia (2014).

of disagreements around the political borderline between lands. At the political borderline between Austria and Italy there is a small portion of the line which is on top of a glacier. The glacier moving constantly makes it difficult to measure where the watershed line exactly is. On the first image is one of the first agreements between Austria and Italy with in red the line marked on top of a photograph.

In 2016 the Italian Limes Project started an experiment to precisely map out the line on top of the glacier with 25 sensors placed in a grid mapping in 3 dimensions the movement of the watershed line. The sensors are directly connected with a drawing machine using a marker to draw the line in real-time. Both countries have since than agreed upon a moving border. But keeping in mind the glacier is in constant motion I asked myself **"What is the precision of flux?"**

Ridge

Undefined

Fence
Crosspoint

Bump

Trench

Fluid
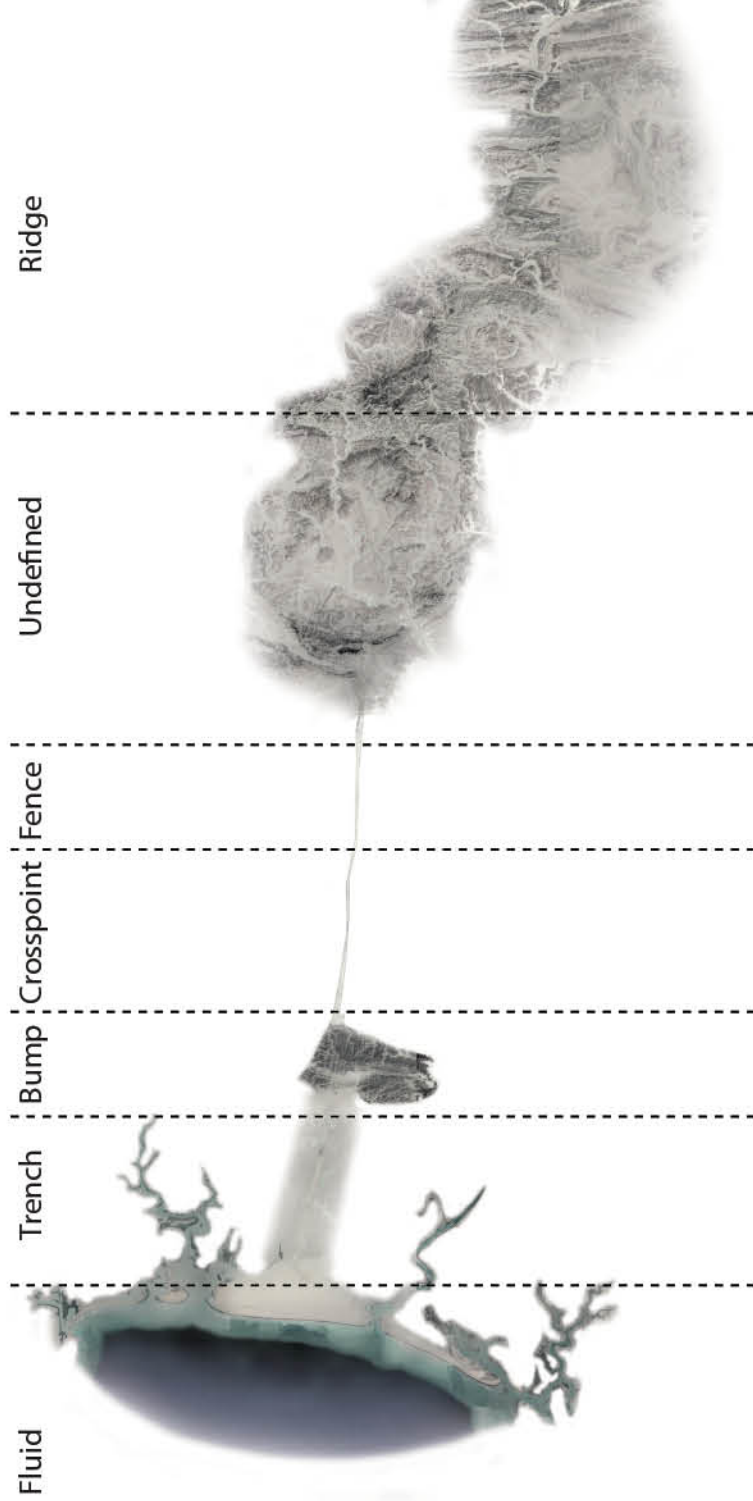
I started researching about the political borderline between Iran and Pakistan and searched for its thickness. Within this topic the projected political borderline and its precision relative to the physical political borderline was examined. The physical line often consists of two physical lines and the moment of interest lies in this in-between ground. The in-between can vary in lots of different physicalities. The Iran-Pakistan border offers the opportunity to discover a few variations of the different in-between zones. They differ from undefined, fluid transitions to harsh, concrete structures. The zones becomes most interesting at places in which they affect the local (wild)life and areas where natural landscapes already form borders of their own.
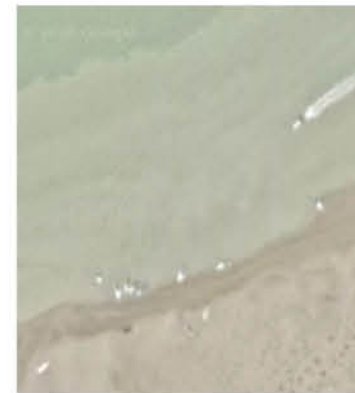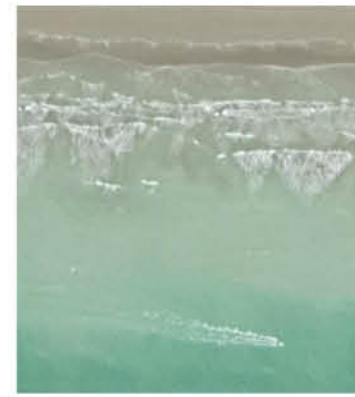
There was a VR-lab session organised for the whole studio in which we could look at our case-studies in the virtual reality, experiencing it much closer to reality than through the flat screen. Even though I knew there wasn't any 360 degrees panoramic pictures or Google Earth's street view in Gwadar and almost nowhere nearby. I thought it could brighten my view, maybe experiencing the mountainous area most accurately. Although it was almost exactly the same as looking at Google Earth's satellite imagery, it made it easier to zoom in very close and still be able to look around. This made me follow white dots, that appear to be boats along the coastline and finding possible trade locations for smuggling. I mapped out all the possible moving boats, stranded boats and camps nearby the political borderline. Later I found out this particular satellite image made it possible to see all this, because in earlier imagery a lot less boats and camps were visible.

At one of the possible camp locations I overlayed satellite images through time and geolocated them in QGIS to accurately map out the changes the camp would go through. It became very apparent the satellite images differ a lot in colour and after mapping the camp through

time the lines weren't at all corresponding with each other , even though the satellite images were geolocated on top of each other.
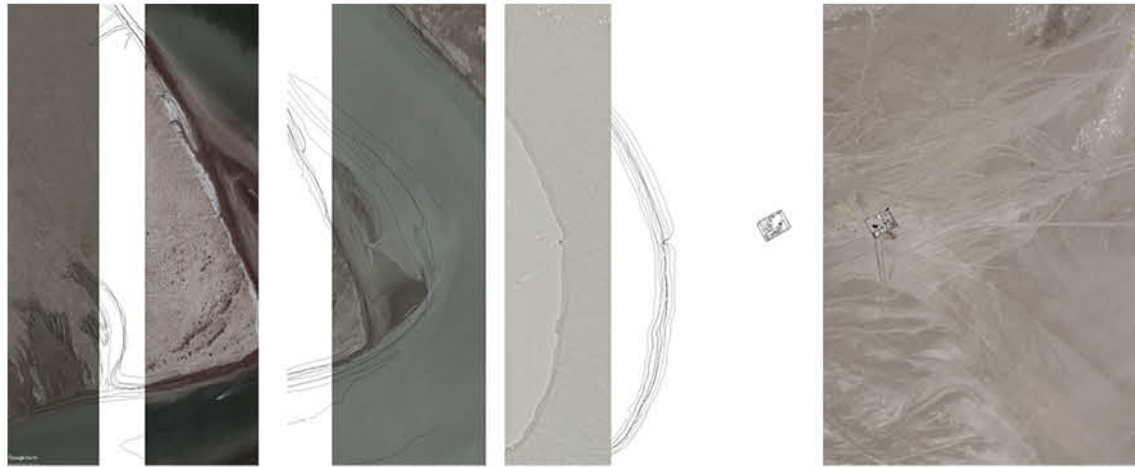

To get a more humane view of Gwadar itself I started to analyse a lot of publicly available videos about Gwadar. There weren't that many people who would make videos in the area with a view from within Gwadar, most of the videos were from people outside of Gwadar

only visiting the place. Most of the time showing only the good places and not the everyday life of the indigenous people. There are even videos found of vloggers being paid to give a good impression about Gwadar. People with a large fanbase being invited to look

at the big scale projects in development with the whole event actually being staged to give the impression of good development.
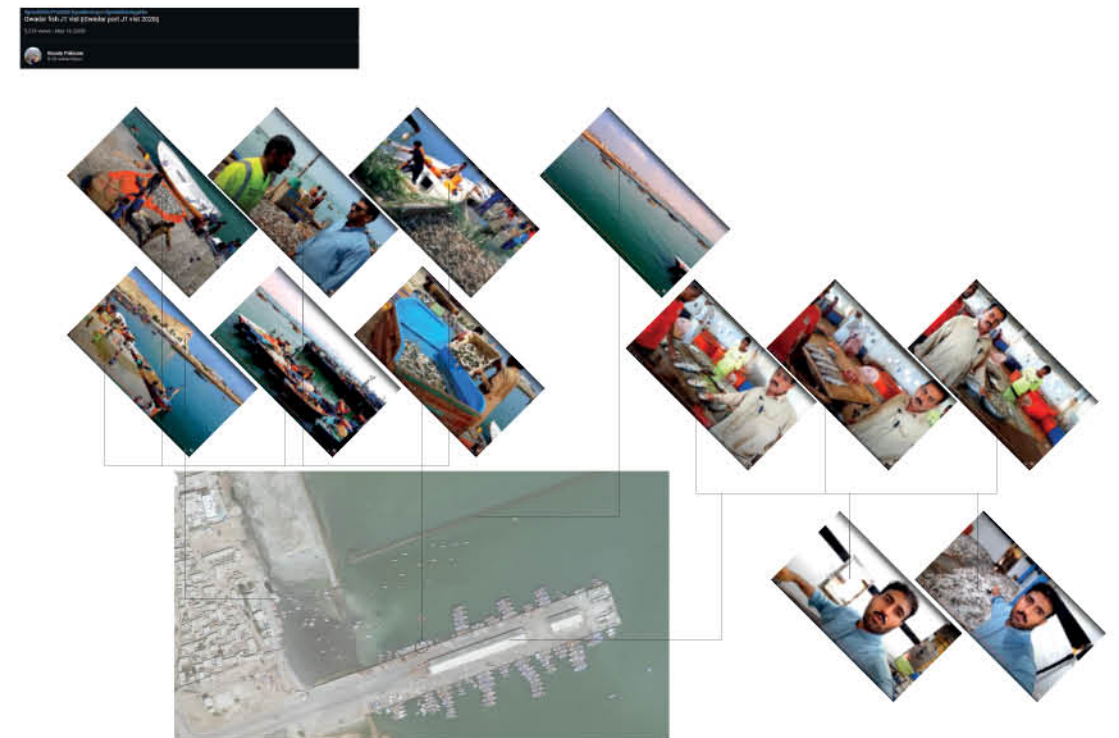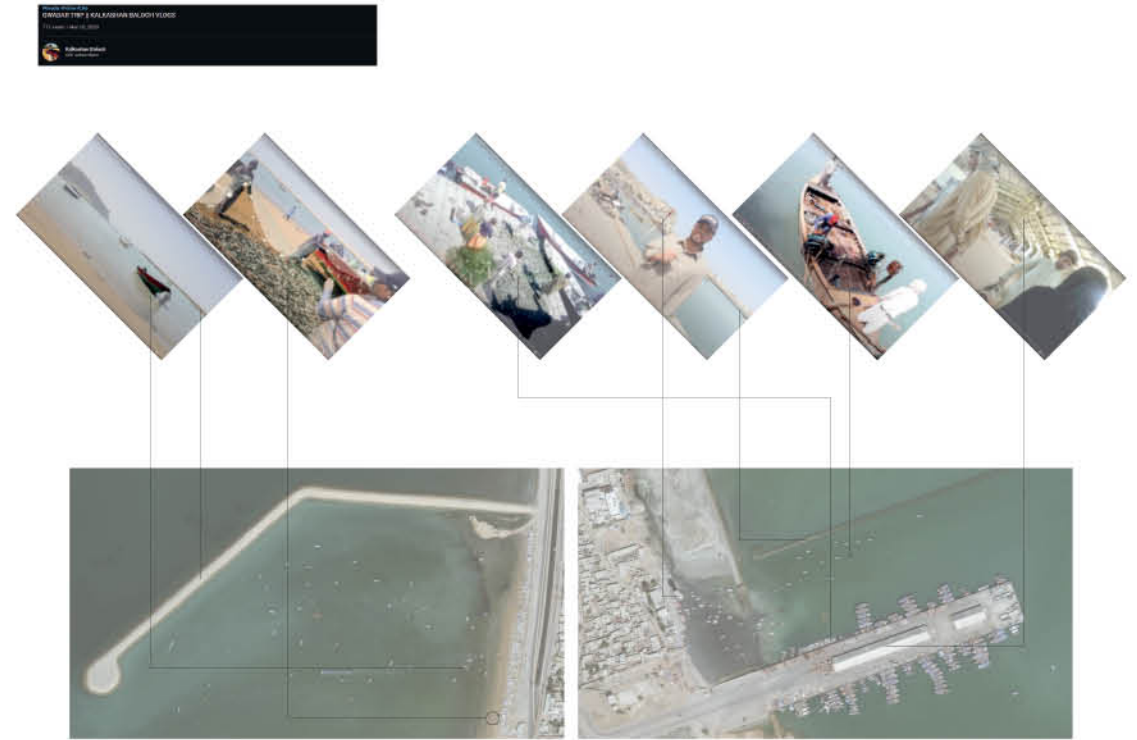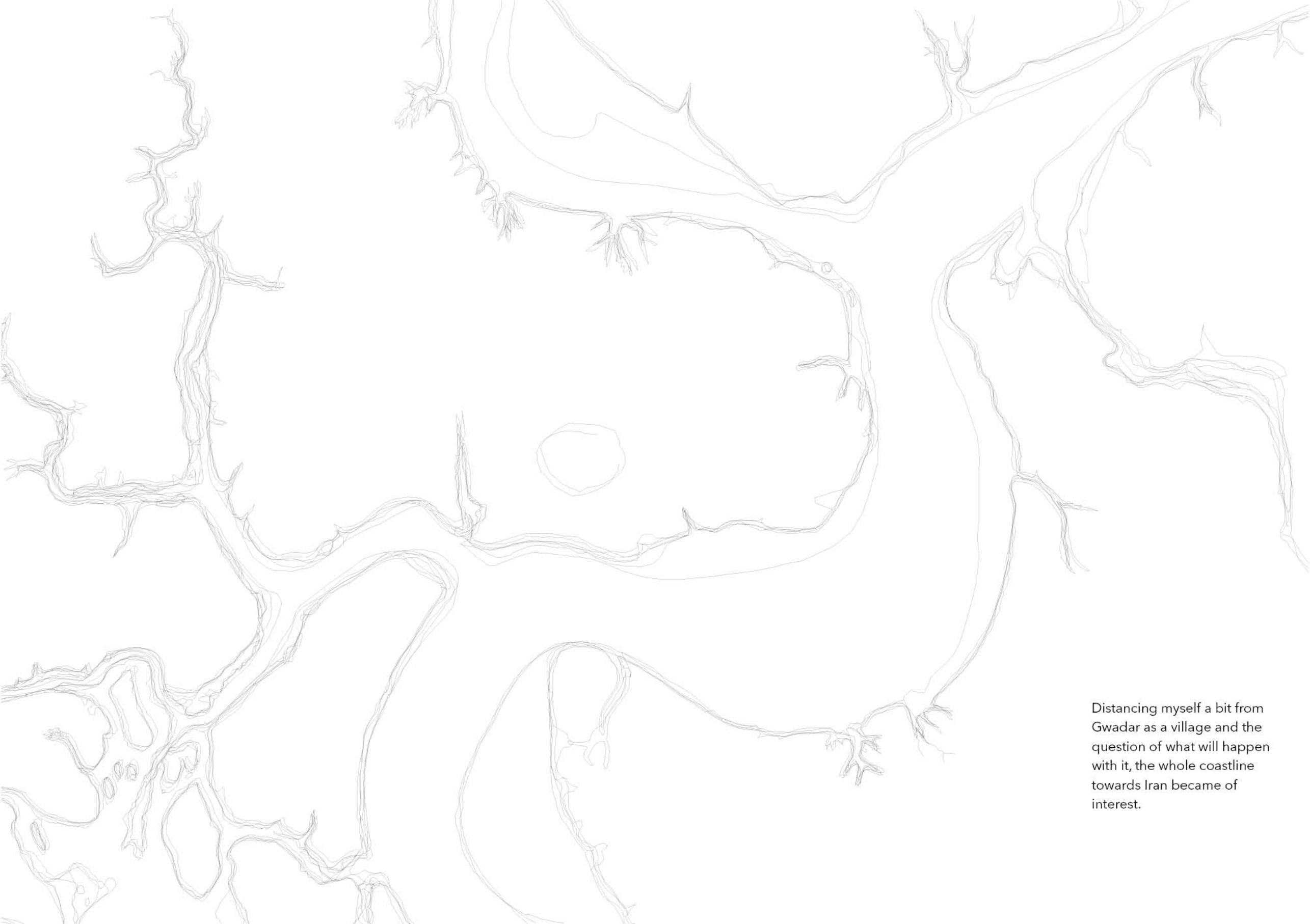
Distancing myself a bit from Gwadar as a village and the question of what will happen with it, the whole coastline towards Iran became of interest.

Iran Pakistan

silting

Gwadar

Pishukan
gaining

Ganz
erosion
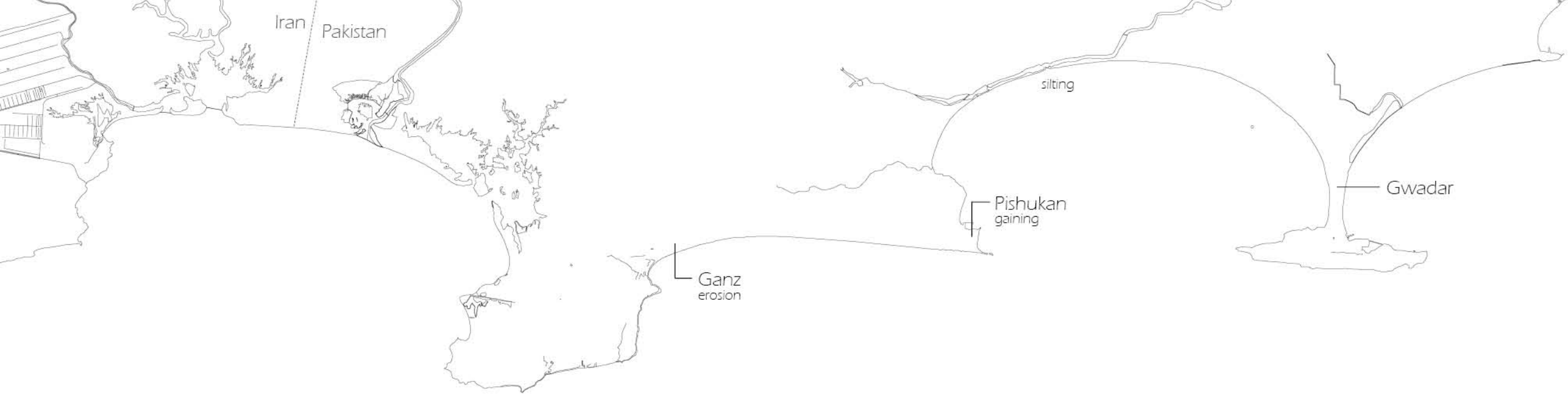
Along the coastline different natural phenomena are constantly sculpting the land, affecting local (wild) life. Multiple places have been mapped through time and visible above are the most interesting ones. From now on I started to use only open source imagery to use for mapping out the natural phenomena through time.
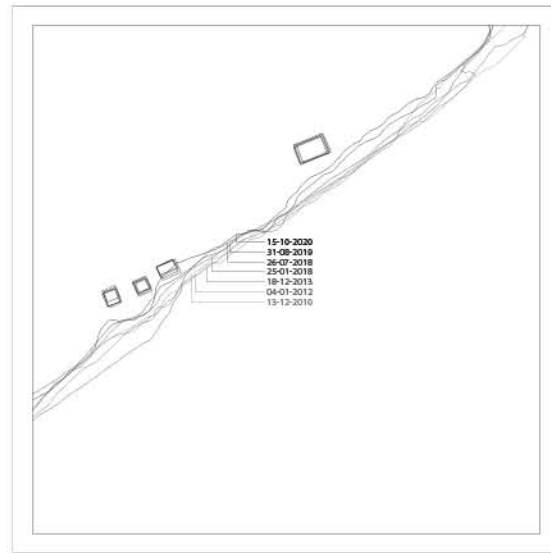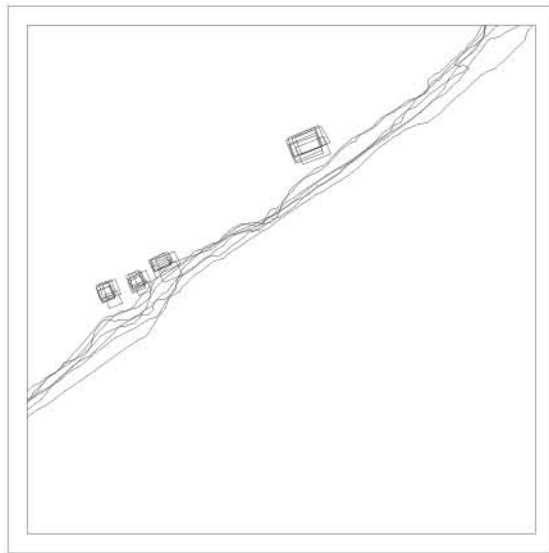
15-10-2020
31-08-2019
26-07-2018
25-01-2018
18-12-2013
04-01-2012
13-12-2010

Near Disaster: Gwadar's Little Village Faces a Crumbling Coastline

As the climate emergency brings rising seas, Gwadar's Ganz village is losing the battle after centuries of existence.

