



SEA TO LAND

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This report has been composed and developed as a student assignment in the course "Planning and Design for Sustainable Development in a Local Context", and in collaboration with Orust municipality where the project is also taking place. The first part of the course is based on both a broader and local context where knowledge is gathered and included into the second part of the course where the aim is to work with the local context and today's existing conditions on Orust.

”

A special thanks to...

Orust municipality for a good collaboration and knowledge of the local conditions

SWEMARC for your broad knowledge of the sea and all that it includes, but primarily your knowledge about aquaculture and how to apply it in a small scale production

Niklas Wennberg and Stadsjord for your inspiration and insights on aquaculture and how to integrate this in buildings

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GRADE: *22,5 hp*



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I. INTRODUCTION



I. INTRODUCTION

background

Orust has a long tradition and relationship with the sea. Along time the relationship has transformed and the job opportunities within traditional fields of work, such as fishing and boat making, are diminishing. With the declining fish stock and new methods of producing seafood we see it as an opportunity to strengthen and renew the ancient relationship between Orust and the sea - to translate the old history into the future. This is to be done through introducing a seafood center - an informative platform for exploring new ways of preparing and consuming seafood. The objectives will be embodied in the center, which will promote all year round activities and serve as a meeting point for the locals and visitors of all ages.

The center will be located in Tuvesvik, an area we see as the newest node in a series of nodes associated with seafood on the western part of Orust. Tuvesvik is under development and located in the north-west part of Orust and has a ferry station for ferries going to the culturally rich islands of Gullholmen and Käringön.