By **Mariyam Suleman**
December 27, 2019

In an article by Mariyam Suleman, published in The Diplomat on the 27th of December 2019 a picture of a collapsed house in Ganz is shared. Because of the architecture in the background of the image, in combination with the village being quite small, it is possible to locate exactly where the picture was taken.

A collapsed house in Ganz village. Photo by Mariyam Suleman.

Erosion

In the year 2019, a small fisherman's village close to Gwadar, named Ganz, has been a victim of rising tides and coastline erosion. Some seaside houses have collapsed as the sea eats out the land underneath. By stacking multiple satellite images of the village through time and carefully mapping the line which divides the land from the sea as far as visible; an attempt is made of mapping out the erosion of the coastline. The drawing on the right is manipulated following the architecture of a collapsed house. The layers of the drawing are relocated so the top left corner of the house is in the same place. By doing so the accuracy of the erosion taking place has increased.

15-04-2020
15-02-2019
13-09-2018
06-10-2017
05-10-2014
01-05-2013
28-04-2012
02-06-2011

26-07-2018
01-05-2013
31-03-2011
08-10-2010
21-11-2003

26-07-2018
01-05-2013
31-03-2011
08-10-2010
21-11-2003

Siltation

The flows of both rivers and sea are constantly fighting against each other here; resulting in a landscape with a rapid visible change. Mapping out the mass and fluid through time it becomes visible there are a few locations within which have left a trace through time. The silted water changes the landscape surrounding the estuary and forms a unique type of sediment. This sediment is very fertile and houses many small lifeforms. Although I haven't found any results of this particular landscape, I can imagine it works in a similar way the sand engine in South Holland works. The sand engine is an intervention to replenish the Delfland Coast. Apart from being more cost efficient and dealing with less maintenance, it also helps to restore nature in the surrounding areas.

Gaining

This phenomenon is called gaining, because through man made architecture and the natural flows of the water; land is being added along the coast. It can be looked at as a form of reversed erosion. In both drawings two forms of reversed erosion are made visible, one which is completely machine based (on the left) and one which is gradually being sculpted by nature (on the right). In both examples an intervention is needed along the coastline to make the sediment stay.

Satellite images have a resolution of 31 cm per pixel from 2014 onwards. Military used drones on the other hand had a 1,6 cm per pixel resolution in 2017, which has probably increased already, being much more precise. Satellite images are only showing a particular moment in time, when the land is most visible. Clouds can perturb the view and hide what's underneath. Satellites also capture an image of a sphere with lots of rough surfaces and to get the images onto a flat screen the images have to go through a process of orthorectification, stretching and contracting the image to make it appear to be at nadir. But the process can not (yet) create what isn't captured. And at last, to reduce the size of each captured moment, the images are layered. Sometimes different moments from different satellites, resulting in a patchwork of images.

Modi
Operandi
Workshop

2.5D MODEL

During the workshop I tried to visualize, spatialize and materialize flux.

In the first two pictures we are looking at a stacking of satellite images backwards in time, the second two picture are the same model, but flipped around to look forward in time.
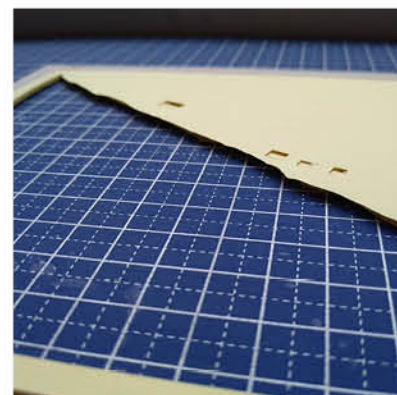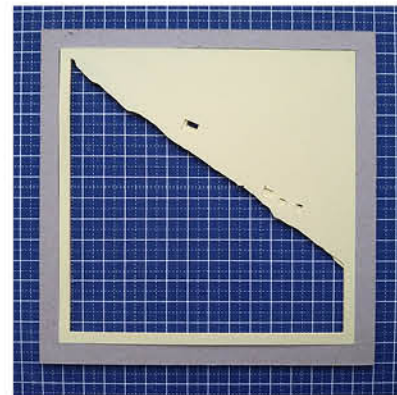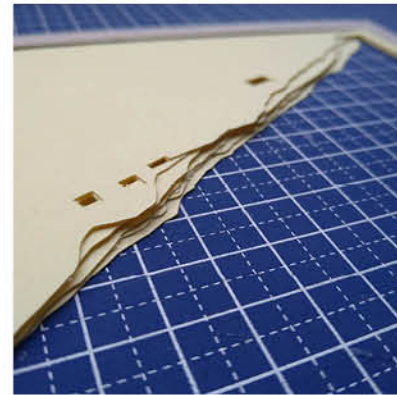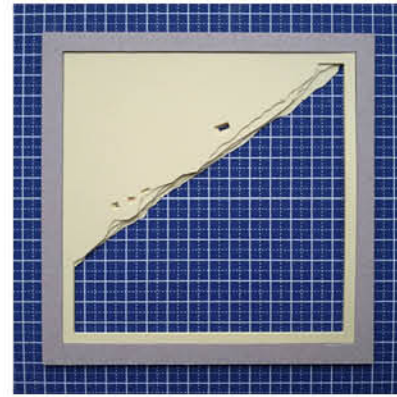
Here a process is visualized by the stains left behind on the cardboard after natural evaporation. The cuts in the cardboard are representing architecture as a constant factor throughout the process.

Modi
Operandi
Workshop

ASSEMBLAGE

This is a set of photographs of the process of sedimentation in different stages. Where I tried to make the architecture unaffected by the natural process of evaporation, but through unaccounted forces you can see the architecture is somehow still affected.
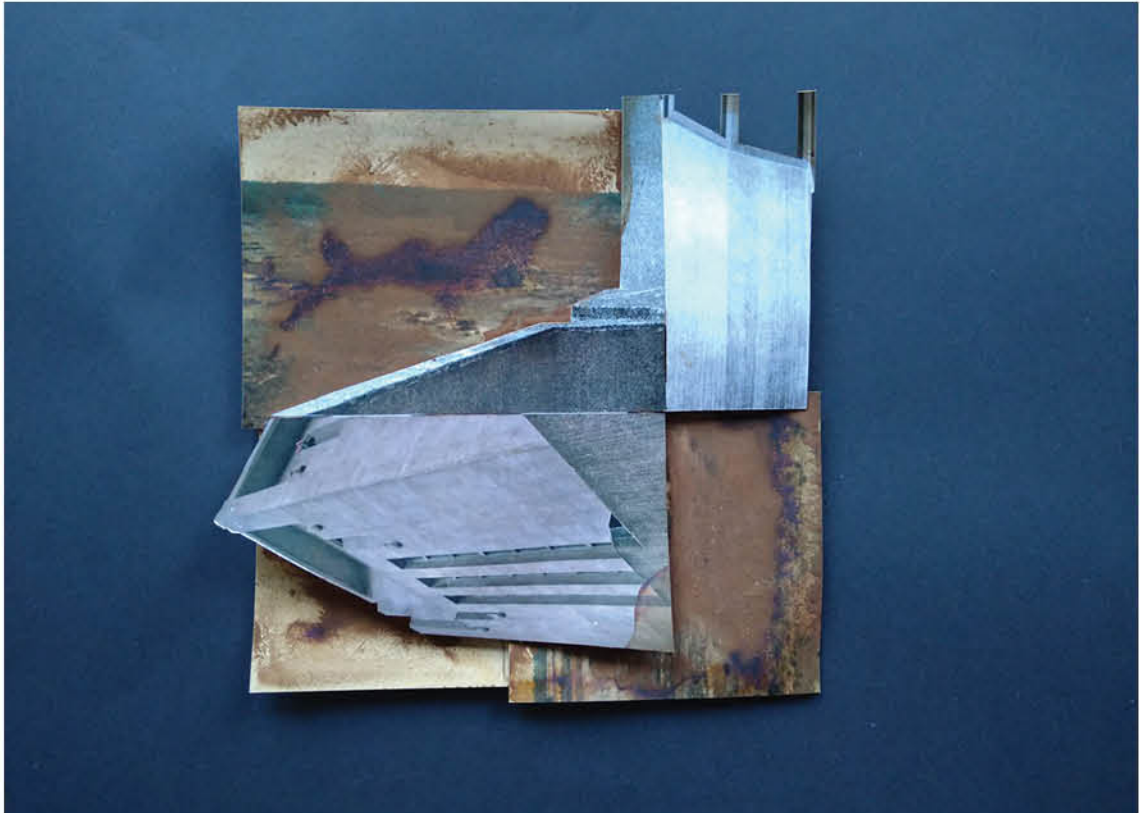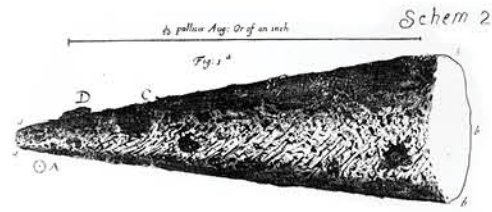
Modi Operandi Workshop

ATMOSPHERE & TECTONICS

Next to visualizing a process I tried to visualize distortion. With the use of water, bubbles and string; and the adhesive forces I managed to deform the underlying 'precise' grid.
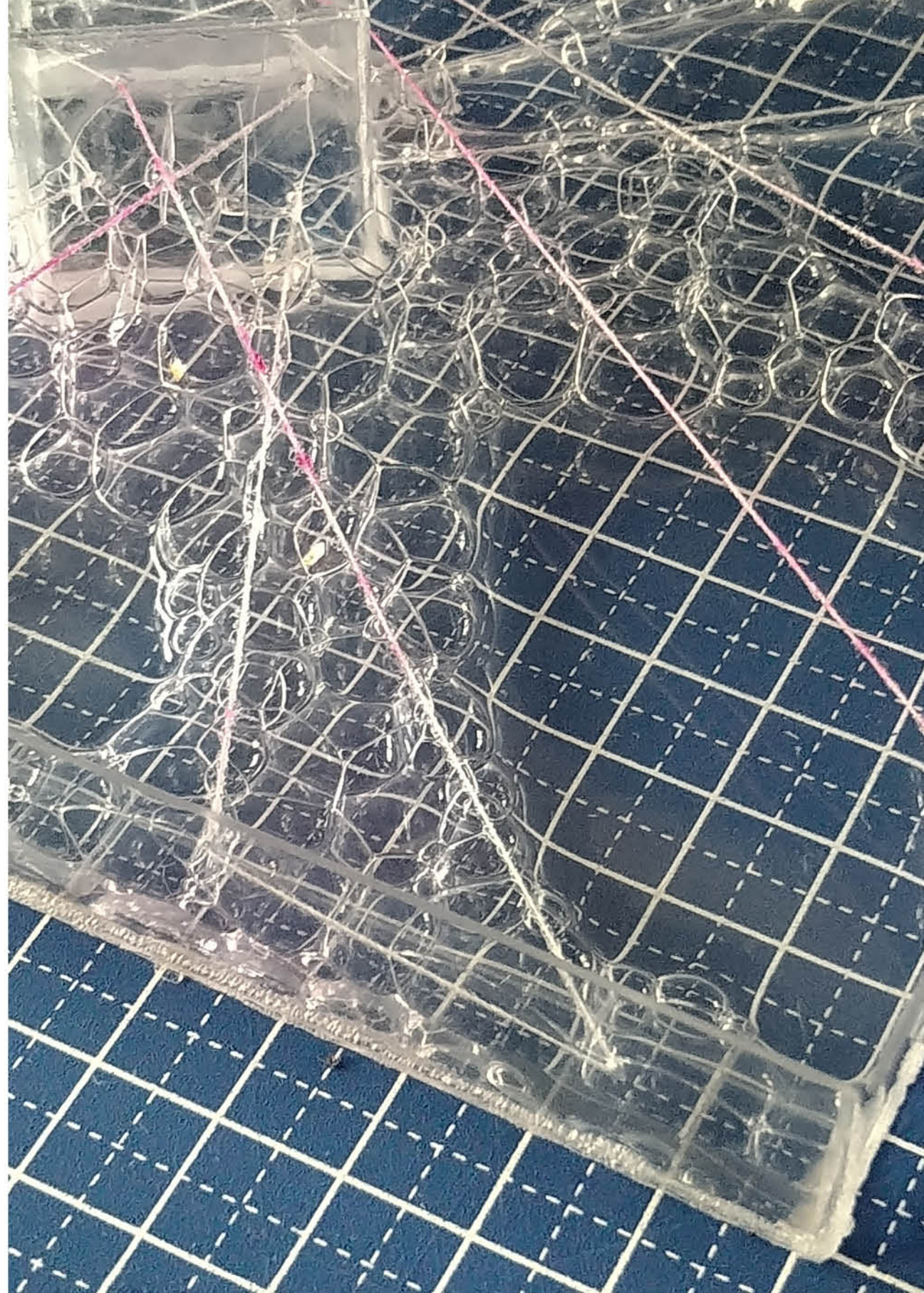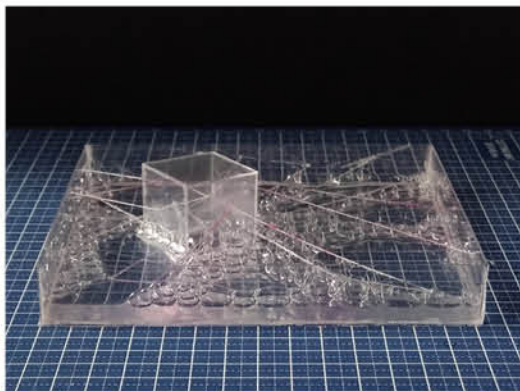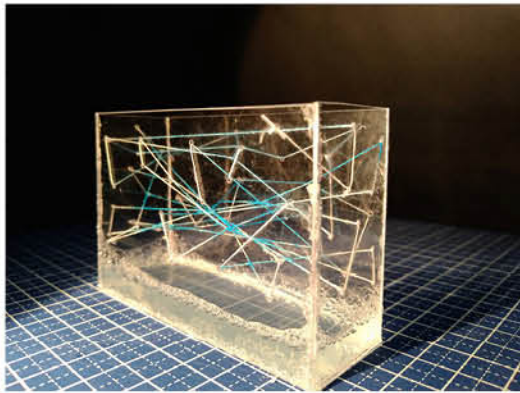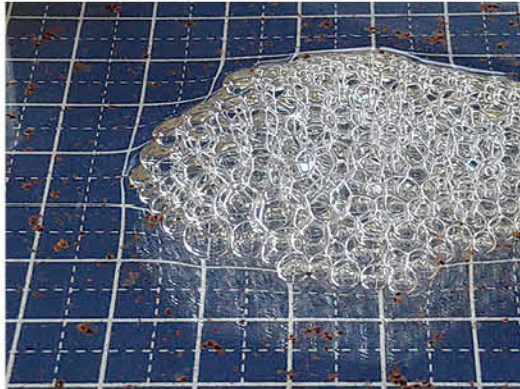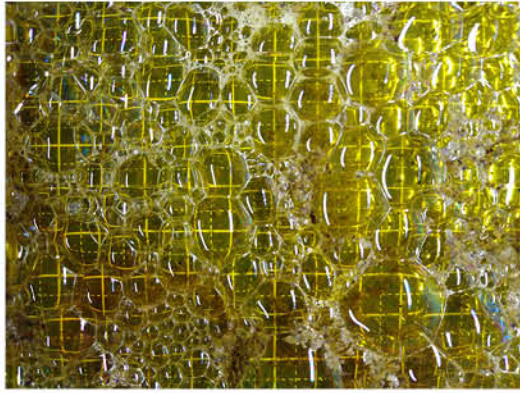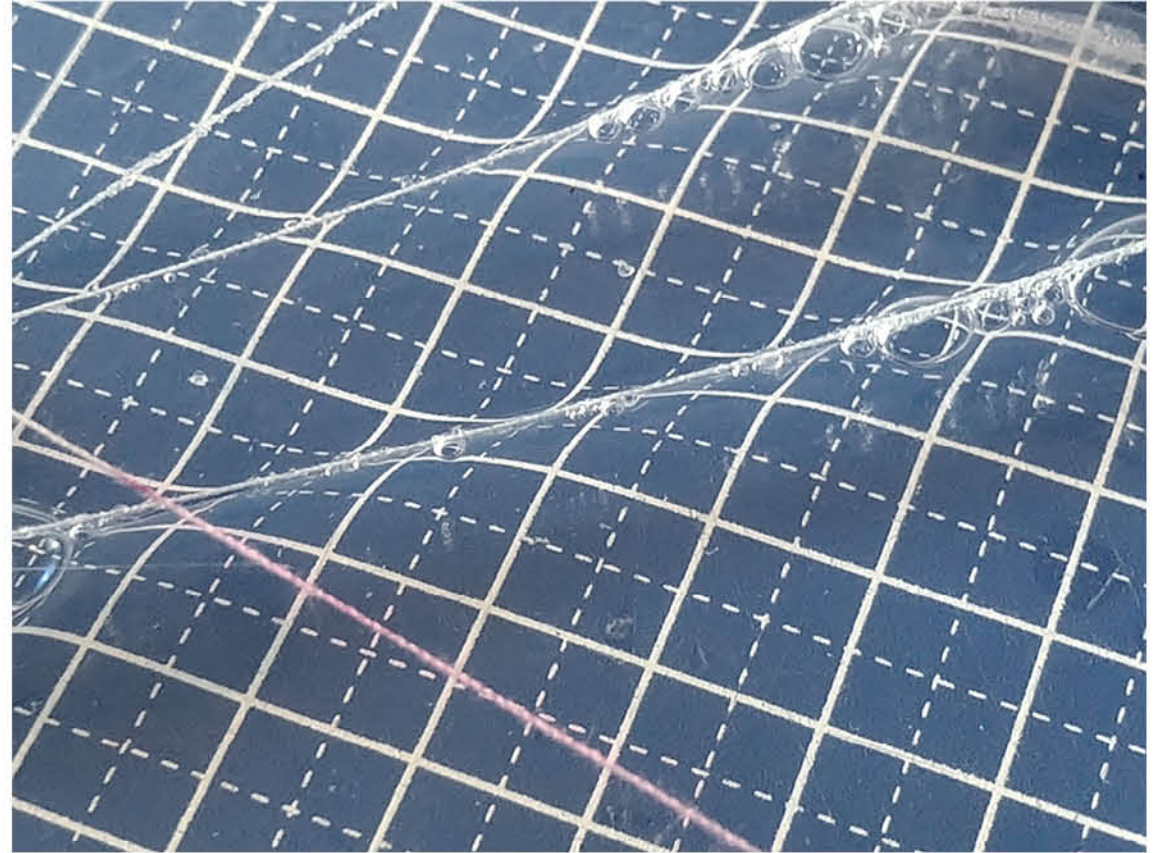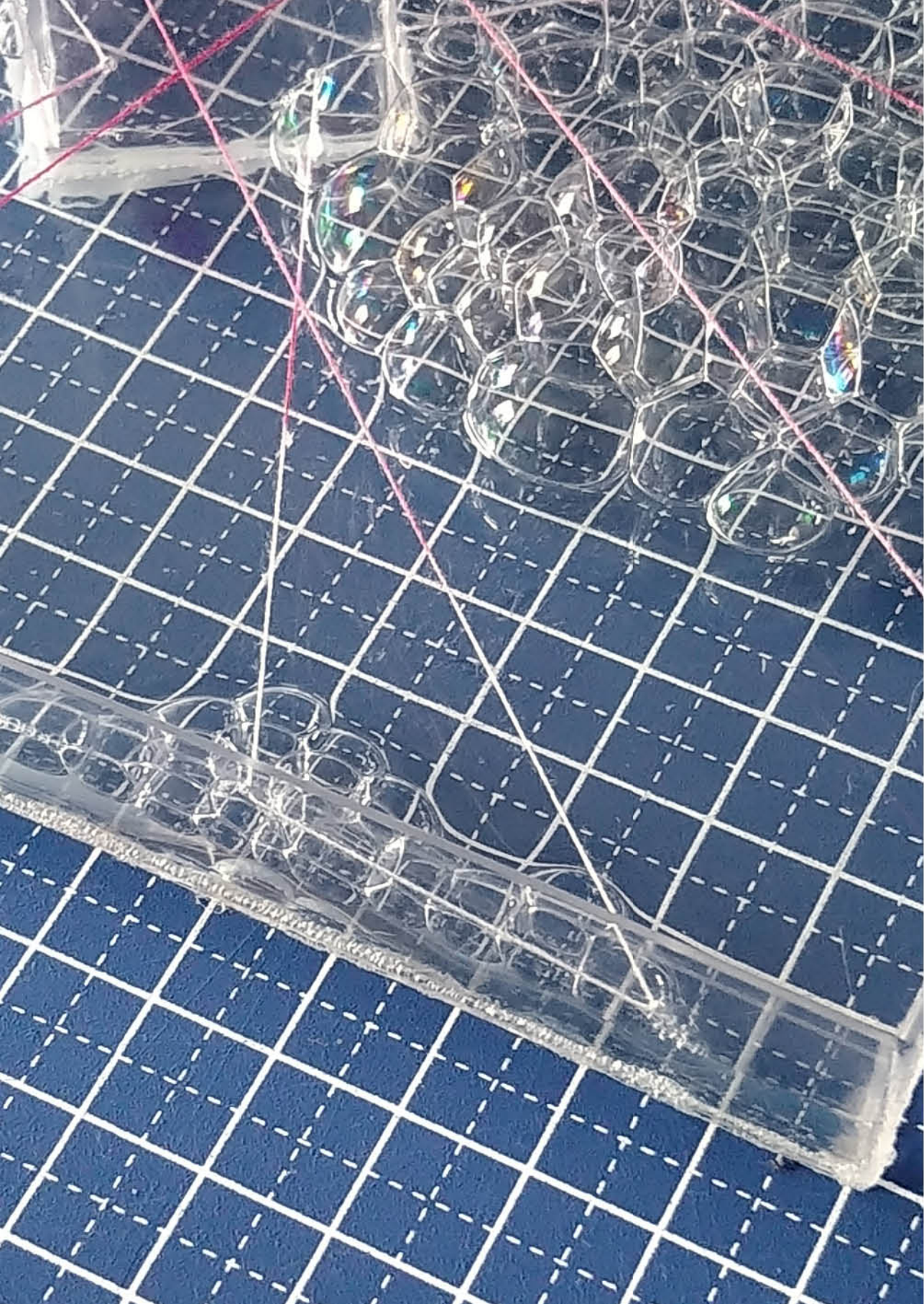
Robert Hooke - The point of a needle (1665)
The Architecture of Error

Looking at Robert Hooke's point of a needle, the needle being something which is engineered, through the microscope. We see there are a lot of bumps and isn't at all as precise as we thought. Same is said about the mark of a full stop on paper. And these are one of the more pretty examples.

Robert Hooke - The mark of a full stop (1665)
The Architecture of Error

"… when artists talk about their work we learn not so much about their work as about the delusions under which they work. When architects talk about their work they will almost always mention the word "precision." But when as architects we talk about how "precise" a drawing, a detail, a material system is - something we frequently and automatically do both in practice and, even more so in education – we betray, …" - Francesca Hughes

This quote by Francesca Hughes in the opening of the book *The Architecture of Error* confronted me with the ethernal search and fetishazation towards ultimate precision, something you could say is unreachable.
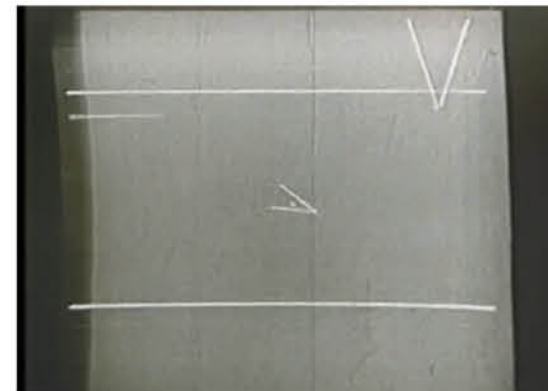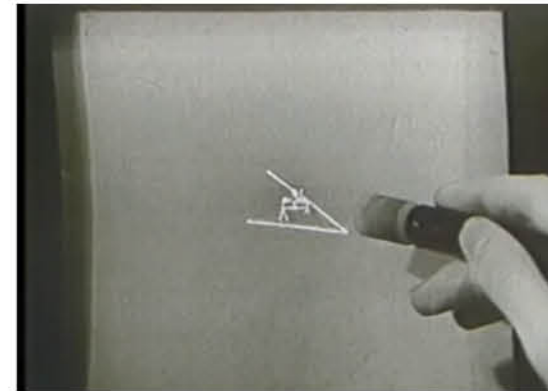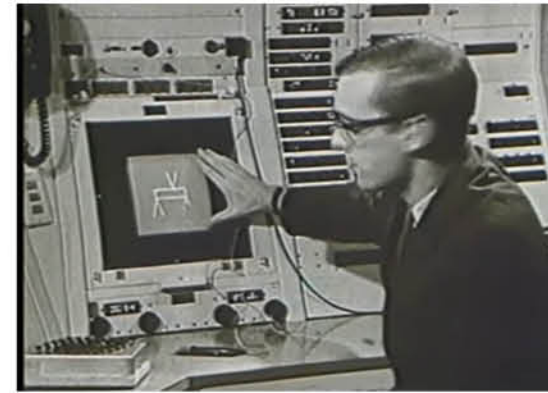
Stills from the video explaining the first computer sketchpad (1963)
The Architecture of Error

When the computer became in use to make drawings, a much higher precision can be reached. But while zooming in and out you can see the lines which first appeared to be attached aren't and the grain is becoming two lines. This 'grain' they talk about in this video explaining the first sketchpad in 1963 became the 'pixel' later that year. Nowadays the precision to which we can draw in the computer is immense. But why should we draw, for example, a brick to .001mm if two bricks are never exactly the same? Why does this precision matter so much as the building is made by others, and in another medium: matter.

Nu descendant un escalier no 2 (1912) -
Marcel Duchamp

Eat Art (1975) -
Daniel Spoerri

Broken Circle/Spiral Hill (1971) - Robert Smithson

A constant motion is something which is already often addressed in art. For example the work of Marcel Duchamp; where an abstract figure is walking down some stairs while seeing every movement superimposed or a large collection of the work of Daniel Spoerri; where he would freeze the end result of a feast, showing what hás happened.

The work of Smithson is something different, not being one end result, but really sculpting the land. His work iterates on the irreversible, as Smithson says it can never become the same as it once was.

error producing architecture

Diller Scofidio + Renfro - Blur Building (2002)

The Blur Building is an installation that is constantly monitoring the environment on the humidity, temperature, wind's speed and direction and producing a cloud formation accordingly. Moving unregulated it creates a space where data is producing the architecture.

Toyo Ito & Associates - Tower of Winds

The tower of winds doing something similar, small lamps changing colours according to the surrounding sounds and its neon rings rippling according to the winds of the city. There is not one result and it will never be exactly the same as it once was.

architecture producing error

Ueberall International - San Diego International Airport Mediatecture Art Piece (2015-2017)
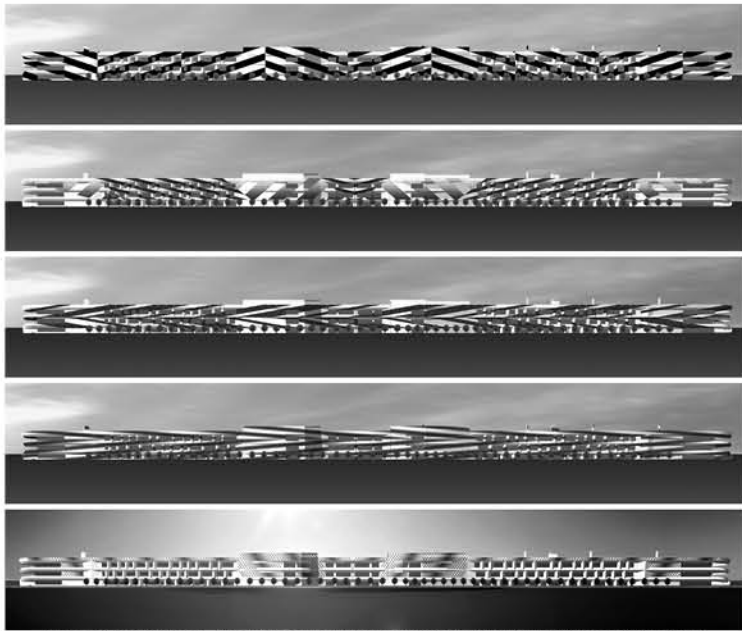
Architecture can produce visual errors, for example the Dazzle Camouflage Wilkinson invented during World War I. The camouflage is hiding the exact path the boat is heading, making it difficult to shoot torpedoes. Using a similar technique it can be used to hide the architecture from satellites or possibly playing with the idea of lost in scale.

To introduce a second technique of the technology used for e-readers, called E INK, that uses minimal energy to change its colour and only using energy when the actual change is happening. This way the pattern can even changes according the gattered data.

I have chosen a location
along the West Bay of
Gwadar where different
types of landscape come
together. A seasonal river
in the North, a mountain,
a minor village and the
coastline. I want to introduce
a set of monitoring stations
in the surrounding land
transmitting data to the
central location in real-time
forming the project.
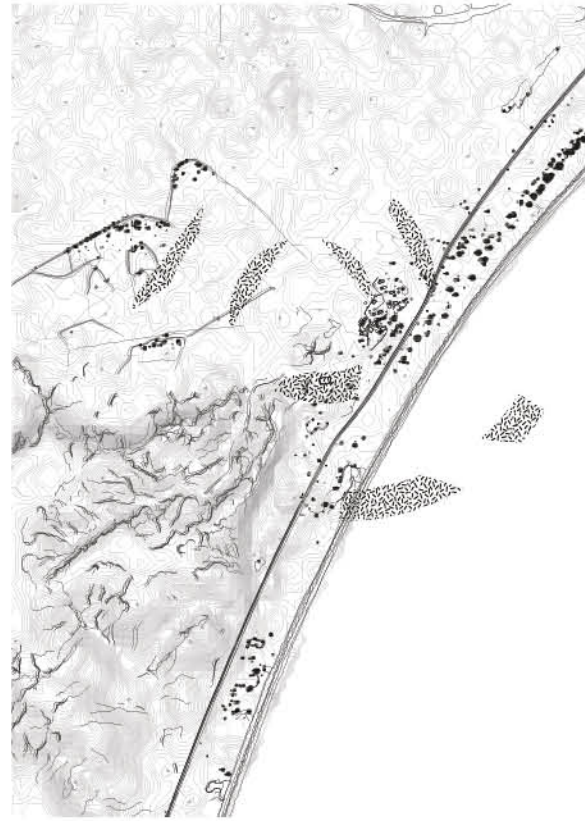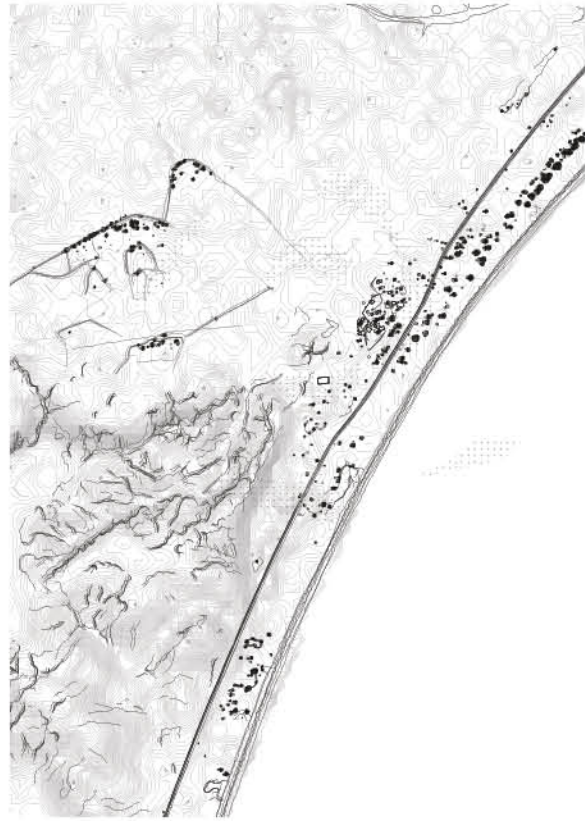
The project should be getting a more precise view of the landscape in flux, while producing architecture that is always experienced differently. Zooming in I have mapped the visual changes through time similarly to the natural phenomena shown earlier as a base layer with on top different scenarios which can occur through time, because the data forming the project is unpredictable. But only when being mapped through future time the project would be visible in its full completion.

20-04-2020
13-09-2018
01-05-2013
02-06-2011
21-12-2010
01-05-2004

Isamu Noguchi - Moerenuma Park (2005)

Landscape in Flux

Where data is embedded with error, architecture can clarify.

I want to end by showing a design by Noguchi, which he pitifully couldn't experience himself in completion. Moerenuma Park, a park full of attractions where you can experience the fusion of nature, art and architecture. Here being a fixed playground for everybody at any given time. Where I want to introduce the Landscape in Flux, where data is embedded with error, architecture can clarify.

Landscape in Flux

Precision and error of the natural phenomena affecting the coastline

Abstract – Natural phenomena are continually changing the coastline and sculpting the land in various ways. By surveying these changes a map can be produced of a landscape in flux. But if the landscape is ever changing, what does it tell us about the precision of flux. The essay also tries to give an answer to the question if there can be error in flux or if the essence of flux is made out of error. First it will be introduced by looking at the representability of open source satellite imagery and the intelligence behind the processes they go through. In the process minor errors can appear that can affect our resolution of a place by looking from afar. These errors are tried to make apparent by mapping out three different types of natural phenomena in combination with man made architecture. The topic will be surveyed with the use of a case study surrounding Gwadar, Pakistan.

**Keywords** – coastline, flux, error, precision, open source, Gwadar

Introduction

Water has always been a divider or indicator of territories. Going back to ancient times a large river has been the end of one's territory due to the lack of resources that make it impossible for crossing the river. Crossing it would enter someone else's. A stream of water would indicate vital grounds surrounding it to use as agricultural land, even claiming the land up until the source. In mountainous areas the deviation is indicated by the absence of water, meaning the watershed line. And in the most clear separation the ocean or sea dividing land and water; mass and fluid. Due to the constant motion of the water, there have been lots of disagreements around the political borderline between lands. At the political borderline between Austria and Italy there is a small portion of the line which is on top of a glacier. This makes it difficult to measure where the watershed line exactly is. There have been multiple experiments to map out the movement of a glacier, for example with colored stones with dates written on them. These stones were placed on top of the glacier in a carefully chosen line along the width of the glacier and mapped with coordinates. After a while the stones were searched and mapped again and the deformed line would give an estimated change in the movement of the glacier. Here the question of precision arises. The stones can be affected by other phenomena such as gravity and the melting of water underneath. After completing the experiment multiple times faults in the system occurred, because the stones were actually falling through the ice. In the case of the glacier dividing Austria and Italy a different system is used. On the Gräfferner glacier in the Ötztal Alps a set of 25 measuring devices have been installed. These devices are placed in a 5 by 5 grid to carefully map the watershed line on top of the ice sheet. Because the glacier is constantly moving, the watershed lines move with it. This line is drawn by a machine tracing, in real time with data received from the sensors, the political borderline between Austria and Italy. Both countries have hereby agreed upon a moving border since 2014. (Ferrari, Pasqual, & Begnato, 2019) This is a clear example of mapping a landscape in flux. But what does the result tell about the precision of flux and can there be error in flux?

Looking closer at the case study of Gwadar; a fisherman's village relying completely on the Arabic Sea. Gwadar is located in the west of Pakistan situated only 70 kilometers to the border of Iran and more than 500 kilometers from the largest city Karachi. The village has recently become visible on the global radar due to the Chinese investments to make Gwadar into a world trade port along the New Silk Road. It has always relied on its fishing industry which is now being disrupted by the newly built infrastructure along the peninsula. The coastal area of Balochistan is affected by constant natural phenomena such as sandstorms, erosion and drought; shrinking the peninsula of Gwadar and slowly running out of drinking water. The Chinese investments have promised a better future for Gwadar, but momentarily are only affecting the lives of the locals in a negative sense by cutting off access to the sea and securitizing the whole area in a strict manner.

The way Gwadar is researched upon, we have to take into account the place is observed through the lenses of open source imagery and with a rather biased view of a Western perspective. The mentality of my perspective is focused a lot on improving situations which are in essence already progressively developed. In the situation as Gwadar, where the way of living goes its own way, from hearing the need for drastic change isn't much present. And there's definitely no demand for a developer who looks from a far and transforms the whole region.
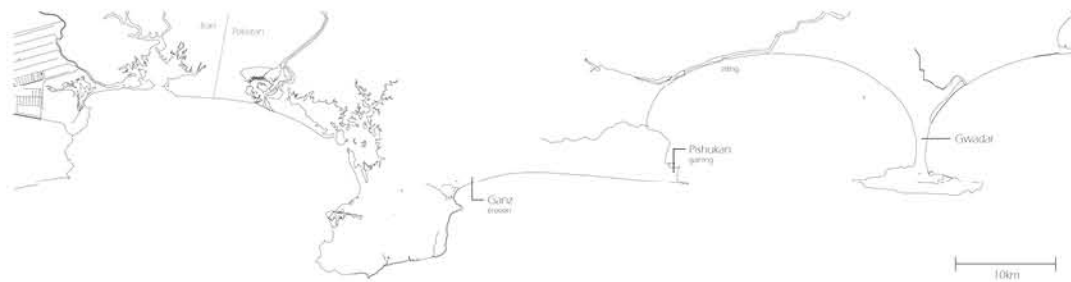
[1] [Coastline surrounding Gwadar, Source: Open Street Map]

Approach

This essay will focus on three locations surrounding Gwadar where the sea is constantly shaping the coastline. At these locations different types of natural phenomena are the cause of the coastline being in flux; erosion, silting and gaining. [1] These natural phenomena are at interest here because they are either taking away land resulting in possible disasters, changing frequently it produces a unique type of soil or adding land by a natural process. The places are located at the West of Gwadar and chosen because of its effect it has had on local life. After looking carefully in a zoom-in view at places along the coastline throughout the historic images of Google Earth's satellite imagery, it is apparent our view is distorted. The imagery shown underneath is through satellite images geolocated on top of each other and traced. Through man made architecture the faults in the satellite images are made visible. [2]
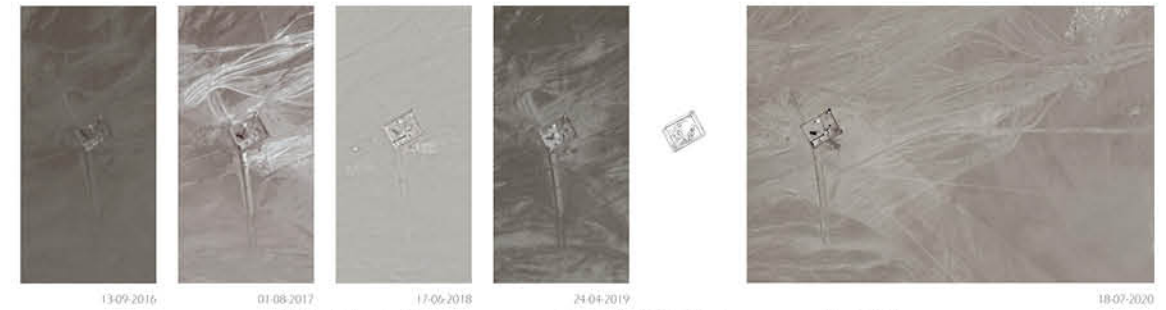
[2] [Faults in satellite imagery, source: Google Earth Satellite imagery traced in QGIS]

To what extent is the mapped distortion changing our view on a place? Or can it even be a right representation, as we could look at the world as mass in flux? As the world is 'flying' through the universe and tectonic plates are ever changing the environment we live in. In art the constant motion is often addressed as the essence of the work. For example the work of Marcel Duchamp; Nu Descendant un Escalier (Nude Descending a Staircase) where an abstract figure is walking down some stairs while seeing every movement superimposed or a large collection of the work of Daniel Spoerri on Eat Art where he would freeze the end result of a feast, showing what has happened. Architect, academic Francesca Hughes confronts us in the introduction of the book; The Architecture of Error with: … when artists talk about their work we learn not so much about their work as about the delusions under which they work. When architects talk about their work they will almost always mention the word "precision." But when as architects we talk about how "precise" a drawing, a detail, a material system is - something we frequently and automatically do both in practice and, even more so in education – we betray, … (Hughes, 2014) Architects have a fetishization for drawing with huge precision, but not only is the building made by others, it is made in another medium; matter. Nowadays most drawings are made on a computer which is able to project towards an invisible precision.

In 1963, when the first computer sketchpad was being introduced in a TV show a form of false precision was shown. Two lines appear to be attached to each other at their ends, but when zoomed-in the lines are seen to be detached. When zooming out the line becomes a grain on the screen, which later will be called the pixel. (Hughes, 2014) Before addressing the natural phenomena affecting the coastline, I will give an introduction on the visibility and its precision through which I have been experiencing Gwadar and its surroundings.

Visibility

The only way of getting to know Gwadar was through the screen and some verbally transmitted anecdotes. We have to take into account how the intelligence behind these publicly available imagery works. For example the technology of drone detectability can already make an immense precise image in the resolution of 1.8cm per pixel, but is only used in the military. If these images were to be available for everybody, the human rights were to be violated. This is why the public available resolution of satellite imagery is 31cm per pixel, to make people untraceable. (Weizman, 2017)
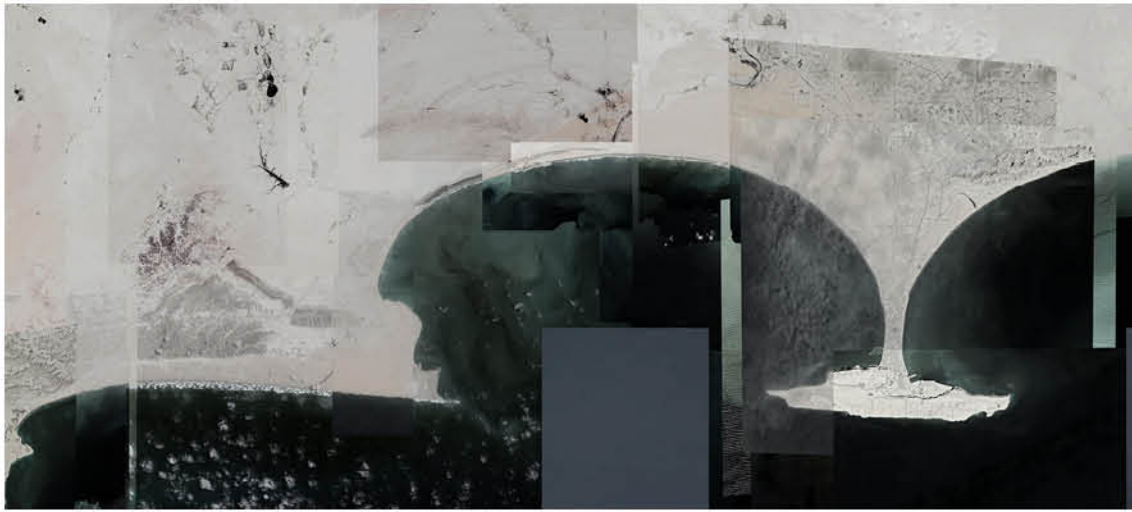
[3][Layering of satellite images, Source: Google Earth]

[4][Mapped boats along the political border, Source: Google Earth]

Not only does the resolution of the images available play a role in how we see a place through the screen, the satellite only takes shots in a sky without clouds. Otherwise the image would be of no use. This means we are constantly looking at a place through the lens of a cloudless day without the rough weather which could appear. Even the images and videos that are made publicly available aren't taken in rough weather conditions, but we mostly see the results that are caused by natural phenomena. Furthermore, the satellites take shots of rough surfaces that extend beyond the two dimensional and overlaying multiple shots to increase resolution. Only the other shots are taken by different satellites at different times, which results in a patchwork of images. [3] While prepared for viewing on screen, the images have to go through a process of orthorectification. Images can be geolocated upon its right coordinates, but to be viewed completely correctly, the images have to be stretched and contracted to remove its internal and external distortions. The process of orthorectification tries to make sure every pixel is viewed upon its assigned coordinate, to see the complete image at nadir. (Zhou, Chen, Kelmenis, & Zhang, 2005) When looking at higher buildings it's often possible to see the sides of the building instead of only the top, this is because the process cannot create what isn't captured.