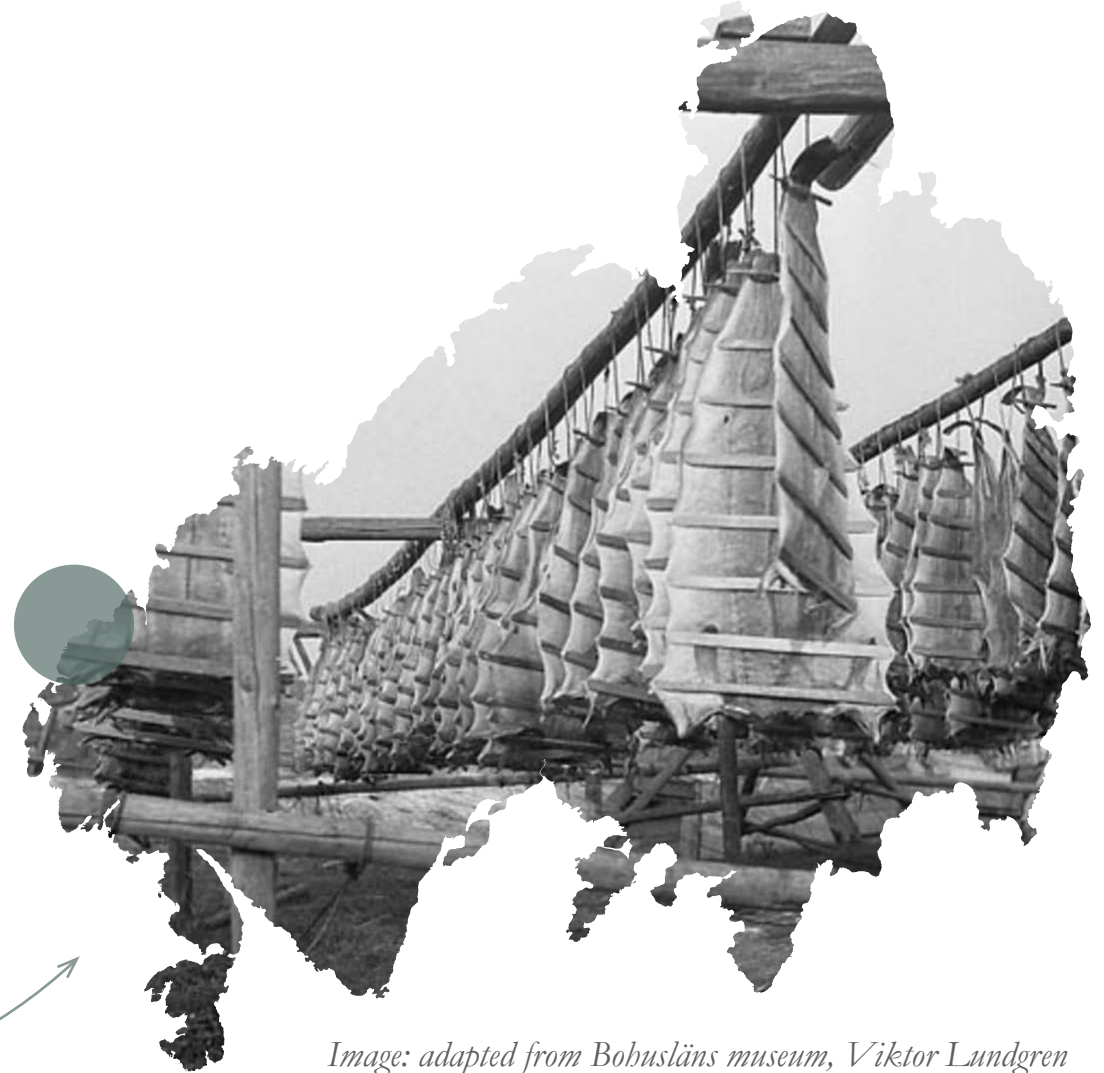


Image: adapted from Bobusläns museum, Viktor Lundgren

I. INTRODUCTION

swot analysis

To get an insight of the conditions on Orust, we, the whole class, started off with establishing a SWOT analysis. The SWOT analysis also works as a basis for the local development objectives that are described further down.

Closeness to a diverse landscape and rich bio-diversity (in terms of both leisure and resource qualities)

A rich cultural heritage, identity and history

Suitable land and sea for local food and energy production (an asset for both local economy and self-sufficiency)

A municipality engaged in sustainability

Big differences between summer and winter (in terms of services, activities, liveliness and spatial activity)

Lack of meeting places, public facilities and public space

Lack of culture and activity in winter (young and elderly)

Increased environmental awareness

Eco tourism - both for residents and tourists

Aquaculture

Rising sea level and flooding

Individualization

Ageing population - activities has to attract youth

Cultural gaps (summer - winter/ temporary - permanent)

I. INTRODUCTION

local development objectives

During the first part of the course 14 local development objectives were formed, which shapes the basis for the project's focus and design. The objectives have very different orientations, making it difficult to accommodate all of these in one and the same project. We have therefore chosen the goals that support our focus.



The project will support the following objectives:

Orust is an interesting and active place to live in for people in all different stages in life.

Orust is an island with several centres. Each containing public spaces, services and meeting places for everybody all year round. Activities build social networks and relationships which lead to the strong community feeling.

The coastal villages of Orust are functioning human habitats, where humans live in line with the environment now and in the future. Floods and storms do not create permanent destruction.

Orust offers local job opportunities connected to the sustainable redevelopment of traditional local industries (e.g. fishing, agriculture and craftsmanship).

I. INTRODUCTION

working procedure

What is the history telling us?

All locations are unique and characterized by their history in different ways and to different extents. The human needs a history that is many times told by the place. The place thus gives us identity, pride and togetherness (Boverket 2006). In this part we are trying to highlight and discuss Orust's history and how this story can be translated and integrated into the project.

What do the future offer us?

In this part we are describing and discussing aquaculture as one solution that can help Orust to reach new ways of producing and consuming seafood. With a strong sea-life culture Orust has good conditions concerning this type of development.

Design proposal

The design proposal is the last part of the project, and exemplifies how all the parts we touch within the theory can prove in practice. The ambition is to create a center with opportunities for new ways of producing and consuming seafood. The building also aims to work as a starting point for discussion concerning activities that could raise awareness of the relationship between people and the sea.

The effects of the design proposal

In this part we discuss different effects that will follow with the project. These are not only economical gains, but also social and environmental advantages.