Even though the resolution isn't most accurate, slightly deformed and the images and videos show a particular moment; places we cannot access are made visible. The location of camps, secret plantations and other sorts of places, that don't want to be discovered, are surfacing. The image shown earlier [2] is, for example, a possible location of a smugglers camp along the political border with Iran. This location is found through surveying small boats crossing the border of Iran via the Arabian Sea and following them along nearby rivers flowing into the sea. [4] Forensic Architecture, a research agency based at Goldsmiths University of Londen, uses publicly available imagery to build up a legal case of architectural evidence concerning human rights violations. (Weizman, 2017) After carefully looking through all kinds of imagery and reads, a sense of the place can still be formed.
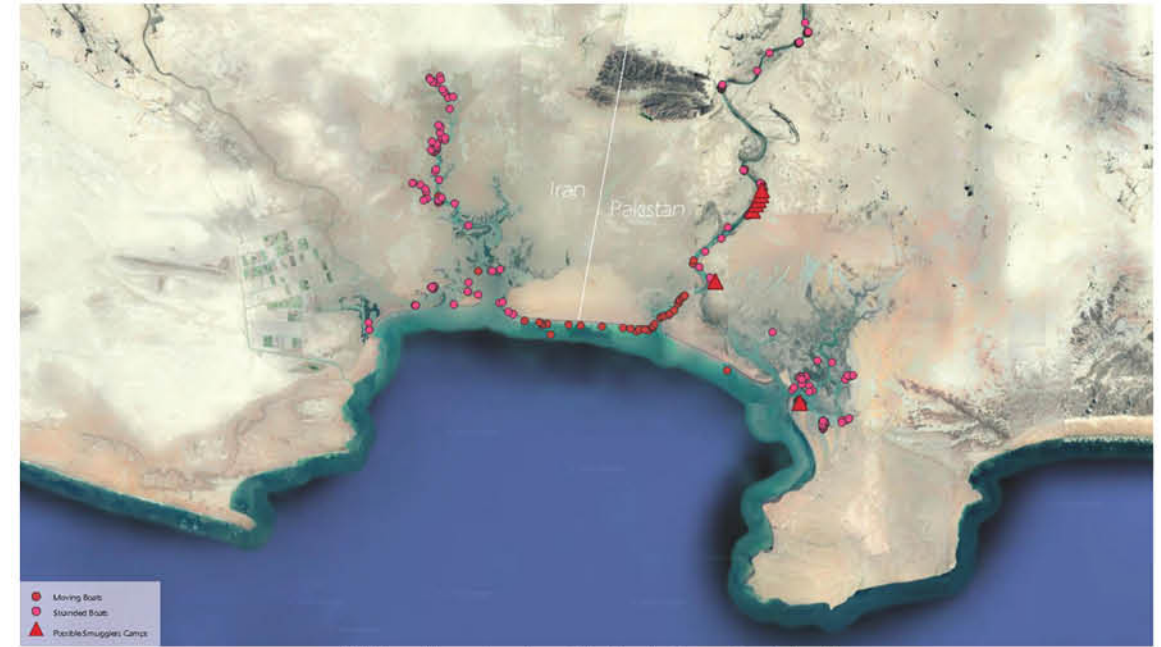
Phenomena

Erosion

In the year 2019, a small fisherman's village close to Gwadar, named Ganz, has been a victim of rising tides and coastline erosion. Some seaside houses have collapsed as the sea eats out the land underneath. By stacking multiple satellite images of the village through time and carefully mapping the line which divides the land from the sea as far as visible; an attempt is made of mapping out the erosion of the coastline. The area surrounding Ganz hasn't been captured in the high resolution that often; so the outcome of the mapping isn't that significant. But the effect of coastal erosion is visible in the drawing. [5]

An article by Mariyam Suleman, published in The Diplomat on the 27th of December 2019 a picture of a collapsed house in Ganz is shared. (Suleman, 2019) Because of the architecture in the background of the image, in combination with the village being quite small, it is possible to locate exactly where the picture was taken. The drawing above is manipulated following the architecture of the collapsed house. The layers of the drawing are relocated so the top left corner of the house is in the same place. By doing so the accuracy of the erosion taking place has increased, but to get more precise lines a lot more data is needed.
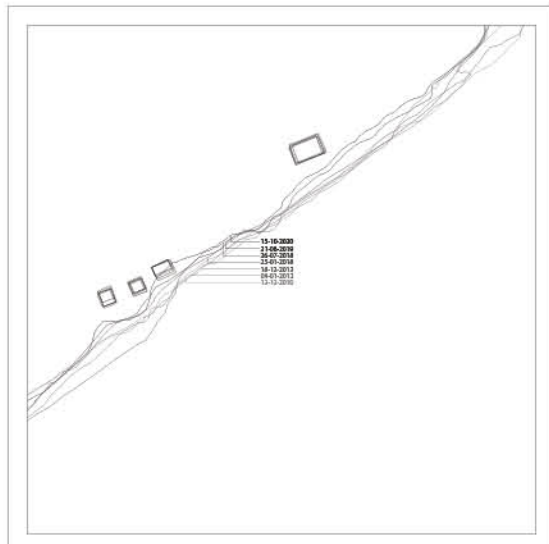
[5] [Erosion in Ganz, Source: Google Earth Satellite imagery traced in QGIS]

Siltation

Along the West bay of Gwadar two seasonal rivers flow into the sea. Before the actual moment arrives where the rivers find the sea, they both follow the coastline and clash into each other. The area in which this phenomena takes place is creating a very unique landscape in flux. The flows of both rivers and sea are constantly fighting against each other; resulting in a landscape with a rapid visible change. Mapping out the mass and fluid through time ends up in a rather messy drawing. If we then would color in the mass, as in the landscape without human interventions, it is visible there are a few locations within the area which have left a trace through time. Areas which have been only mass or only fluid within the satellite images used. As already mentioned, the human interventions can be an indicator of the precision of the drawing and are a reference point through time. [6]

On both East and West of the location drawn above, the river forms a long strip along with the coastline cutting off direct access from the road to the sea. This way a natural barrier is created protecting the road from larger waves. The sand on top of the barrier gets blown inland either silting the water or reinforcing the coast. The silted water changes the landscape surrounding the estuary and forms a unique type of sediment. This sediment is very fertile and houses many small lifeforms. Although I haven't found any results of this particular landscape, I can imagine it works in a similar way the sand engine in South Holland works. The sand engine is an intervention to replenish the Delfland Coast. Apart from being more cost efficient and dealing with less maintenance, it also helps to restore nature in the surrounding areas. Although the expected results aren't happening at the speed which was hoped for, after the first 5 years new forms of life have been found in and around the sand engine. (Stive, et al., 2013)

[6] [Silting, Source: Google Earth Satellite imagery traced in QGIS]

Gaining

This next phenomenon is called gaining, because through man made architecture and the natural flows of the water; land is being added along the coast. It can be looked at as a form of reversed erosion. The drawing made underneath [7] shows the most outer line of the cape of Pishukan. Pishukan is located on the other side of the West bay at the same latitude as Gwadar. In the drawing two forms of reversed erosion are made visible, one which is completely machine based (on the left) and one which is gradually being sculpted by nature (on the right). In both examples an intervention is needed along the coastline to make the sediment stay.

To work in a most efficient way first only a wave breaker is built so nature can start its natural process. This way the sediment will reach beyond the calculated, placing itself within the smallest pores and forming naturally. At a certain point of monitoring the shape of the land, the changes aren't that significant from each other anymore. For the gained land, on the left of the drawing, the next process can start; closing of the area to cover from the sea. Now the volume of water needs to be filled with sediment, which is a fully machine based operation sucking sand from the nearby seabed and transferring it to the closed off area. The natural process is what is at interest here, which can't be done at such a large scale without a human intervention.
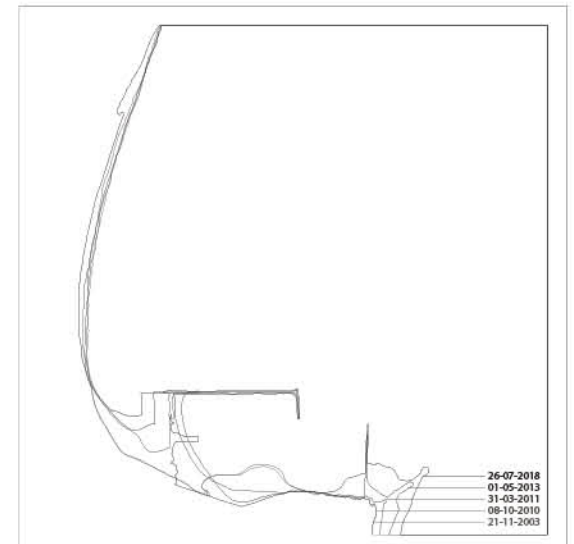
[7] [Gaining in Pishukan, Source: Google Earth Satellite imagery traced in QGIS]

Conclusion

The natural phenomena are natural processes already embedded with lots of forms of error, by being in flux. But, for example, in the case of gaining land; it is actually transporting land from one place to another which is the same for erosion and silting. Something cannot be created out of nothing and is always a result of system or process. Within a system a particular accuracy is set and if gone beyond this accuracy; error can be found in its precision.

In the case study about Gwadar and its surroundings it was difficult to find accurate information regarding the natural phenomena affecting the coastline in terms of its precision. For a landscape in flux I doubt it is even necessary to have such a precise mapping of changes. To predict what can happen in the future; a survey of the past is needed, but what will really happen can only be estimated, there will always be a form of error embedded in the process. In a way we

could say flux consists completely out of error and therefore cannot be mapped in complete precision. The mapping of a landscape in flux is either a momentary estimate or a surveyed average.

Although everything we are looking at through the screen has forms of error, even when viewed in tremendous resolution, senses of a place we cannot visit are made visible. The distortion of the view we are experiencing are results of a carefully calculated system to make sure the finalized image won't cause catastrophic faults. It is impossible to get a precise image on screen of a landscape in flux, but we can use human built interventions to find our way through the distortion and false precision.

Reflection

The navigational disorientation I experienced at the start of the course has now developed towards an understanding of what causes this disorientation. The actual feel of the places has increased, but is a particular view through the screen. The feeling of being lost in a landscape of what is true and precise still stands. But by looking beyond what is visible and understanding the technology behind the system that produces the imagery, I have experienced more of the range of what architecture can symbolize in the search towards an ultimate precision.

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DESIGN RESEARCH

TUTORS

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INTRODUCTION

Before starting the actual
design phase, a lot of
research has to be done
towards a design. Working
without s program of
requirements, everything
is possible. This means I
have to create a program
of requirements for
myself before starting to
draw a building. The next
chapter will explain the
thoughtprocess I went
through.

LANDSCAPE IN FLUX

PRECISION AND ERROR OF THE
NATURAL PHENOMENA

Casper Liam Lie

colour experiment

The first rule I have chosen to use as a starting point to design with is the 31 by 31 centimeter pixel from the publicly available satellite imagery. There is only an issue on the problem of reliability therefore I wanted to have a form of proof for myself. The images on the right show a set of colours painted on surfaces corresponding the the colour sets of CMYK and RGB. The expirment is placed on top of a roof at the Arendstraat 40 in Antwerp, Belgium. With the experiment I'm trying to see if it is possible to seperate the different colours through the satellite image. The coloursquares are places towards to north to have as little rotation in the square pixels of the satellite. The prognosis is that the colours will overlap and different colours will come out, hopefully soemthing will become visible once the Google Earth updates its view on Antwerp.

precision

Precision is one of the leading themes within my design, but the question of how to design with precision rised very quickly. With the pixel in mind I have set a grid to design within. By using a very strict grid it will be more easily to measure the precision within the design. Chosing a square as the base of the grid it will be easy to rotate, duplicate and divide. The grid spreads in a 10 by 10 range in both directions with using the outer rim as the place where all structure can be put. The grid will spread out in both x and y directions.

310

310
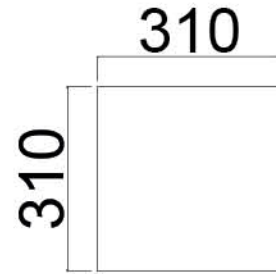
The grid makes a lot of variations possible. Using every 10th pixel as a column it can create a larger open space. Using the outer rim for walls or a whole row of the 10th pixel it can create hallways or larger rectangle rooms. By using a 10 by 10 grid structure the inner space between the structure will be 2 meter 48 centimeter.

3100

310

2480
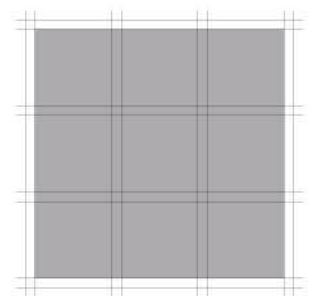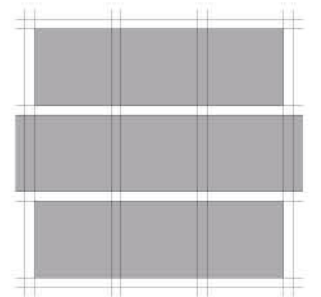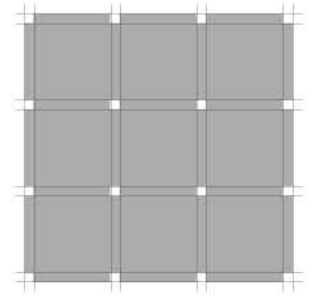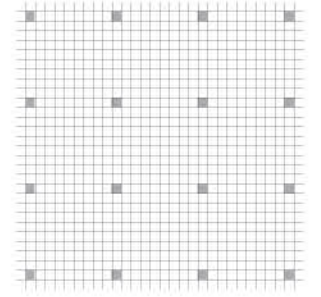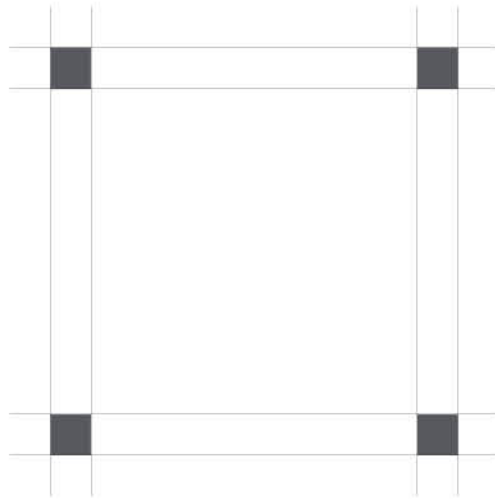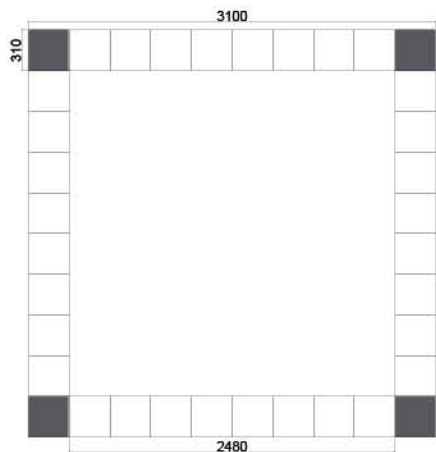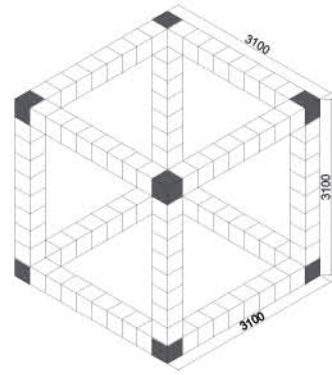
Choosing the 10 by 10 spread it makes it even possible to go into the z-axis with keeping the height of the rooms livible. The primairy structure will be made as ribs within these outer edges of the 10 by 10 by 10 grid system with a 31 by 31 centimeter base.
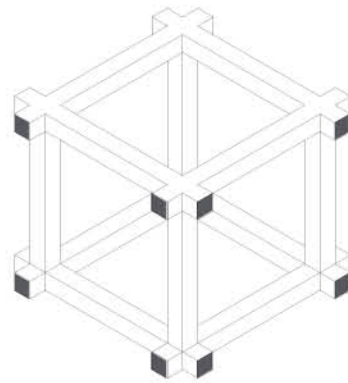
On the next page the grid is projected onto the surrounding langscape. This is again a 10 by 10 system, but this time made with the cubicale rib structure instead of the pixel.
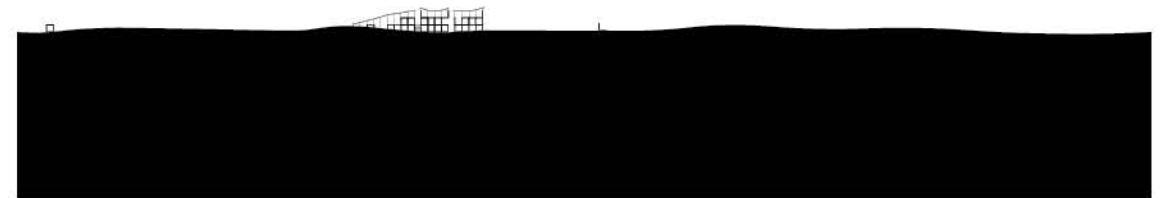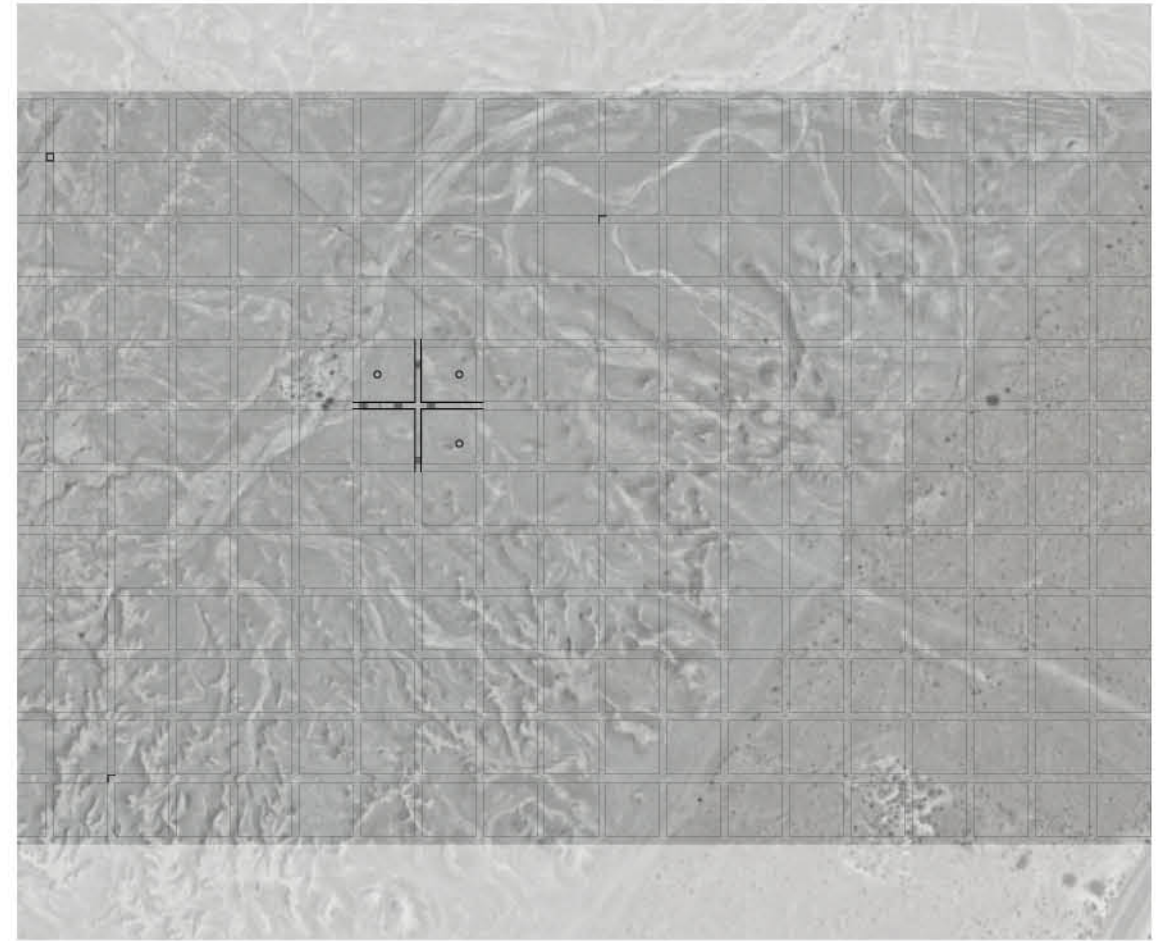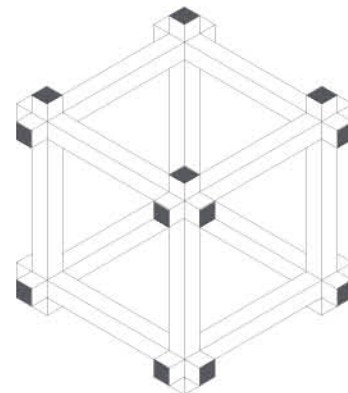
error

With precision comes error and there are a few types of error. Here I want to explain a few examples of the different types there are, showing examples which most interests me.

The first project is from Janne Saario, called Micropolis. Saario was asked to make a design for a skatepark in Helsinki and beefore he started to design he went on a weekend camping at the site of the skatepark. He than found out there was quite some small wildlife living there that only shows itself at night. Therefore he designed strips of grass throughout the whole of the skatepark. A nice gestrure to not disturb the existing wildlife. You could say this is a design prepared against error.

Another more simple example is the Taipei 101, by C.Y. Lee & Partners. Here a large sphere is hung in the middle of the skyscraper to withstand the forces of an earthquake by moving in the opposite direction.

Other types of error are things which were unaccounted for, you could say mistakes. The next project is the Berliner Philharmoniker, by H. Scharoun and E. Wisniewski who designed a concert hall where the sound is equally distributed in all directions, hereby solving one thing, but creating another. The orchestra itself was also affected by this equal distribution.

Lastly there are also projects where error is translated into something else or where projects want to hide stuff.

I'm trying to look one more step further to create a project which uses error to define the project. I could only come up with one example: the Teshima Art Museum, by Ryue Nishizawa. Everytime you would enter this space shown on the last image the water will be in a differente configuration, it is impossible to predict what will happen next. One of the most inspiring projects in my design research.

The research upon the different types of error gave me an idea to add another layer towards the very strict earlier presented grid. If I were to be only using the ribs of a cube to design the whole building it would become a very straight forward buidling. Looking at Sol LeWitt's Variations of Incomplete Open Cubes it gave me a way out of the strictness and adding a level of complexity. Within the whole design, which relies all on cubes there is not one completed cube to be found.
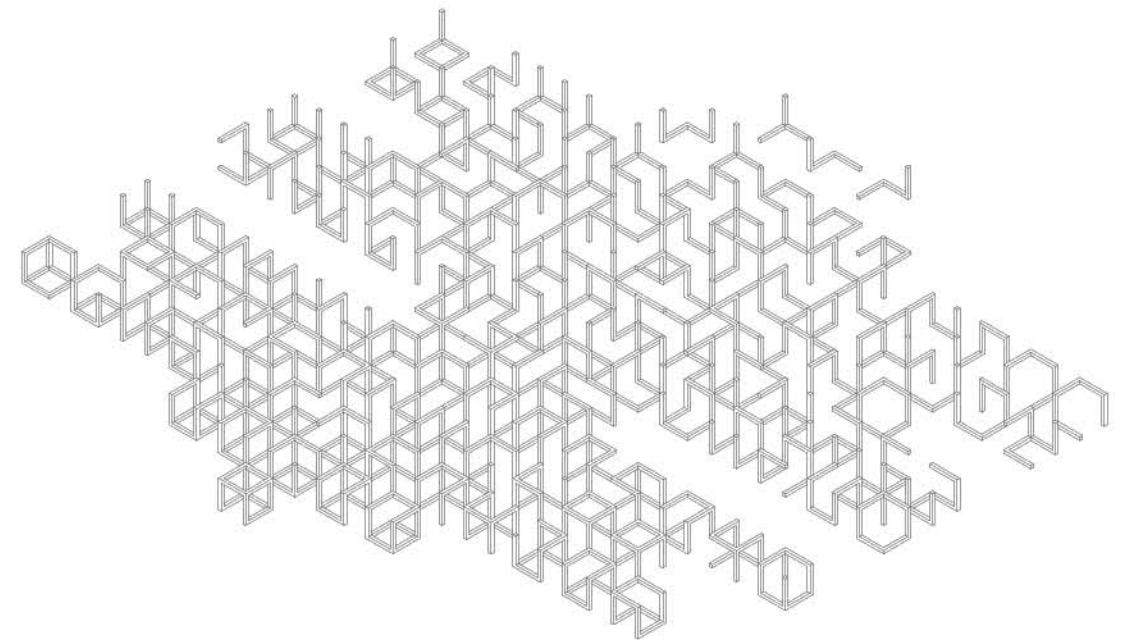
Before starting to design I still had to decide on what type of building to design. Dealing with a landscape in flux the decision was quickly made: a research centre on monitoring the environment. I've done research on multiple research stations and different types of monitoring devices. Following are two example of places I've researched.

Halley Research Station
Antartica

Although Antartica is in terms of temperature completely different as Gwadar, the rest of the weather conditions are quite similar. The Halley Station is a very desolate station where a full team can work all year round. The plan views and watching a few vlogs of people there gave me a lot of insights on how such a place works.

Sandmotor
the Netherlands

The Sandmotor in the Netherlands is a very interesting project because of it's natural changes. The project is the first of it's kind in this magnitude. Natural phenomena are slowly adding onto the seawall without having to do anything. Next to this, different lifeforms are found after the first five years, because of the inner waterway. It attracts a lot of other lifeform and also people for recreation. It is constantly being monitored and gives a lot of information for future similar projects.

With all this background information the design can start to take shape.
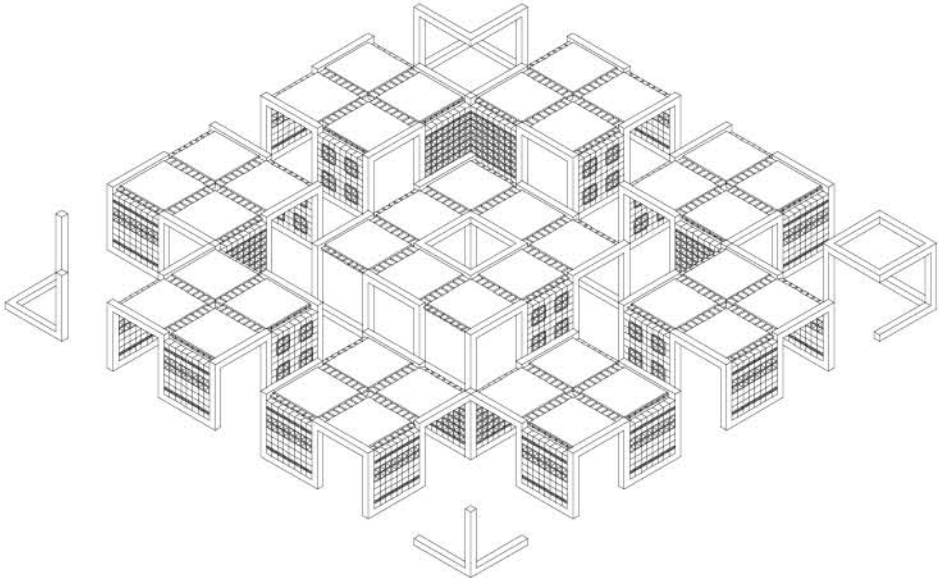
The first design was a small, one layer basic shelter, housing a school for little childeren.
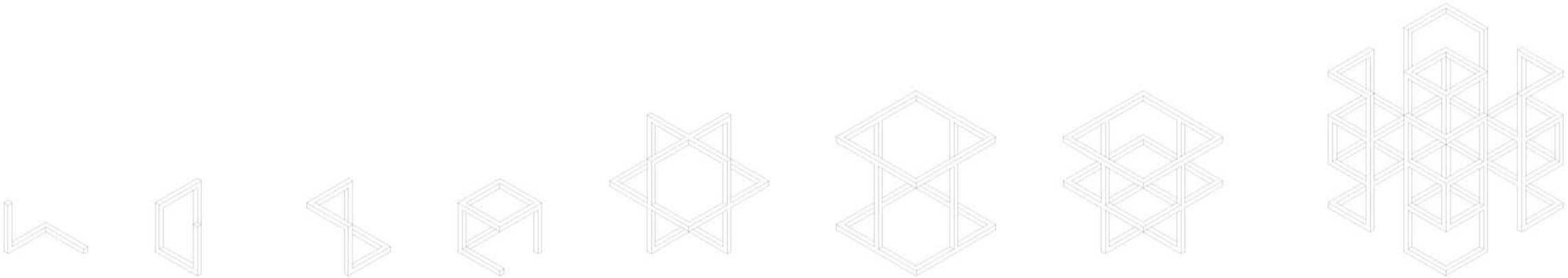
Corner Workshop

In the corner workshop I started casting the base elements to design with and placing them in a similar environment, seeing how the landscape reacts to the elements and the other way around. The blocks are made in scale 1:24, so the model car that I've painted in dazzle paint can be used as a scale figure. The picture make a timeless and scaleless image.
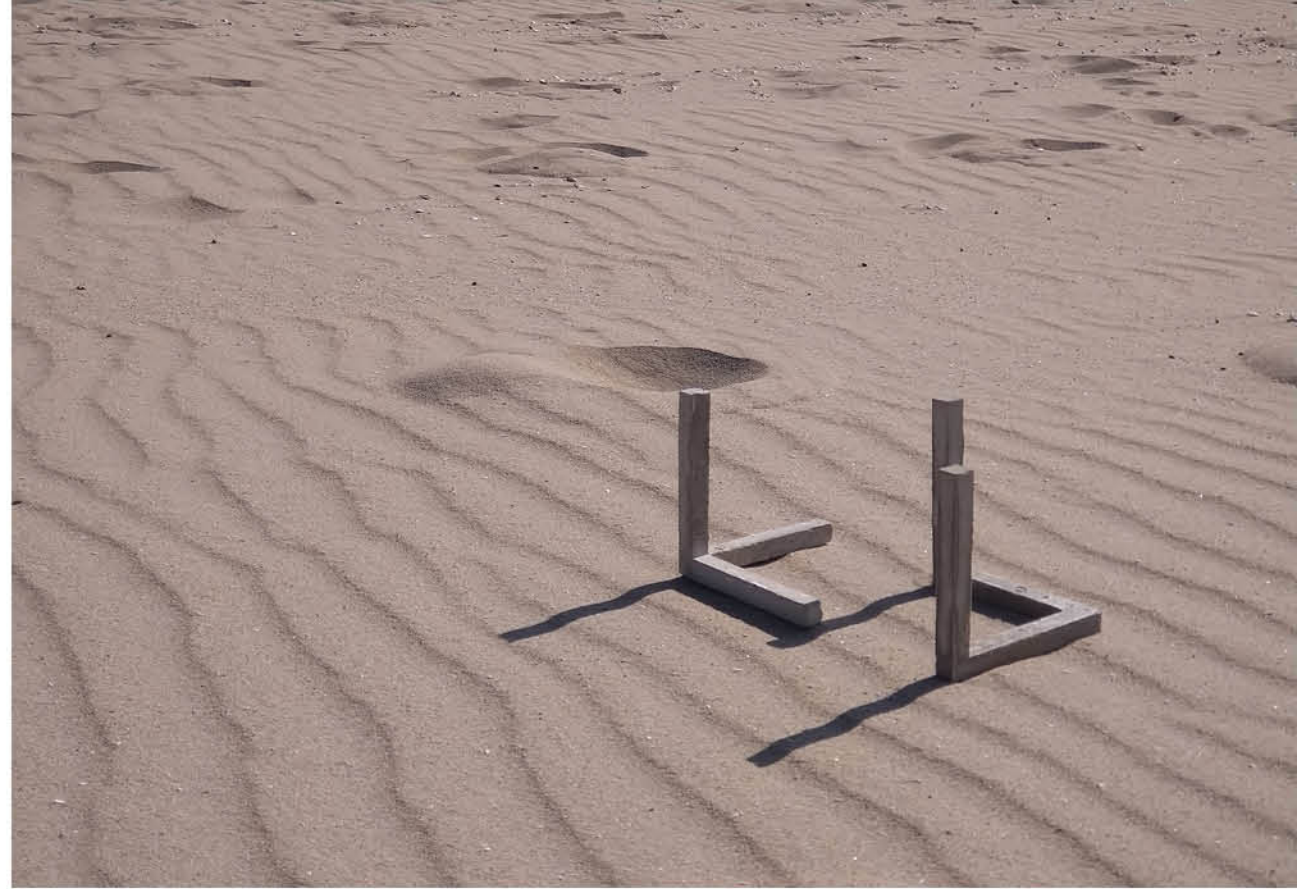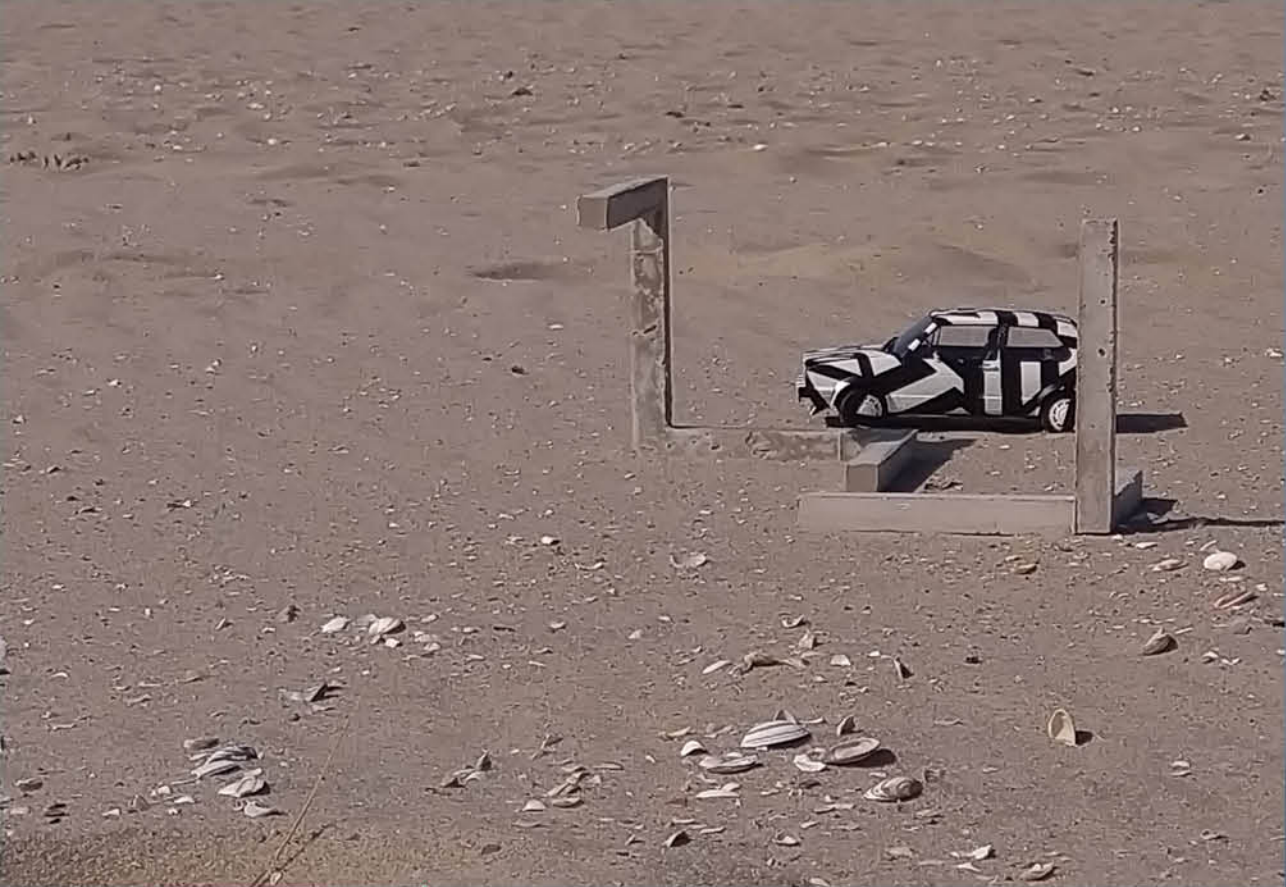
The next phase in the corner workshop gave place to focus more on a part of the building itself. I have build part of the surrounding pathway with inner room on almost the exact building typologies as the real.
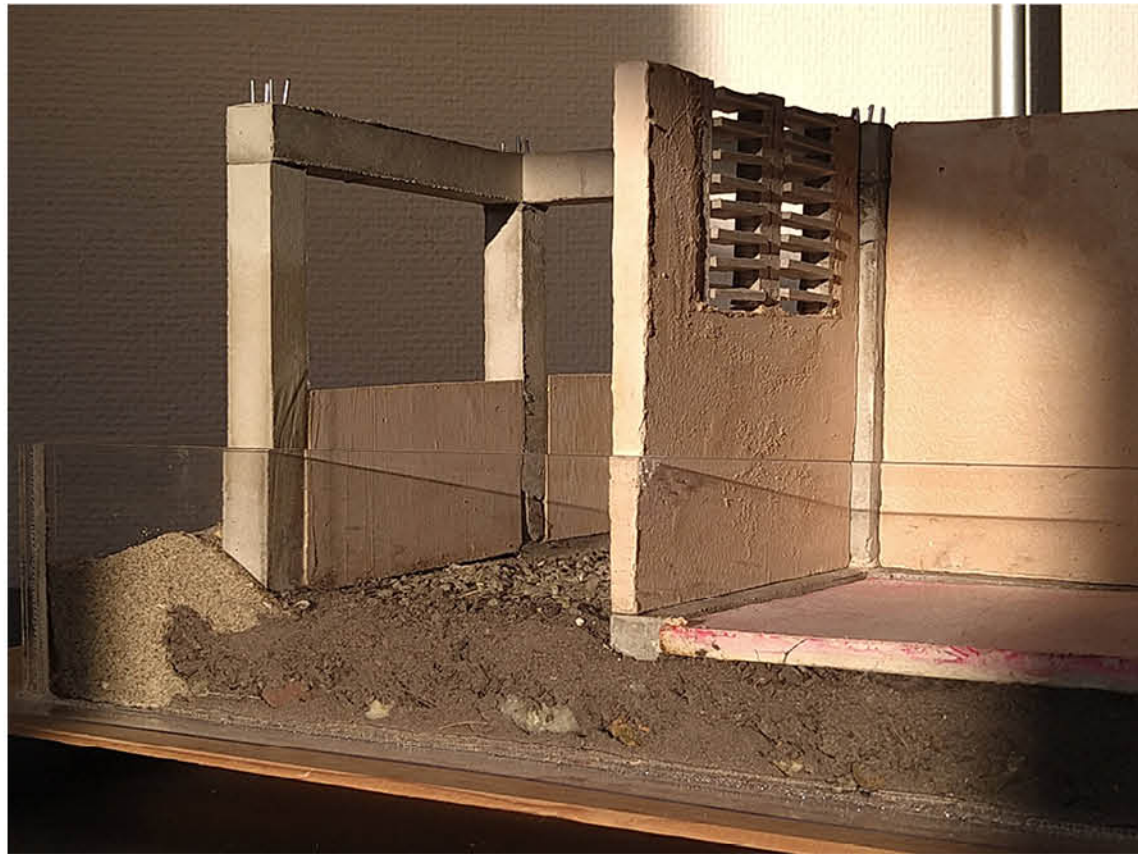
In this corner model I found out a lot of things can go wrong which weren't accounted for. But these mistakes are what is making the model very real. Not everything goes according to plan, but the beauty lays within these type of error.

P3 results
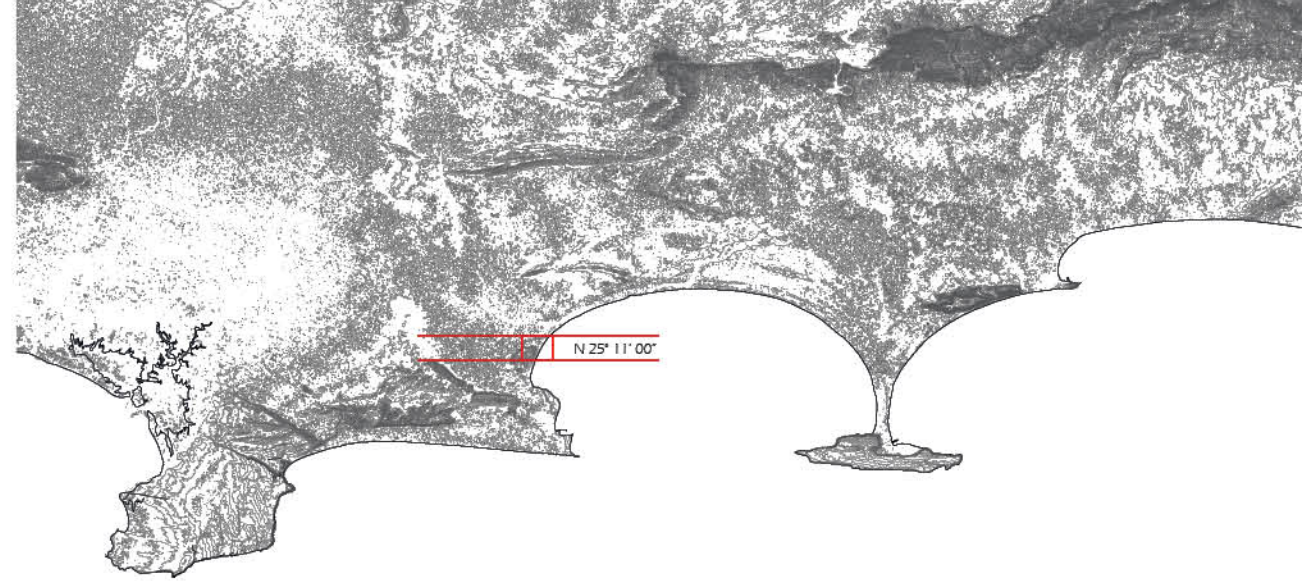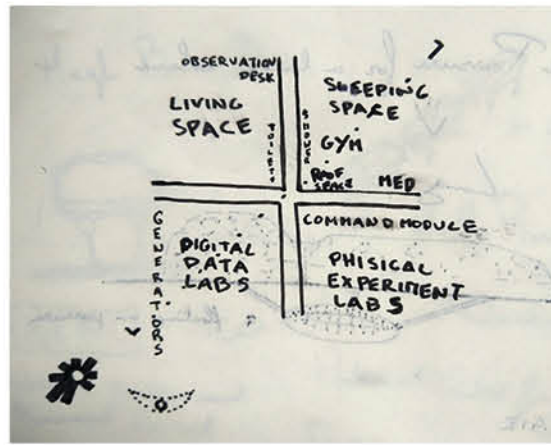
At P3 I've decides on a lot of aspects within the design. The image above is explaining the project in its most basic way. Showing where all the different rooms are located. Below is a detailed portion of the corner of the sleeping space with materiality added.