2.HISTORY

2.HISTORY

58°10'24.96"N 11°37'44.5"Ö

the history of Orust

Orust is an island located in Bohuslän on the west coast of Sweden. Together with a number of surrounding islands like Gullholmen, Kåringön, Flatön, Lyrön, Härmanö and Malö, it forms the municipality of Orust. It was in 1658, in conjunction with the peace in Roskilde, that Orust became Swedish (Orust kommun 2017).

Since Orust is an island surrounded by water, the fishery has been important for the people living there, not least the herring fishery. In the end of the largest herring period (1808) several fishing villages were demolished. However, after the fishing period, the agriculture increased. Later on, the development of methods and machines for agriculture reduced the labor demand and Orust population decreased (from 1900 to 1968 the island's population was halved). It was at its greatest in 1880 with 18 129 inhabitants. Today Orust and the surrounding islands has 15 093 inhabitants (SCB 2016). During the summer the population grows with summer guests reaching almost three times as many people as it lives there all year round (Orust kommun 2017).

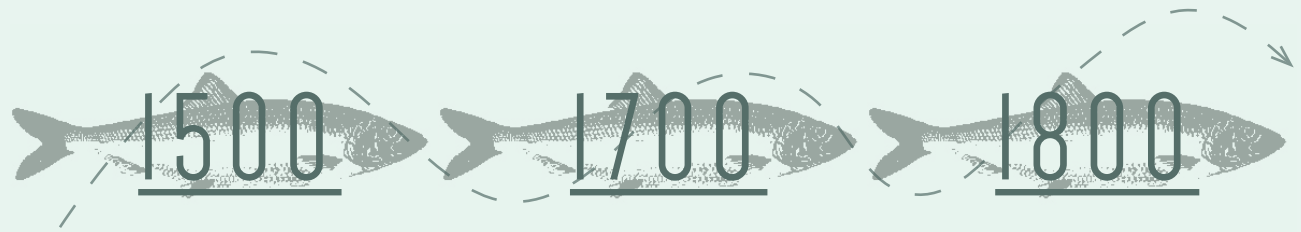
After 1950, several of the island's shipyards began to manufacture plastic boats, and today the shipbuilding industry is important in Orust (Orust kommun 2017).



Village of Gullholmen

2. HISTORY

the history of the fisherman



3 HERRING PERIODS

1900



The old fishing industry was replaced with new and more efficient methods e.g. bigger boats, new engines, harbors were dug out and equipped with concrete quays and wavebreakers, fishing gear was adapted to sea fishing (in Swedish: havsfiske) (Westerlind, A-M & Westerlind, G 1972).

WWII - >

After WWI the fishing industry on Gullholmen decreased due to worsening profitability, as a result of this people moved away from the islands and many houses were sold to summer guests (Westerlind, A-M & Westerlind, G 1972).

1995



The FAO member states adopted a code of responsible fishing and continued to avoid the exploitation of different species so that fish can continue to be an important source of food and income (FAO 2012).

1970

Fishing was increasingly being done on international waters, the boats were spending long periods on the water, the catch was often landed in foreign ports, fishing became less vulnerable for economic changes, the leasing of rooms and the sale of land to summer guests increased.

2012

52 per cent of the world's fish stocks are fully utilized and another 25 per cent overfished at a level that is so low that the fish population's regrowth is threatened completely (FAO 2012).

AQUACULTURE IS THE FASTEST GROWING FOOD PRODUCTION SECTOR, NOW ACCOUNTING FOR ALMOST 50 PER CENT OF ALL FOOD

(FAO 2012)



3. AQUACULTURE

3. AQUACULTURE

what is aquaculture?

“Aquaculture is the cultivation of fish, crustaceans, mussels and oysters as well as algae in all types of water; fresh and salt water, in lakes and in the sea. Aquaculture also occurs in land based cultivation systems. Cultivation can be done open in cages in lakes, seas or in ponds. This can happen in closed or partially enclosed facilities on land or in water where the water recirculates and purifies and only a small part of the volume of water is exchanged (so called RAS plants). This can also be done in so called manifold systems where several different types of species are grown together. The latter type, for example, can combine sea-based fish farming with cultivation of algae and/or shellfish” (SWEMARC 2017)

Aquaculture is one solution that enables the production of fish that does not naturally occur in today's water due to overfishing. If the production is conducted properly, it can be seen as a sustainable way of producing future food (FAO 2017).



Image: New York Times, Stephen Castle

why aquaculture?

Fish has long been an important source of protein for many people in many parts of the world. In connection with the development of new more efficient fishing methods, the world's fish stocks have decreased radically. Today about 52 per cent of the world's fish stocks are fully utilized and another 25 per cent overfished at a level that is so low that the fish population's regrowth is threatened completely (FAO 2017).

In the same time, according to the FAO, over 80 million tonnes of seafood should be cultivated in 2030 in order to meet the expected demand. Moreover, as health, climate and environmental reasons also speak for increased consumption of fish and shellfish, there should be according to Jordbruksverket conditions for even greater growth if production is sustainable (FAO 2017).

an increased demand for fish

<u>year</u>	<u>caught fish</u>	<u>farmed fish</u>
1960	33,9 million tonnes	1,6 million tonnes
2013	92,6 million tonnes	70,2 million tonnes

3. AQUACULTURE

how is aquaculture used today?

Looking at the situation today, China dominates the international aquaculture with over 60 per cent of the world production. Next comes India with almost eight per cent, followed by Vietnam, Indonesia, Bangladesh, Japan and Thailand. After the countries of Southeast Asia, Norway is the world's largest aquaculture country with almost 1.7 per cent of the world production (FAO 2012).

Looking at the situation in Sweden, aquaculture produces a total of around 15 000 tonnes of seafood. This corresponds to 1.5 per cent of what Norway produces and approximately 0.2 per cent of global aquaculture. Most of the fish farms are found in Norrbotten (17) followed by Jämtland (16), Gävleborg (12) and Västra Götaland (11) (SWEMARK 2017).



Image:Entreprenör, Anders Kristensson

funding

There are different types of support/funding for projects like this. On a regional level Västra Götalandsregionen (VGR) is supporting environmentally, economically and socially sustainable fisheries and aquaculture in Sweden. This is done through the new marine- and fishery program that runs from 2014-2020. The support/funding is approved by the County Administrative Board (in Swedish: Länsstyrelsen) (Länsstyrelsen Västra Götalands Län 2017).

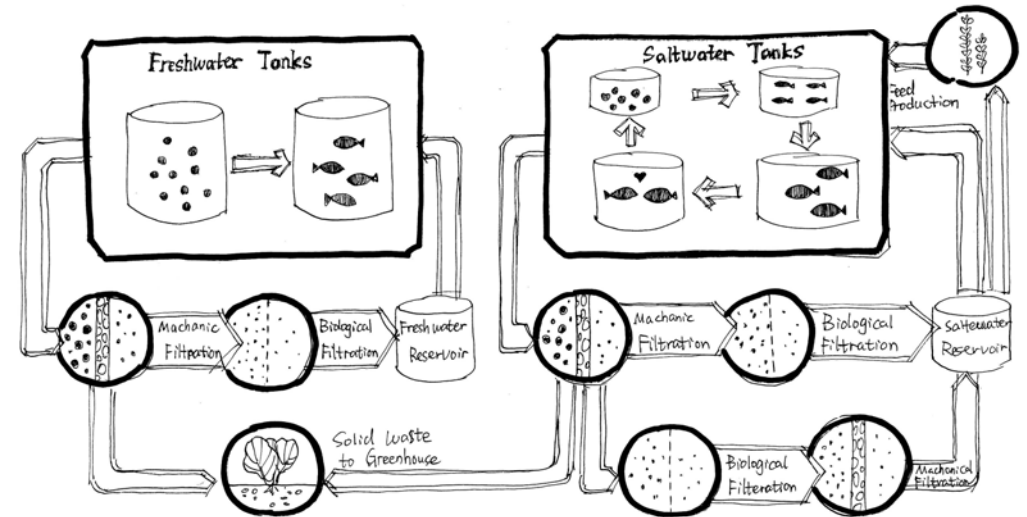
On a national level Vinnova supports different types of innovative projects, both in private and public sector. They have the idea that “innovation is needed throughout society to meet societal challenges and to strengthen Sweden's competitiveness” (Gaeu Consulting 2015).