At the right you can see where the projected is located according to Gwadar and how the surrounding landscape is added to the whole project. I've chosen a long strip between two coördinate lines to place the different elements. All the elements work together to get a clearer view on the landscape.
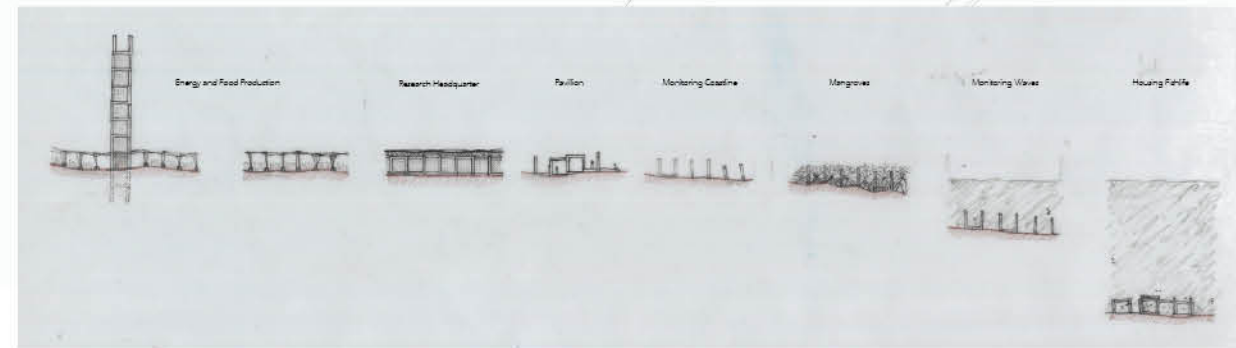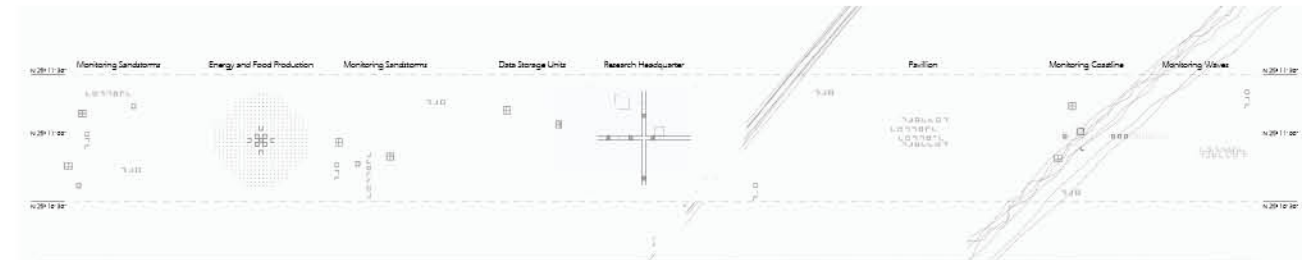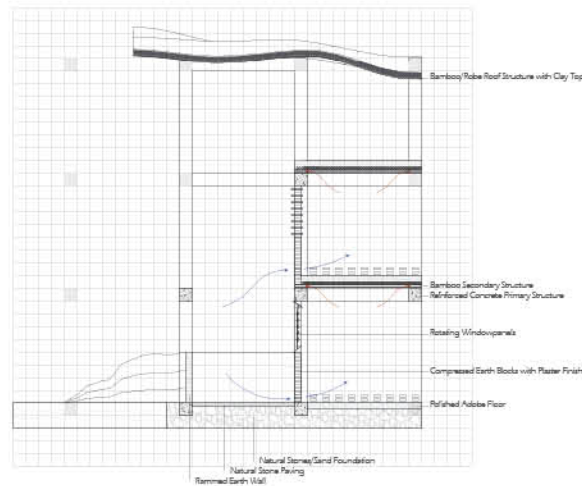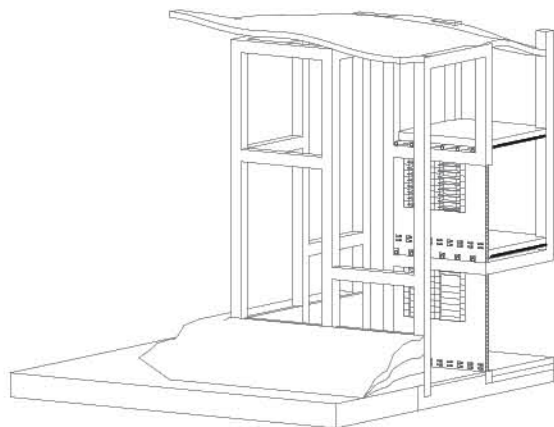
All the aspects shown in the earlier concept drawing have been processed in the building and a basic 3D model has been made. The building consists out of four quadrants: living, wellbeing, data and labs. The data quadrant (south-west) is placed within the ground and is the most stable, because the computers ect. should not be affected by any natural phenomena. The external roof slopes upwards from this point on toward the highest on the north-east corner. This has to do with the dominant windforces so the sand can flow over the building. In the living quadrant (north-west) there is room for a large kitchen, eating space and some storage. The labs are placed in the south-east with different types of labs to do all kind of experiments. In the wellbeing quadrant (north-east) are sleeping spaces for at least 14 scientists and there is also space for a gym and medical centre.
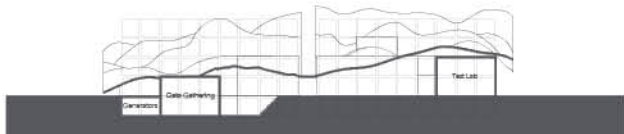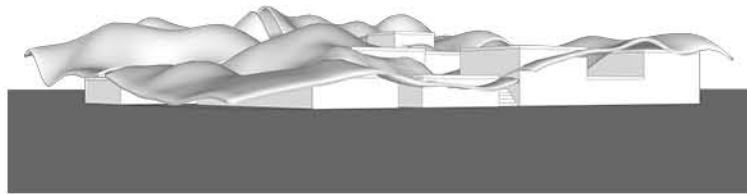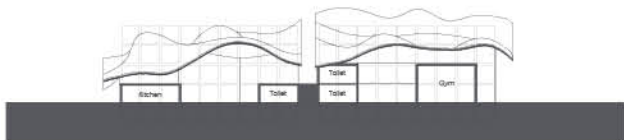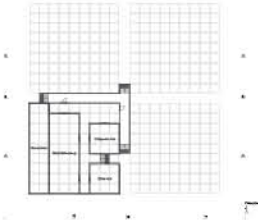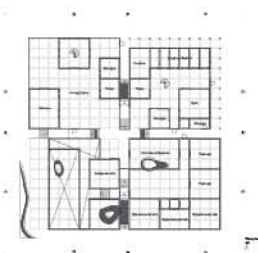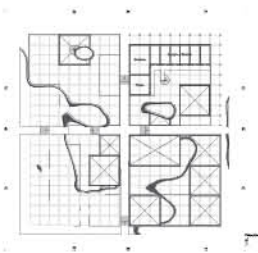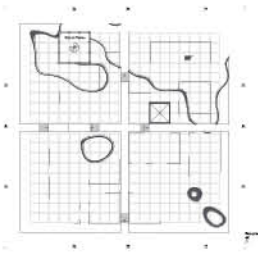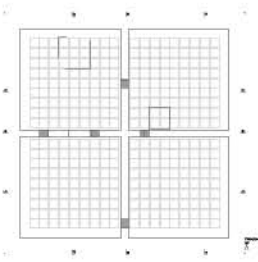
When it comes to a materialisation I would like it to have such a natural feel as the project shown underneath. The external roof having a natural wave/dune feel. As well as having a lot of space underneith the roof bus still in the outside environment.

Toshiko Mori Architect - Thread Artist Residency & Cultural Center

Focussing myself more towards the roof I've looked more into double curved surfaces and how to make them. I came up with using the concrete rib structure to place bamboo sticks on top and using string to make the whole structure fexible in a way that it will always finds it most suitable position. The material on top of the bamboo will be clay and this pushes trough the bamboo layer creating a rather rough surface on the one side and a smooth on the other.
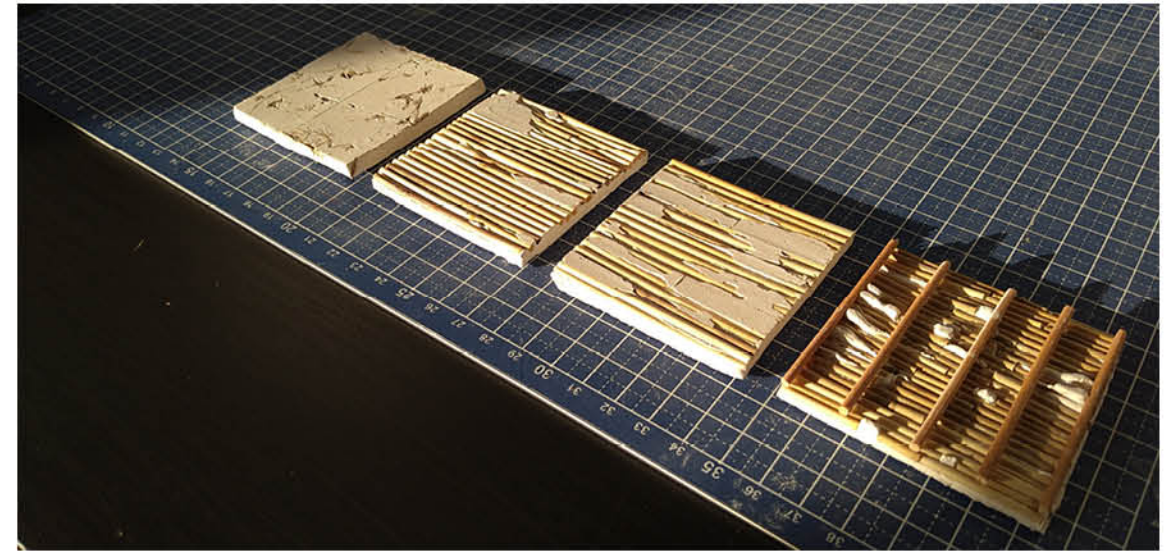
I have tried to recreate the look and feel of the real in different models, reïnforcing the gypsum (which represents the clay in real) with fibers and leaves.
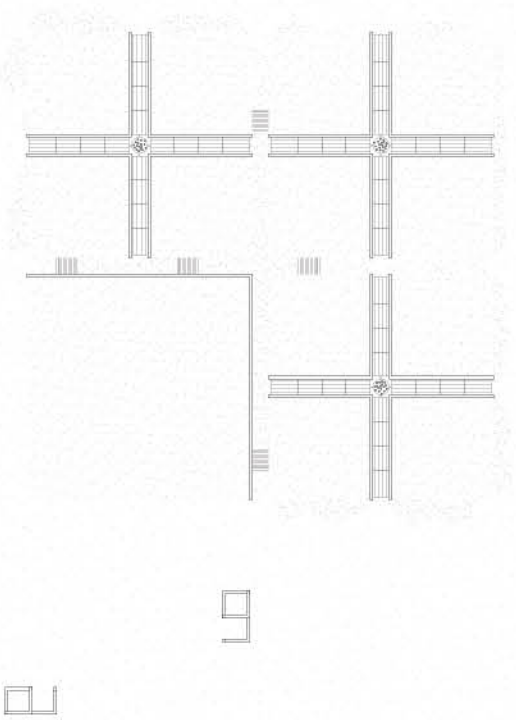
Using the bamboo as support for the clay top layer it gives a nice tactile feel on the inside and a smooth surface on the outside. The concrete rib structure than encloses the double curved surfaces,

The roof being made out of clay can have little cracks which later on will be filled with sand out of the natural changes in the landscape.
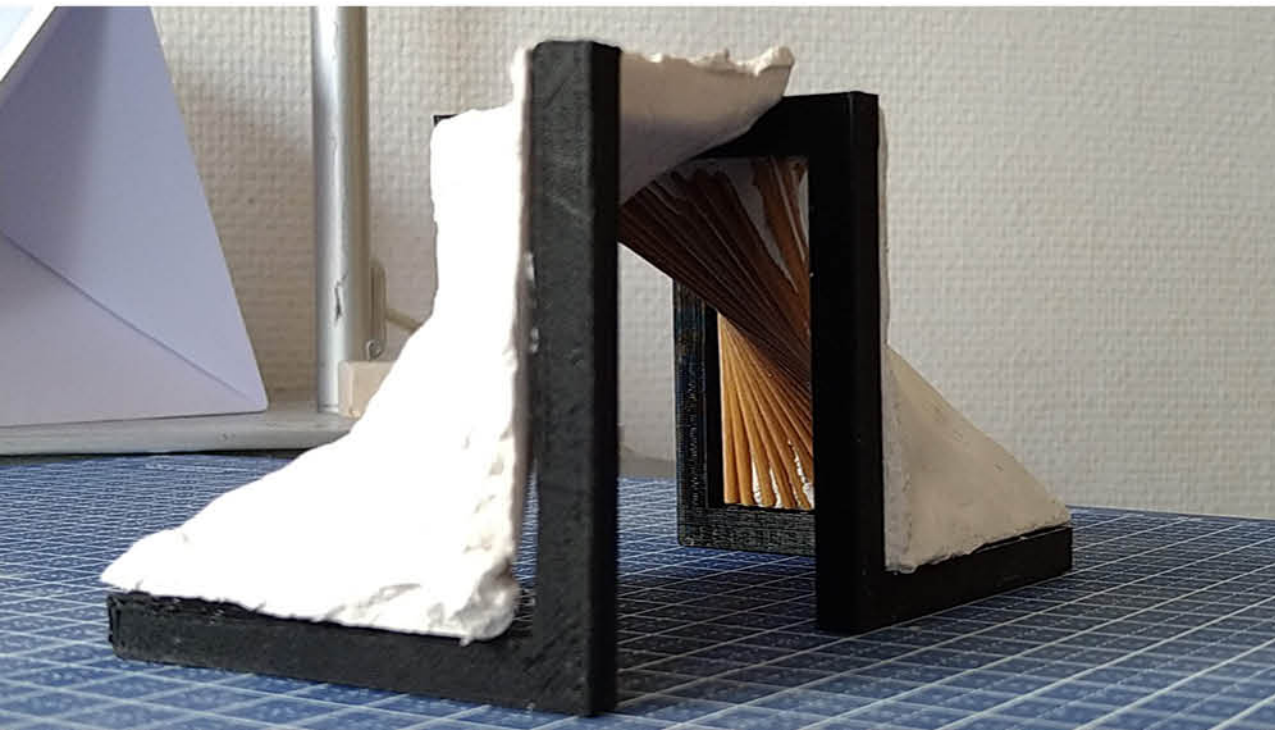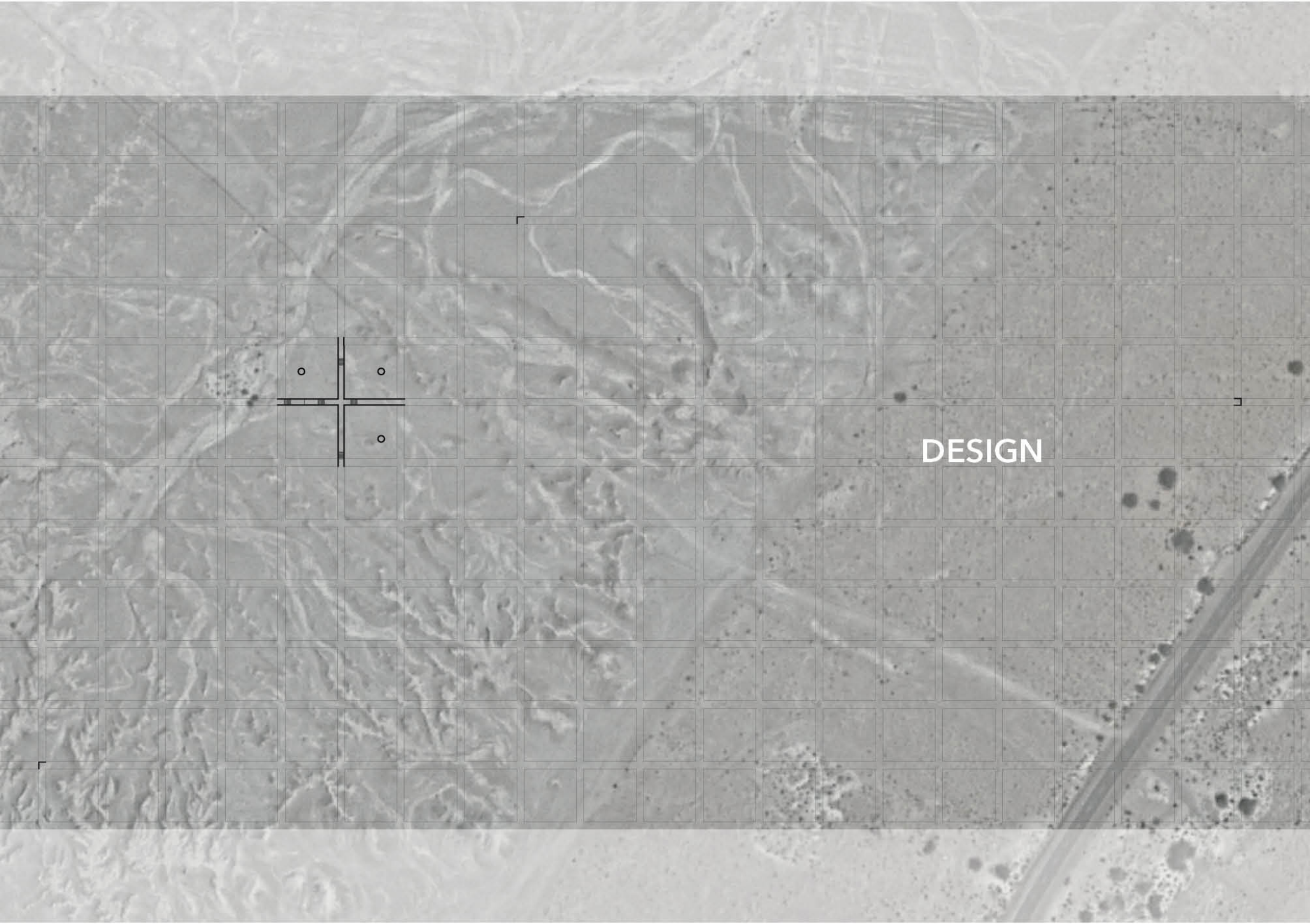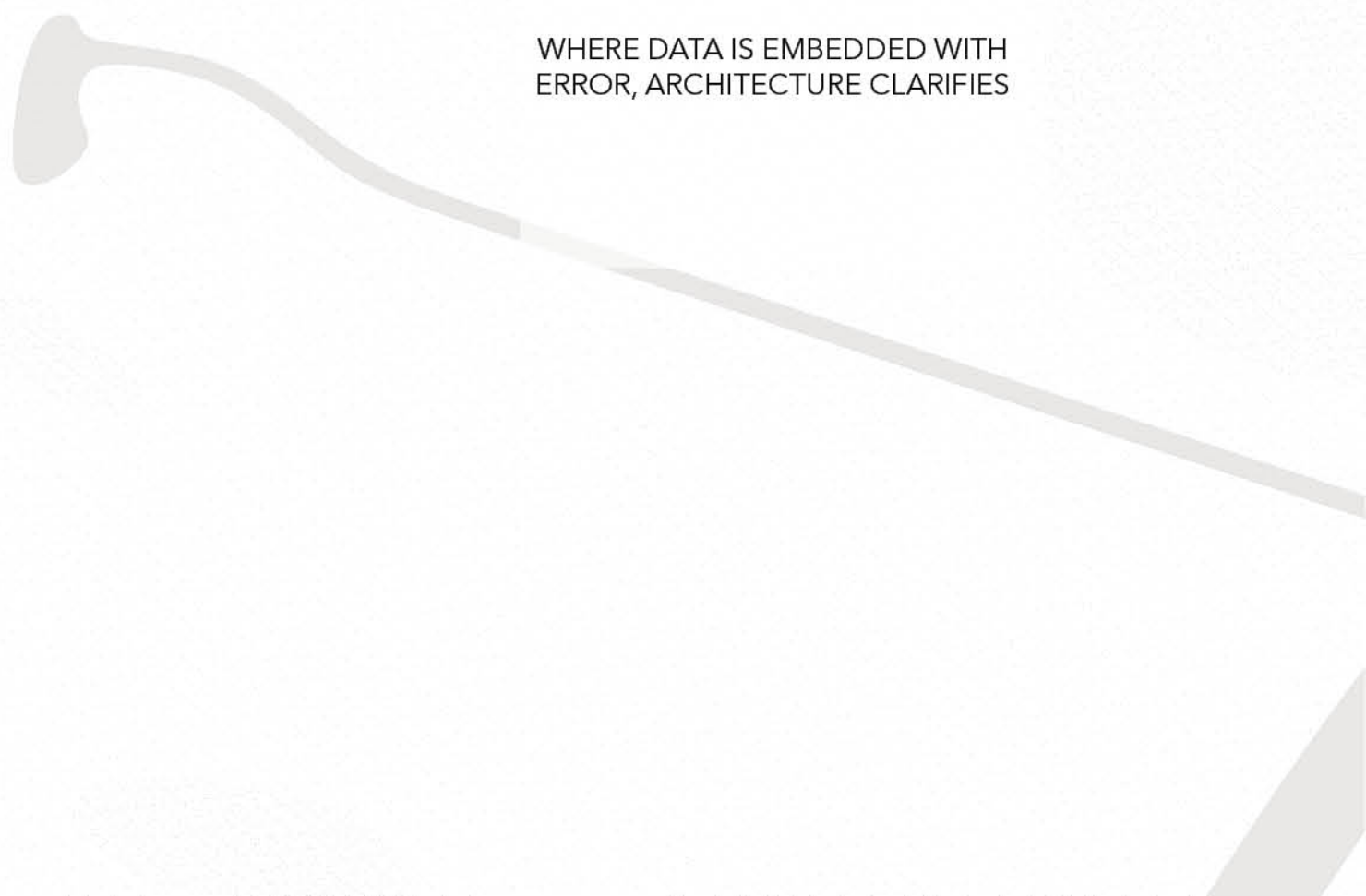
DESIGN