Looking at the international level the European Commission has launched the European Maritime and Fisheries Fund (EMFF). This fund is one of the five European Structural and Investment (ESI) Funds, which seek to promote a growth- and job based recovery in Europe. The fund “helps fishermen in the transition to sustainable fishing, supports coastal communities in diversifying their economies, finances projects that create new jobs and improve quality of life along European coasts and makes it easier for applicants to access financing”. (European Commission 2017).

3. AQUACULTURE

recirculating aquaculture system (RAS)

There are many different methods or systems for fish farming. Looking at Norway as a leading example in Europe, they are often using tanks or enclosures such as fishponds, or “cages”. There are both pros and cons of these systems, but a difficulty is that the cages have a throughput of water, which can lead to the spread of bacteria, viruses, fungi, algae and other microbes. Another thing is that the cages sometimes break and the farmed fish mixes with the wild fish, which is not good since the biological composition differs from the different species. To prevent this, and due to the low currents on the west coast of Sweden, we have decided to work with a so-called recirculating aquaculture system on land. The recirculating system is a closed system where the water exchange is limited. It requires a bio filtration (this could for example consist of a greenhouse) to reduce ammonia toxicity, but may also need other types of filtration to maintain clean water and a suitable habitat for the fish. The main benefit of the recirculating aquaculture system is that you can reduce the need for water since it recycles and purifies itself. The system can be used on land and works both for fresh- and saltwater (Randau, K 2012).



3. AQUACULTURE

+ potential support/funding

how to realize the project



START UP PROCESS

Here is where the project takes its first step towards reality. This could be in collaboration between us students from Chalmers and the municipality of Orust, but also with an inspiring person as Niklas Wennberg who have worked a lot with these type of projects before. This is also a time where local businesses can enter the process, e.g. Scanfjord. Here a key person as Petra Ohldin Lampinen could be involved.

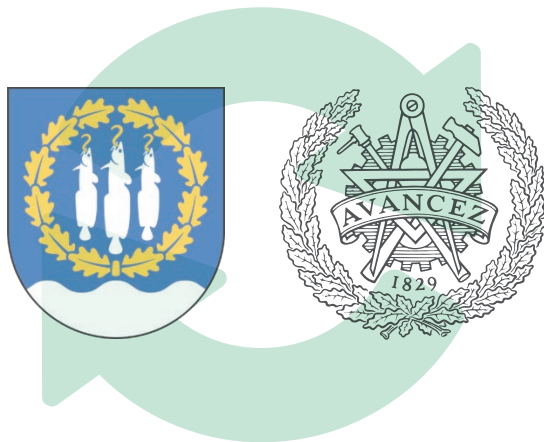
WORK IN PROGRESS

Here is where the fish- and vegetable cultivation has gained momentum and it is now time to start off with the cooking- and restaurant activities for real. Potential stakeholders could in this case be restaurants- and restaurant schools, Orust Blommor or Tofta Gärd etc. (for delivery of products).

KEEP IT GOING

In this time the production is stable and the restaurant activities goes well. This is also the time where different schools enter the process. It could be schools associated with marine biology or "general" schools that want to explore sustainable ways of engaging in food production.

*Grythyttan cooking class
Image: Örebro studentkår*



*Lecture/workshop at Stadsjord, Göteborg
Image: Stadsjord*

3. AQUACULTURE

species

Clarias

Clarias is a freshwater species that originally comes from Africa and that is optimal for growing in recirculating crop systems. It is naturally resistant and hardy, which means that no medicines or chemicals are used in the production. Clarias is an omnivore, which means that it can live on a high proportion of vegetable proteins in the feed, which in the long run may lead to the use of Swedish feed based on decay products from agriculture and forestry. One way to cook the fish is by smoking it, which could mean that it can replace the endangered eel etc. (Gårdsfisk 2017).

Cod

Cod is a salt-water species that has been and is still an important commercial fish species. The stocks have been heavily utilized in the latter part of the 20th century, which has led to a sharp decline or collapse of certain stocks, which in turn also have had a negative effect on the fishing industry. Cod can also be grown in recirculating crop systems, but in comparison with Clarias, it needs more space for swimming (bigger tanks). Since Orust has a strong sea-life and fishing culture, we think it is important to work with species that are actually living there, and cod is therefore a good option (Albertsson, E et.al. 2012).

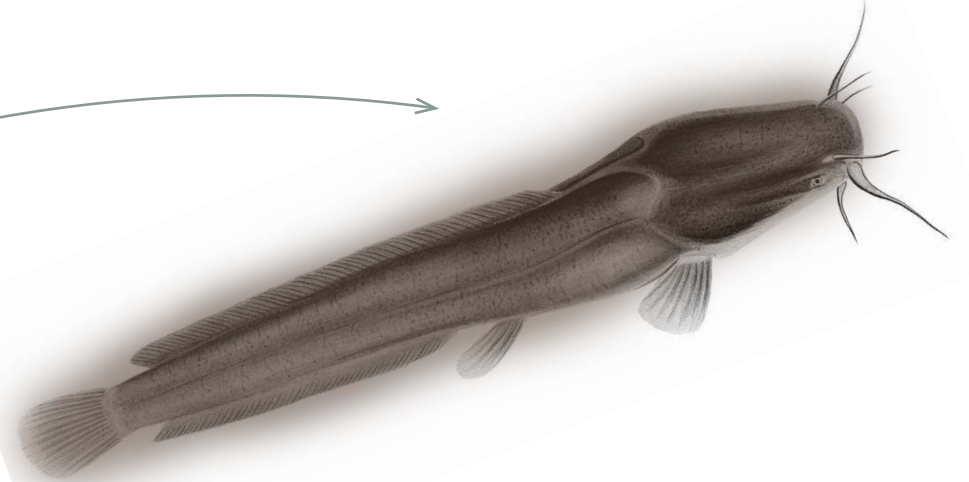


Image: Burchell, W-J



Image: Daconet

3. AQUACULTURE

species

Algae

Looking at the international market, algae production is a major industry, especially in Southeast Asia. Since the idea is to translate the history into the future, we think algae production is a good addition to the fish production. Today, algae are mainly used as natural additives in foods and beauty products, but also as ingredients in food (e.g. sushi etc.). It is also used for making biogas (SWEMARC 2017).



Image: Mercado Libre

Sea cucumber

Sea cucumber is another species that is characterized by a major market in Asia. Here in Sweden the stock naturally exists in our oceans, but it is not in our culture to include this species in our diet. If we are to follow the way towards a more sustainable society, we need to think outside the box and get knowledge of new solutions concerning food. Sea cucumber is optimal to grow in recirculating crop systems, and will in the same time promote a species that already exist on Orust but that is still not used in an ideal way (Göteborgs Universitet 2017).