LANDSCAPE IN FLUX

WHERE DATA IS EMBEDDED WITH
ERROR, ARCHITECTURE CLARIFIES

Starting at the lowest part of the building in the data centre there is one long technical space with data storage right next to it. This part of the building will be most stable with a deeper foundation as the rest of the building. Along the outside of the data quadrant is room for added sand thats slowly makes the building part of its environment.
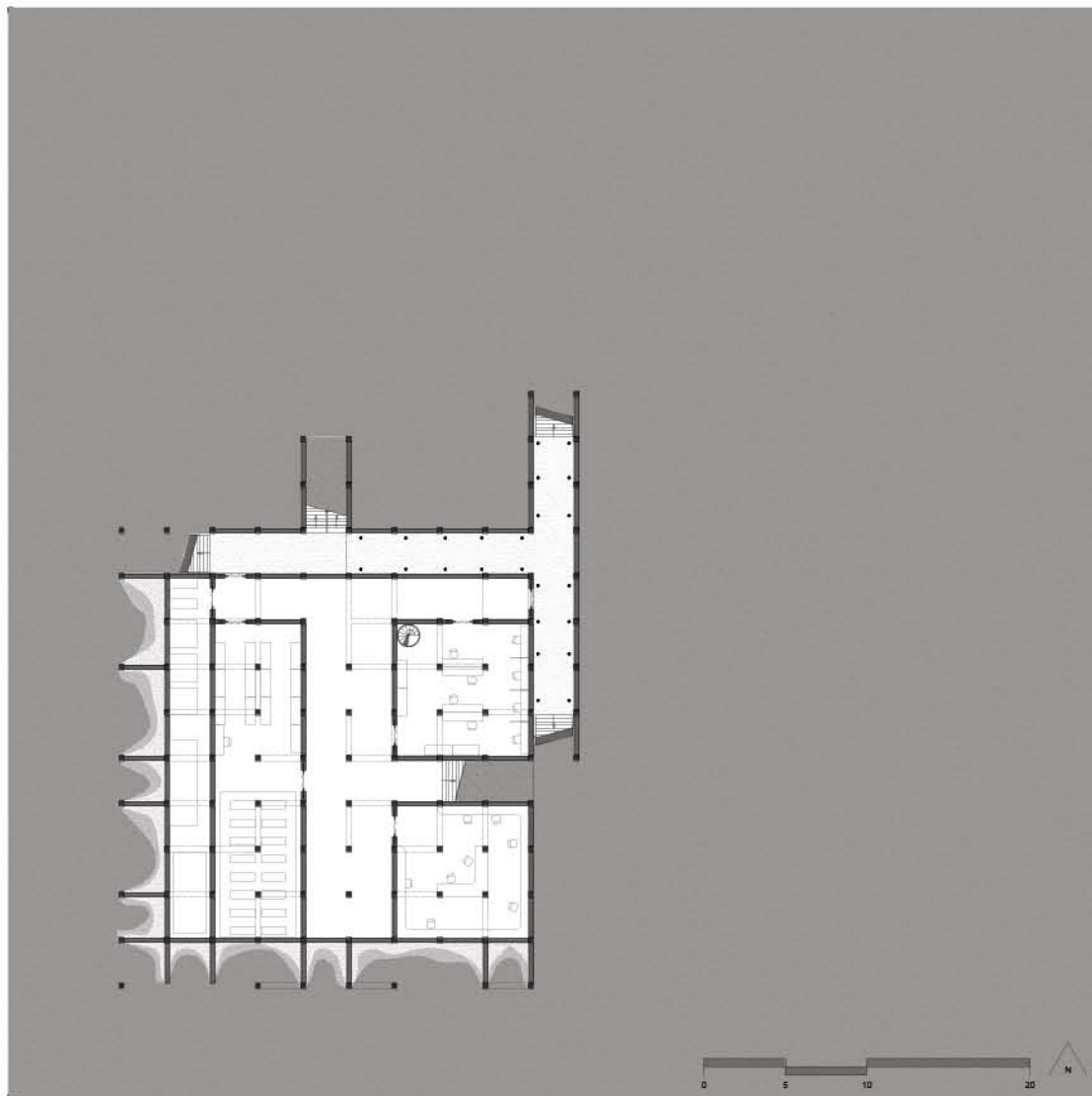
On the ground floor all the quadrants are connected through the middle part of the building. Here the outer part is a pathway surrounding the building, this part is still underneith the roof and blocks out most of the direct sunlight on the walls.
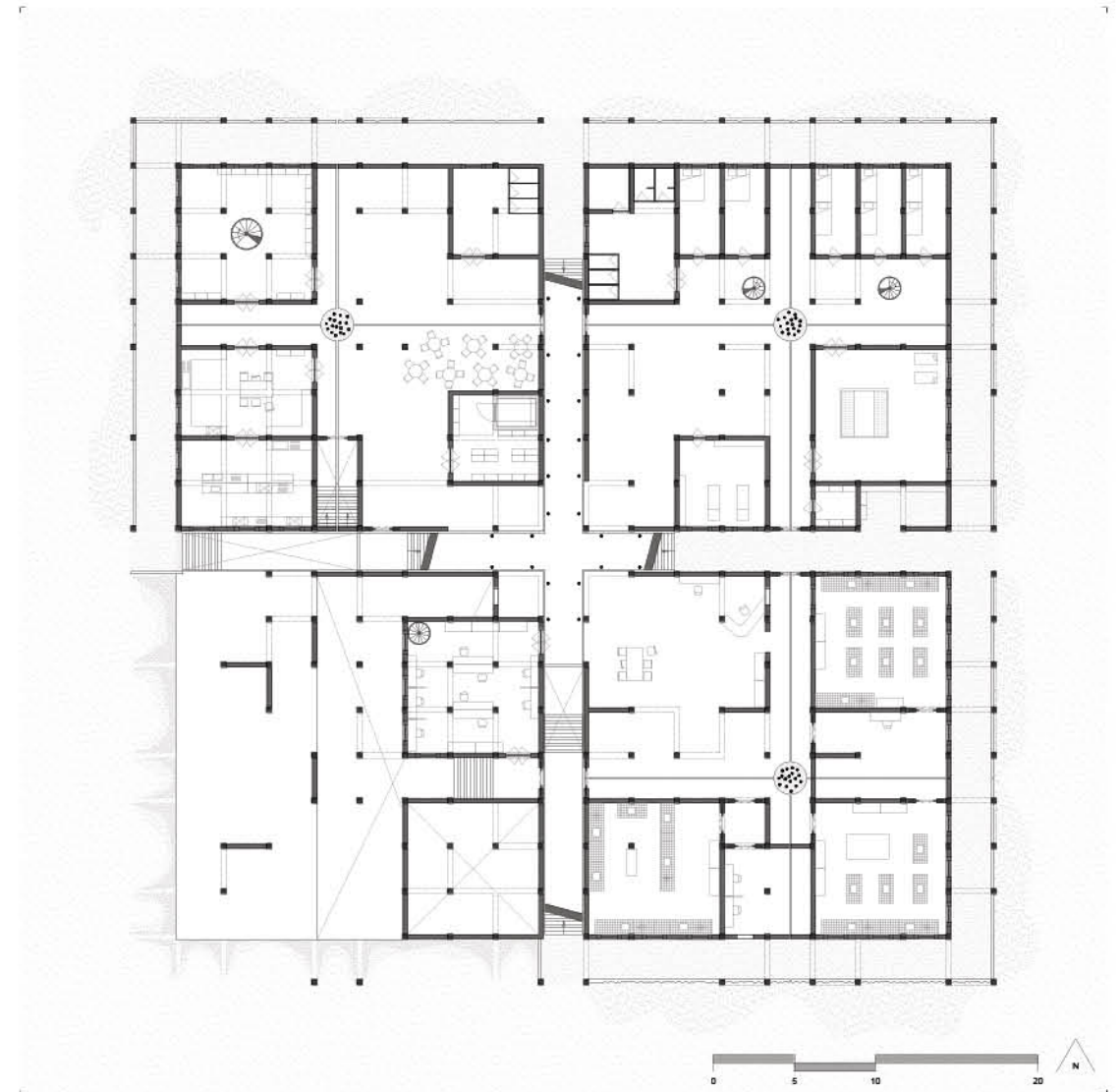
On the first floor there is only space for extra sleeping spaces and a staircase towards an observation tower. In the middle of the building there is an outside pathway looking into the spcaes from outside. this path isn't underneith the external roof.
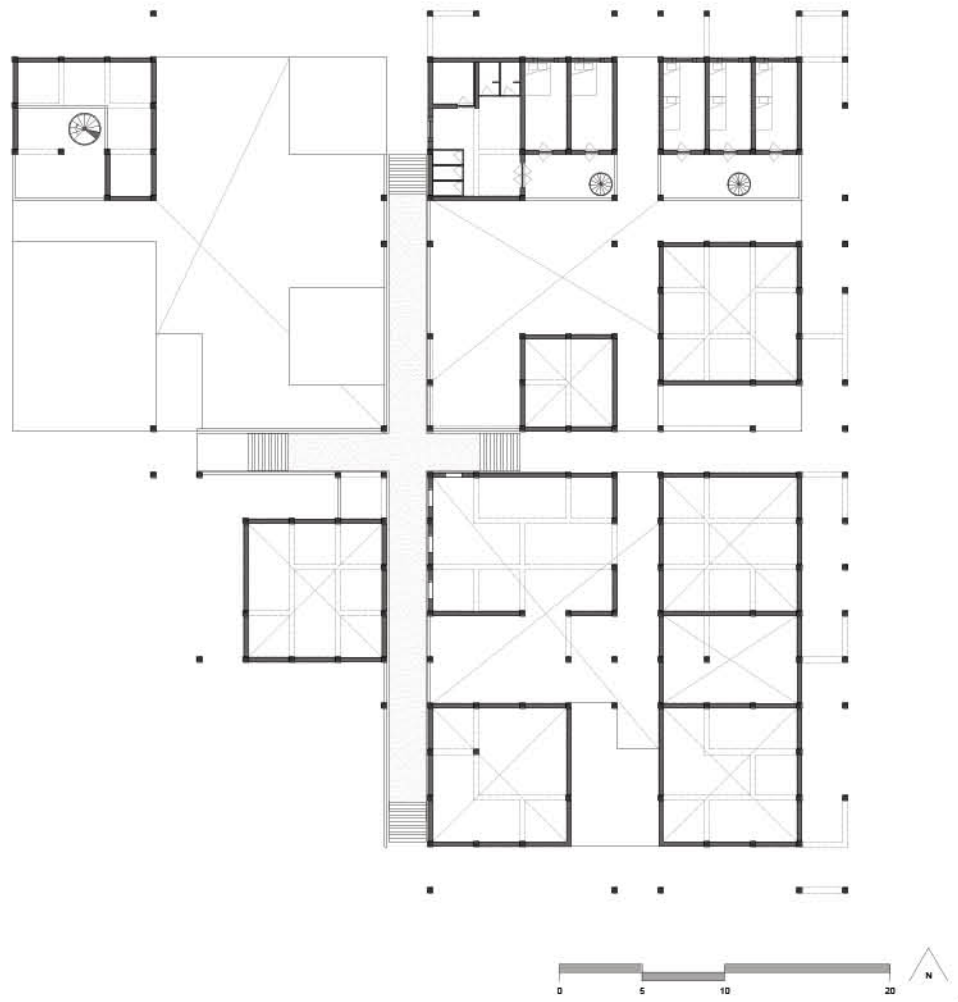
If we zoom in on the wellbeing quadrant you can see a small cross with in the middle a round puddle. This is the breakingline of the quadrant. There is a little gap of 10 centimeter is every quadrant, except the data centre, to measure the deformation of the whole building. This part of the building has the least deep foundation and will undertake the most changes.

Zooming in even further you can see there is also a 10 cm gap between each quadrant and the middle, outside pathway. Here are four different infills of the same area of the building showing the flexability of the space.

In section you can see the building makes use of a natural ventilation flow in the climatised spaces. There is cold air coming from air-intakes placed around the building that is cooled by traveling underground. The ventilation flow is caused by the roof heating up and naturally flowing towards the top and out of the building.


+5,58m

+2,79m

+0m
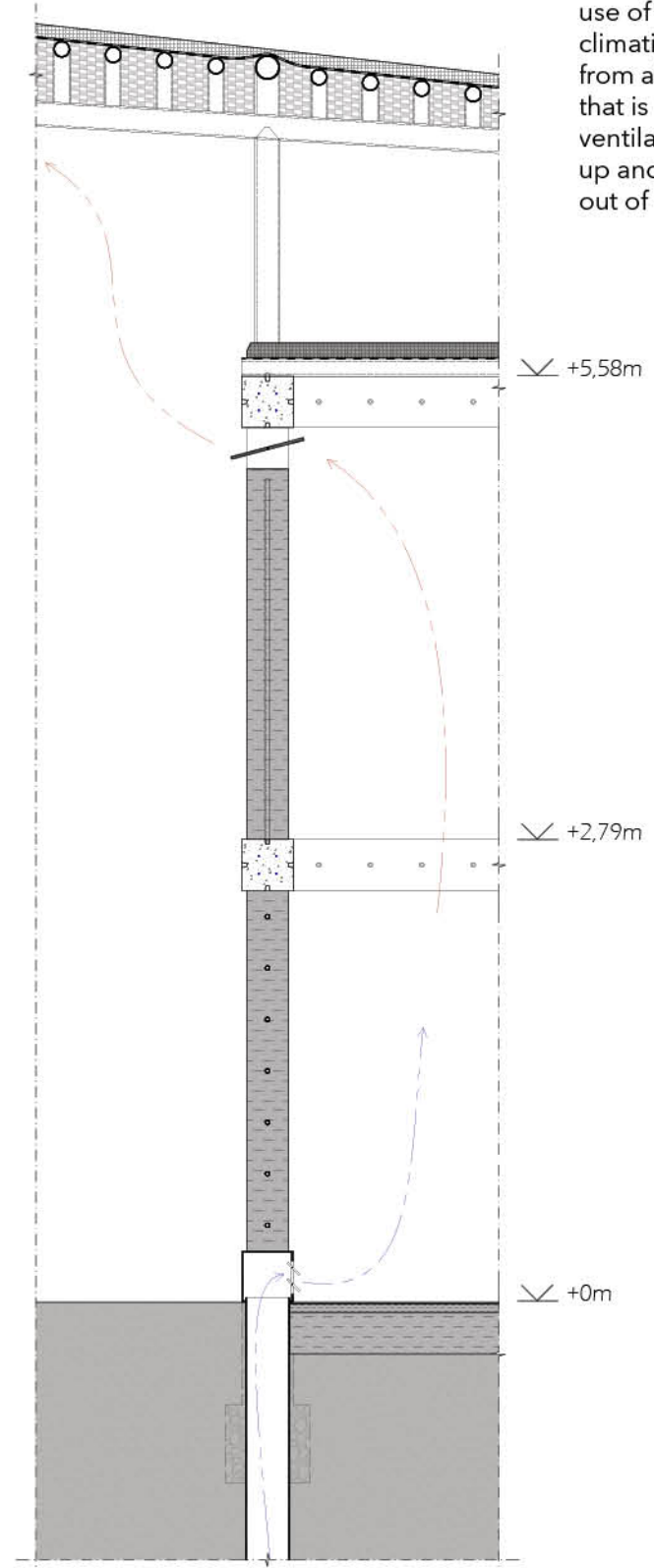
Underneith can be seen how the different air-intakes are places around the building providing the different quadrants with natural cool air.

On the right side is the water flow of the building. In section you can see the round puddle in the middle of a quadrant, there is a bamboo forest that is used as breakwater point, and in top view you can see the drainage along the whole roof. Because of the double curve surfaces it looks quite complicated but if you would follow an arrow you will always end up in the middel of a quadrant or at the most south-west corner.