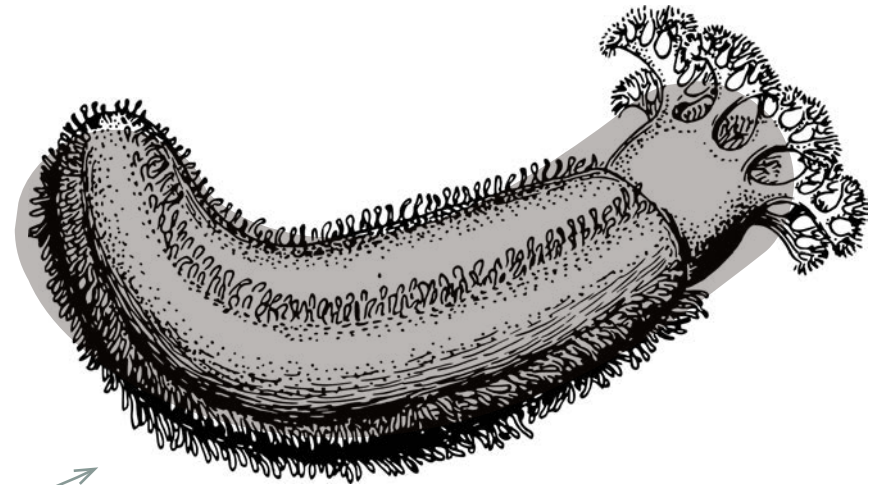


Image: Openclipart

4. DESIGN PROPOSAL

4. DESIGN PROPOSAL

a new node

The center will be located in Tuvesvik, an area we see as the newest node in a series of nodes associated with seafood in the western part of Orust. Tuvesvik is under development and located in the north-west part of Orust and has a ferry station for ferries going to the culturally rich islands Gullholmen and Kåringön. The plans for Tuvesvik include apartments, and the aquaculture center could work as an ignition for further development of the area and give surplus value to the new inhabitants. The new node of Tuvesvik would complement and nudge the existing series of nodes associated with seafood towards the future.

Gullholmen and Kåringön have a history in fishing. The small dense societies organised along the varying terrain next to the water with small intermediate spaces are frequently visited by both locals and tourists in the summer.

Mollösund has a strong tradition of fishing with a few active fishermen today and the mussle company Scanfjord. Mollösund attracts tourists thanks to its fishing history and traditional building typology and spatial organisation. The municipality of Orust has a vision to place a large scale aquaculture facility there. The vision also contains a professional seafood culinary school.



Ellös houses a herring factory called Sweden Pelagic.

Hålleviksstrand has historically been a node for fishing and boat making, but is not in the current active within the fields.

3. DESIGN PROPOSAL

why tuvesvik?

1. Completing the fish farm network

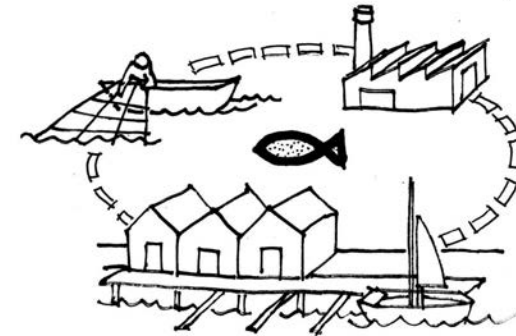
Tuvesvik can be a new node after the oncoming larger fish farm in Mollösund, in a smaller scale and a more “hands on experience” type, involving people from different backgrounds



2. A good connection to traditional fishing industry

Tuvesvik has a close relation to traditional fishing communities (Gullholmen, Hermanö and Kärिंगön)

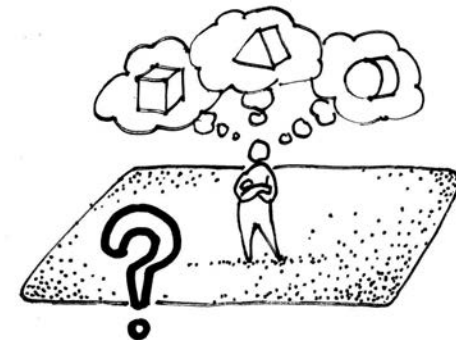
The area is close to an old fish factory, and to the “harbour” where fishing boats landed the catch



3. Potential as a new area

Tuvesvik doesn't have much historic restrictions, which gives it potential to grow with a new profile showing how the way into a sustainable future would look like

The place is facing development (new housing, fish factory, restaurant, brewery etc.), and has the potential to be a new “hub” for new skills and knowledge

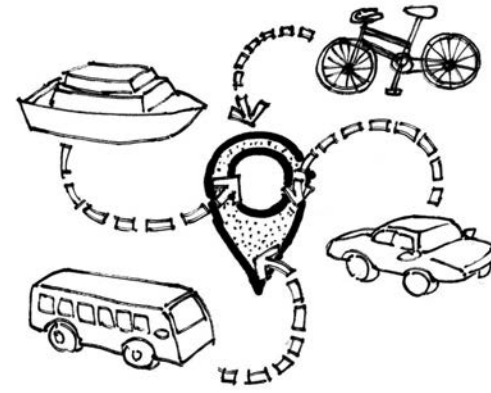


3. DESIGN PROPOSAL

why tuvesvik?