Air Intake Capsules

Energy Flow From
Solar Updraft Wind Tower
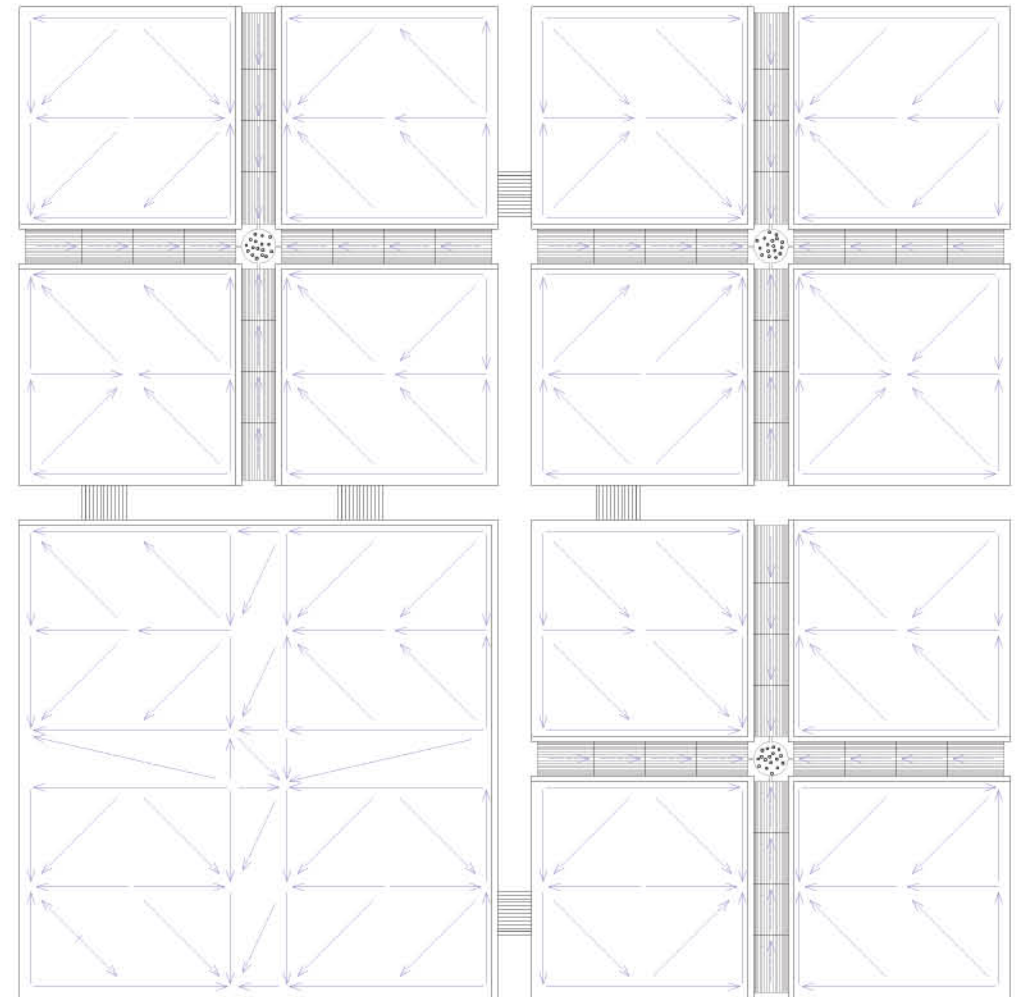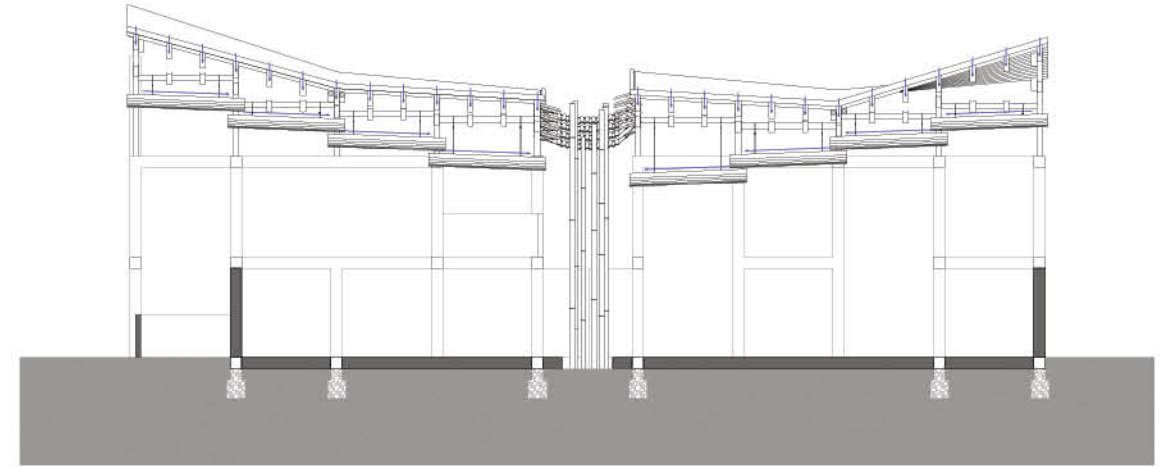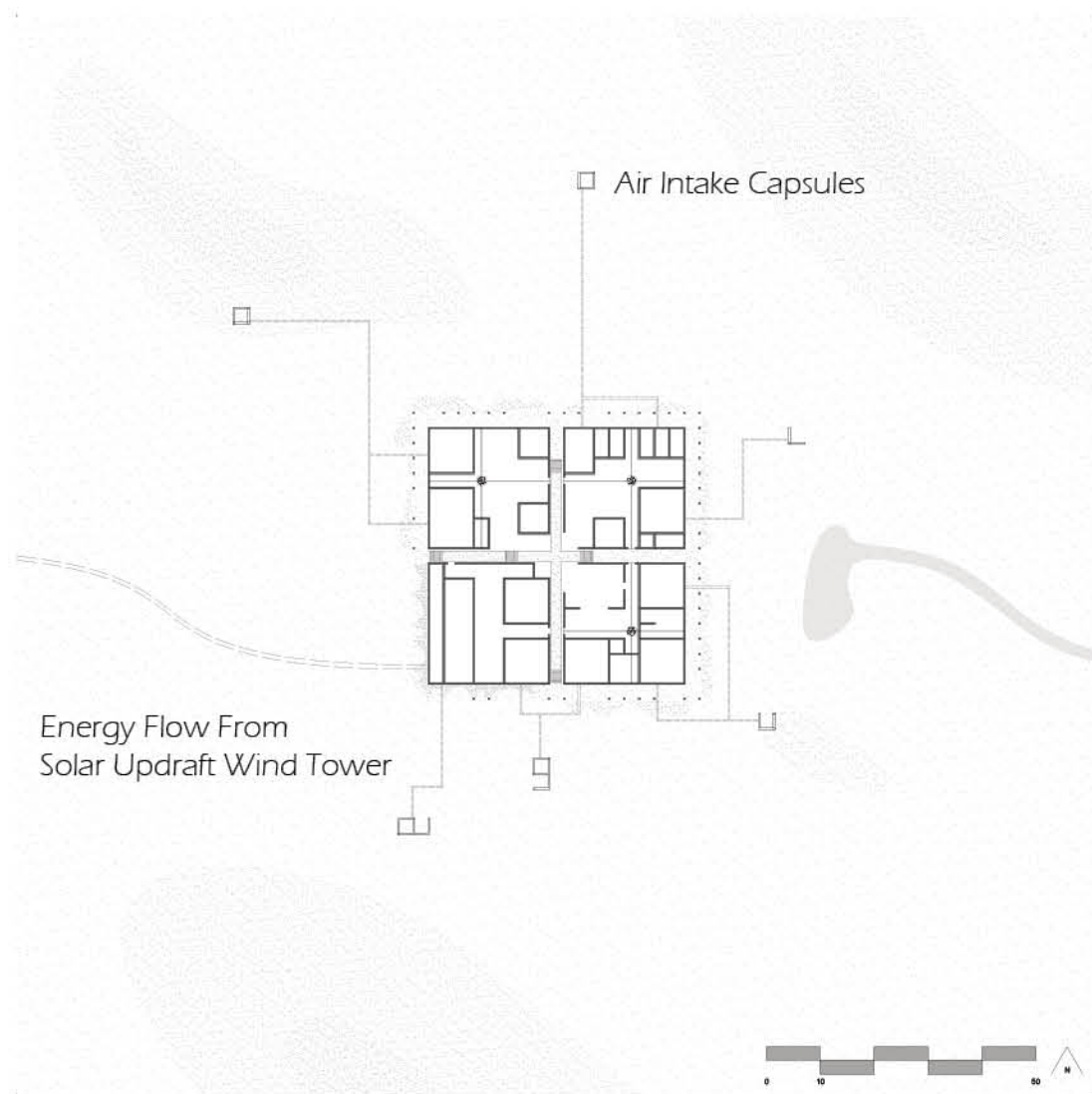
This section is taken through the wellbeing
and labs quadrants.
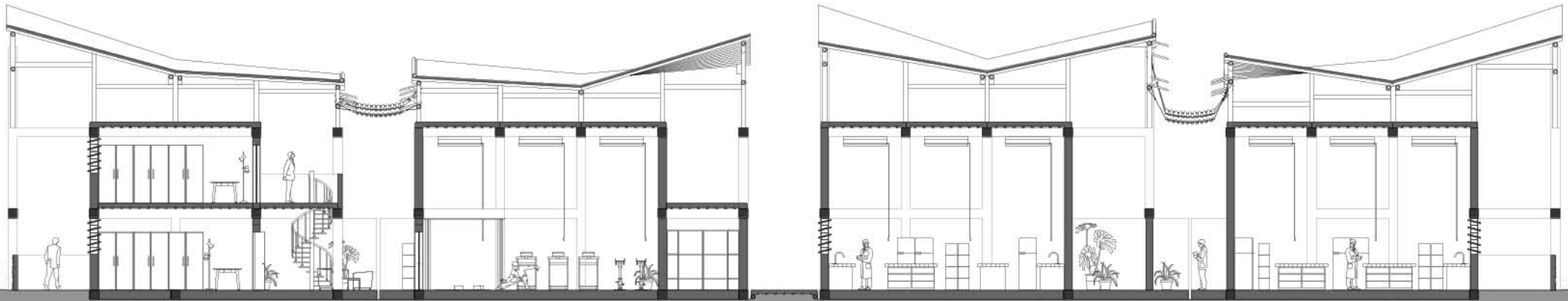
At the breakline of the building there is a hanging bamboo structure which is waterproof and will catch all the excessive sand. If it becomes too much it is possible the remove it by lowering the structure and carrying it towards the outside.

When over time the building starts to deform, sink or undergo any change this same bamboo structure can be adjusted towards the right placement.
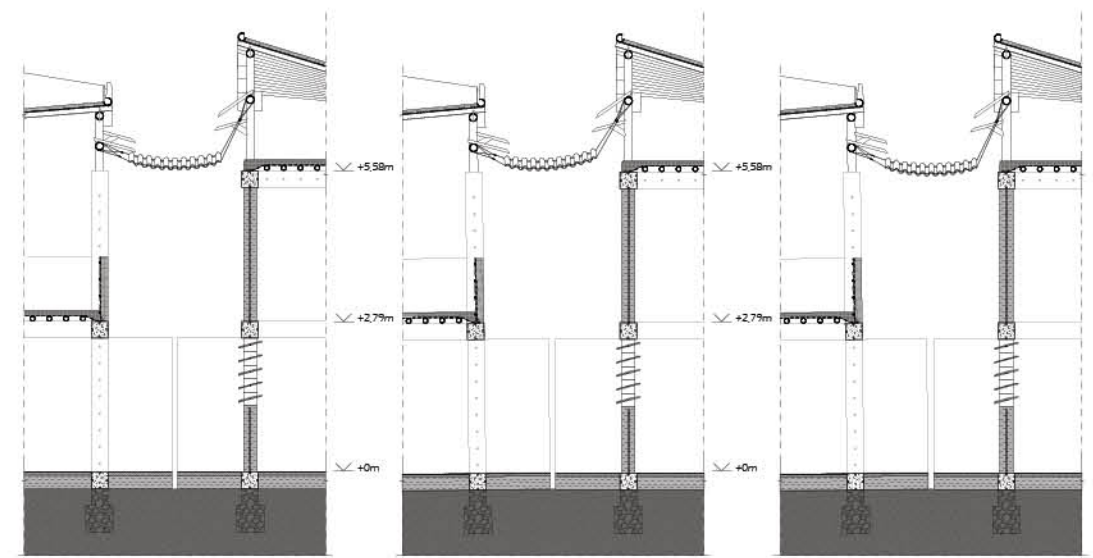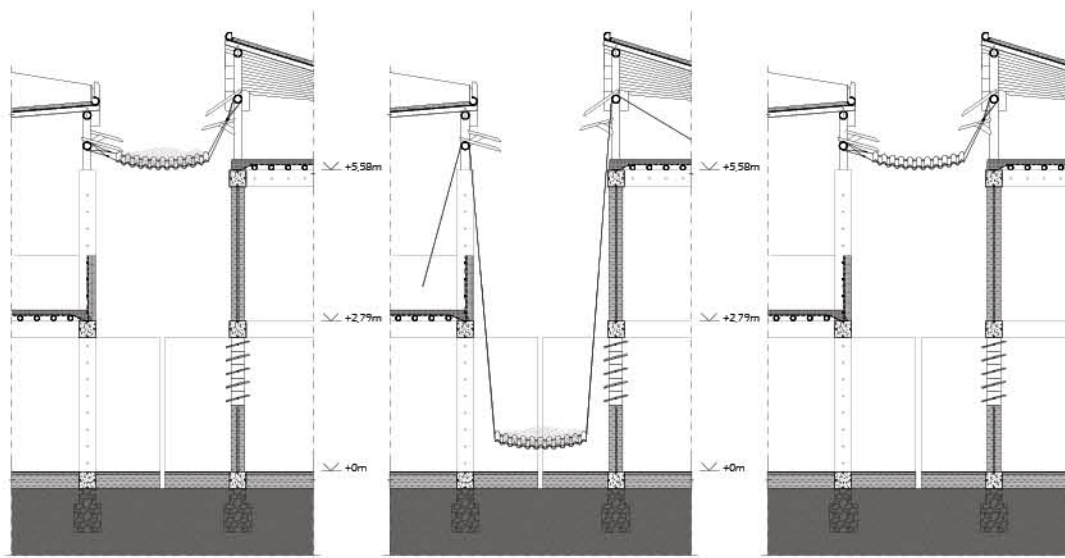
What is explained on the previous page is here shown in model as well as giving a clearer view on the bamboo roof structure of the double curved surfaces.
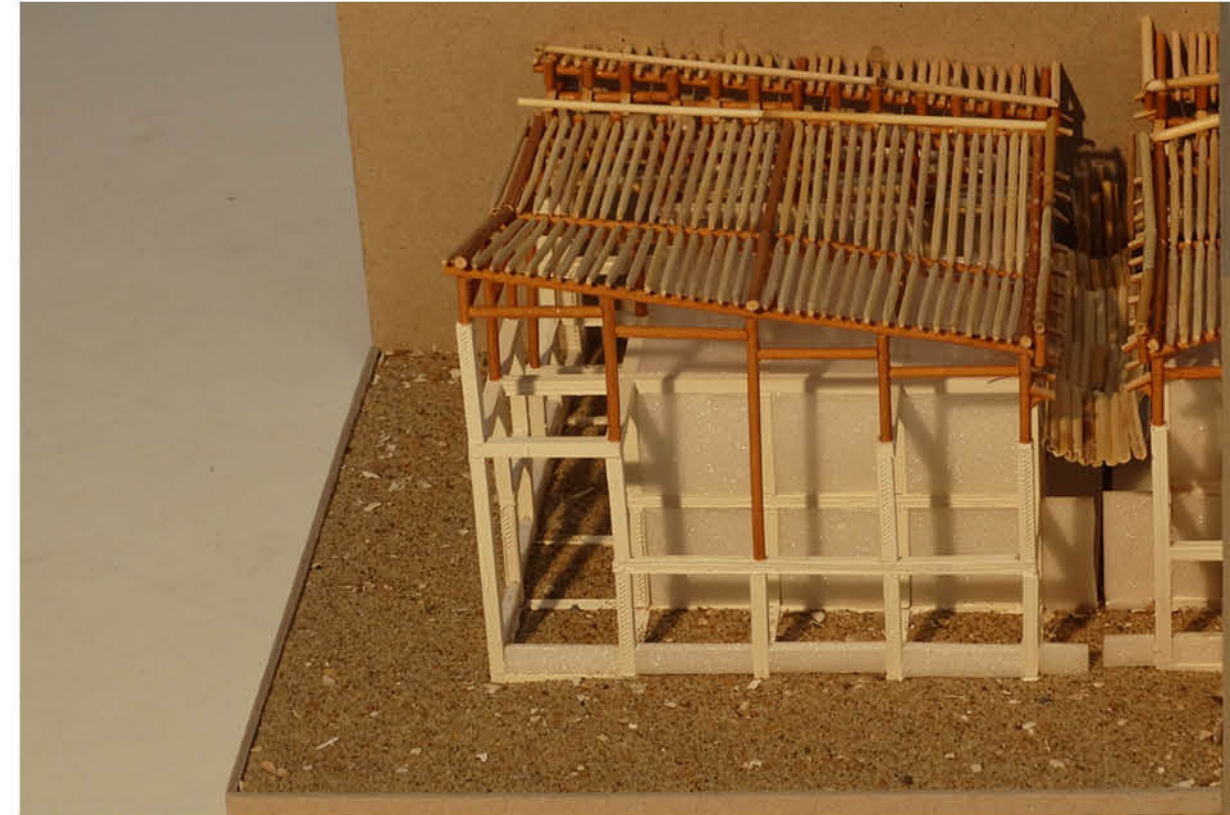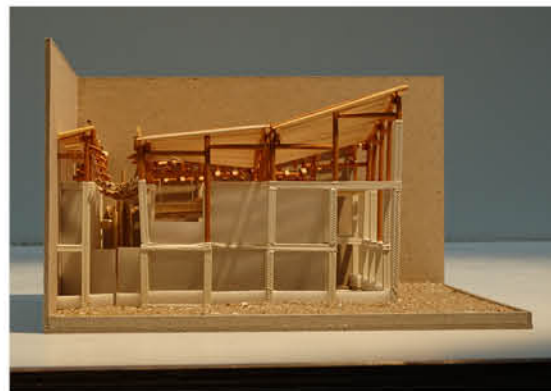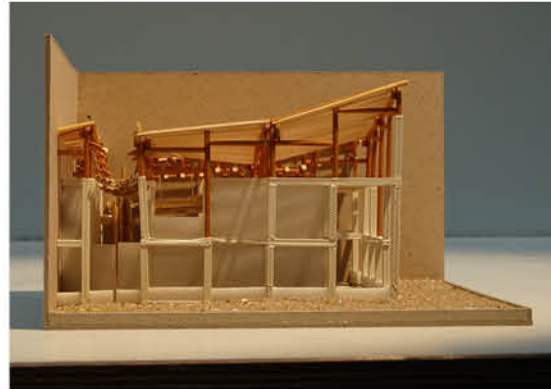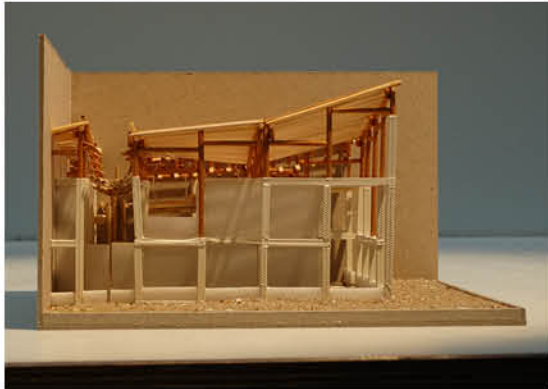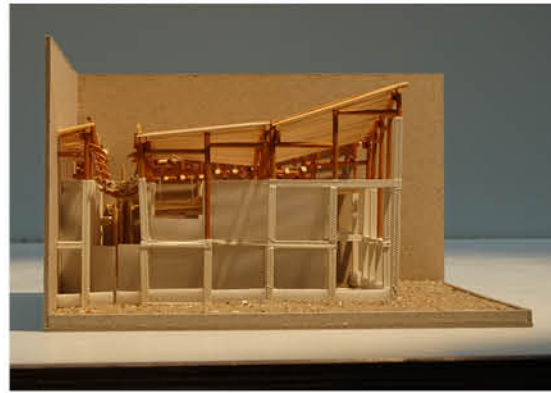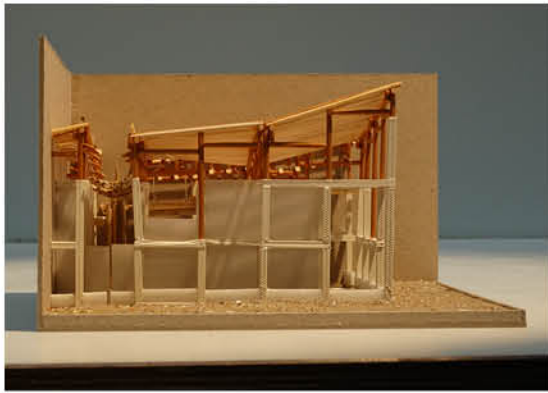
Shown here is the mangrove area where nature takes over the architecture and the movement of water and the growing of the mangroves will changes the placement of the elements.

The corner model shown earlier is further developed and made with all same techniques as the building in real.

Reflection

The relationship between research and design.

In my research I tried to make an attempt to find a form of ultimate precision within architecture. I have been fascinated in mathematical equations from very early on. The idea of one plus one always being two is in its abstraction something correct/ precise, but once you start to depict what is 'one' the equation can change. In the context of a landscape in flux I searched in a philosophical way for confrontation of architecture with ecological influences. Does one exclude the other? During my work in P2 I found the insight that architecture over time always includes error; due to all kind of external factors like natural phenomena affecting materiality.

From the beginning I thought including precision in architecture was a lost case, but after experimenting and experiencing I have become positive about finding ways of incorporating a form of precision within the design by knowing what can go wrong or change over time. This is why I'm also focusing on different types of error, which there are quite a few different examples for. Error can be seen as something which is in motion, but also as something which is failing. Error and precision are in a way each other's complete opposite, but at the same time the one can't exist without thinking about the other. To conclude I think the research I've done is very much included in the steps I've made towards a design by choosing to work within a strict system and grid. I this topic will always follow me around.

The relationship between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS).

I felt quite new to the studio topic of Borders and Territories, but after the whole research part I think I am starting to understand the enormous scope Borders and Territories has. I feel like my own interest is leaning more toward the borders or limits of drawing vs the reality. What is an architect really doing; I've asked myself this question several times in the past year. The intentions of a design can be clear for everyone but can architects translate these ideas into a physical object through drawings or models without losing the initial intentions. For me, trying the understand these methods within the master programme and architecture track (and myself) is the essence of studying Borders and Territories. Creating a design that might be of value in a part of the world where global questions force themselves into local 'simplicity' to me feels like a lot of responsibility. First I had to translate a frustration I had of not being able to physically experience the environment of Gwadar, Pakistan, into actually pretending to have a grip on the situation. By discovering all the processes publicly available imagery, like Google Earth Satellite Imagery, have to go through I found a grip and got really excited about the possibilities of creating 'from a distance'. I started recreating the environment on the beach of The Hague and in making models and experimenting with material. Being able to be in touch with material, which naturally includes error, makes me more resolute and enthusiastic in confronting it with precision.
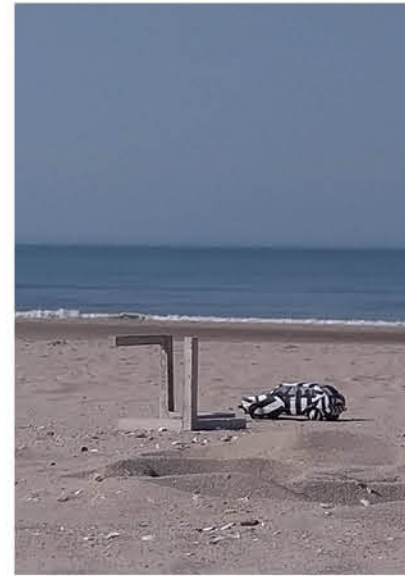
Elaboration on research method and approach chosen by the student in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work.

The scientific relevance of my research is maybe not the most relevant to the outer world, but more towards my own development. I found out there are a lot of interpretations and theories about the topic of precision in architecture and formulating one yourself (or choosing one to follow) will be helping me ground every project in the future.

I have been analyzing local architectural traditions and realized that looking from my perspective as a Western student it can be seen as primitive architecture. But while trying to understand the larger picture of development, it is useful to use local traditions instead of my own Western knowledge on building. I tried to incorporate this realization within the building by using the transitoriness as the concept for a long lasting positive contribution to the environment. The

research center is in itself already a positive contribution, because it is leads to more knowledge about the surrounding landscape and natural phenomena. The architectural interventions I am providing should be experience architecture that will reach locals on a sensorial level.

Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, touching upon the transferability of the project results.

My research about having a grid that has its structural dimensions embedded within the grid is a useful framework to work with on a professional level. A lot of times the used grid is in idea a good layer, but once it comes to materiality it steps out of the fixed gridlines. The topic of error is on a social and even more so on an artistical level interesting, because there is always a thrive to perfection (which in my opinion isn't really feasible). The imperfections are what's making a project, they are what makes the building a physical object and not a drawn/ digital building.

Discuss the ethical issues and dilemmas you may have encountered in (i) doing the research, (ii, if applicable) elaborating the design and (iii) potential applications of the results in practice.

I've stumbled upon a few ethical questions, as also mentioned earlier on, because of the cultural differences and not knowing the exact ways of dealing with situations from afar. I feel the need to travel a lot more to get more confident in interfering into (for me) new cultural areas. In a technical level I need to experience more to make the design more grounded and profound. And also I have realized I'm in a little trouble, because of my love for the look and feel of a material which is as timeless and robust as concrete. Unfortunately this is not the most environmentally friendly material and so I find myself in an environmental dilemma.

The graduation studio 'Border Conditions along the New Silk Road' focusses on sites where spatial conditions have emerged that are 'teeming with suggestive meanings and unexpected potential' but are hardly analysed within contemporary architectural discourse. The studio investigates contemporary border conditions within the larger urban and territorial scale, with a special emphasis on the relationship between architecture and its socio-political context(s). B&T views the contemporary city as an 'urban universe' of spatial conditions, which consists of constellations of elements seemingly without any relative weight. To think of an 'architectural project' in such a context means to engage in a speculative approach directed to alternative formulations of architecture, all based on a fundamental understanding of fragmentation and complexity. In the graduation studio, these new reformulations are instigated by, and at the same time applied to the controversial 'New Silk Road'.

BORDERS
&TERRITORIES