4. High accessibility (bus, ferry, bike, car)

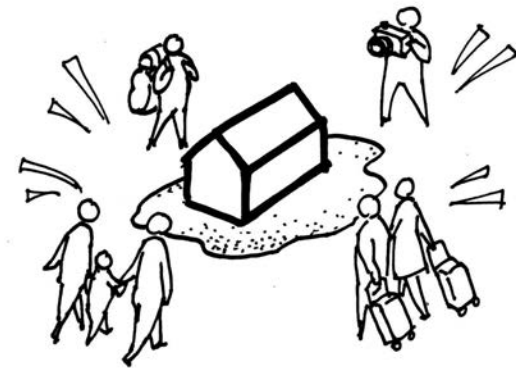
With a ferry- and bus station, Tuvesvik is easy to access by public transport, it is also easy to commute by bike, so people who do not own a car can still visit here



With the built parking lot, it is convenient to commute to and from Tuvesvik by car

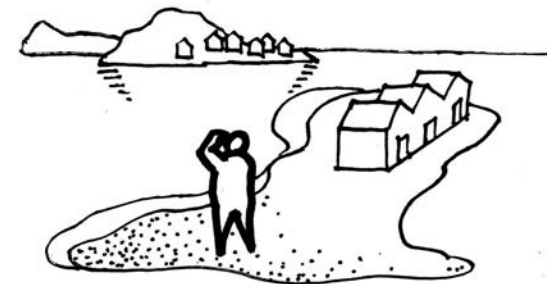
5. Developing tourism

Tourism is a big part of Tuvesvik (Gullholmen, Käringön) today, which could be strengthened through the new aquaculture facility



6. A variety of available context elements

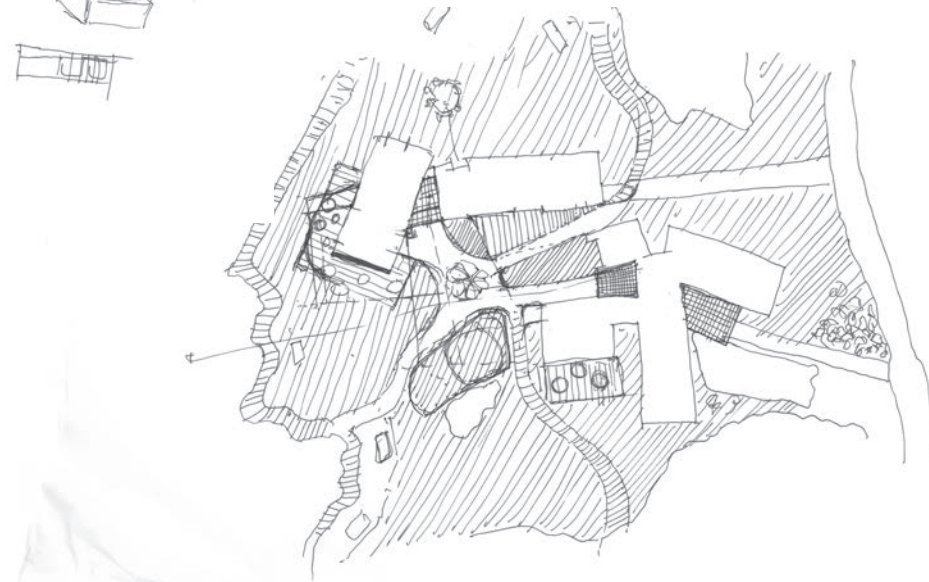
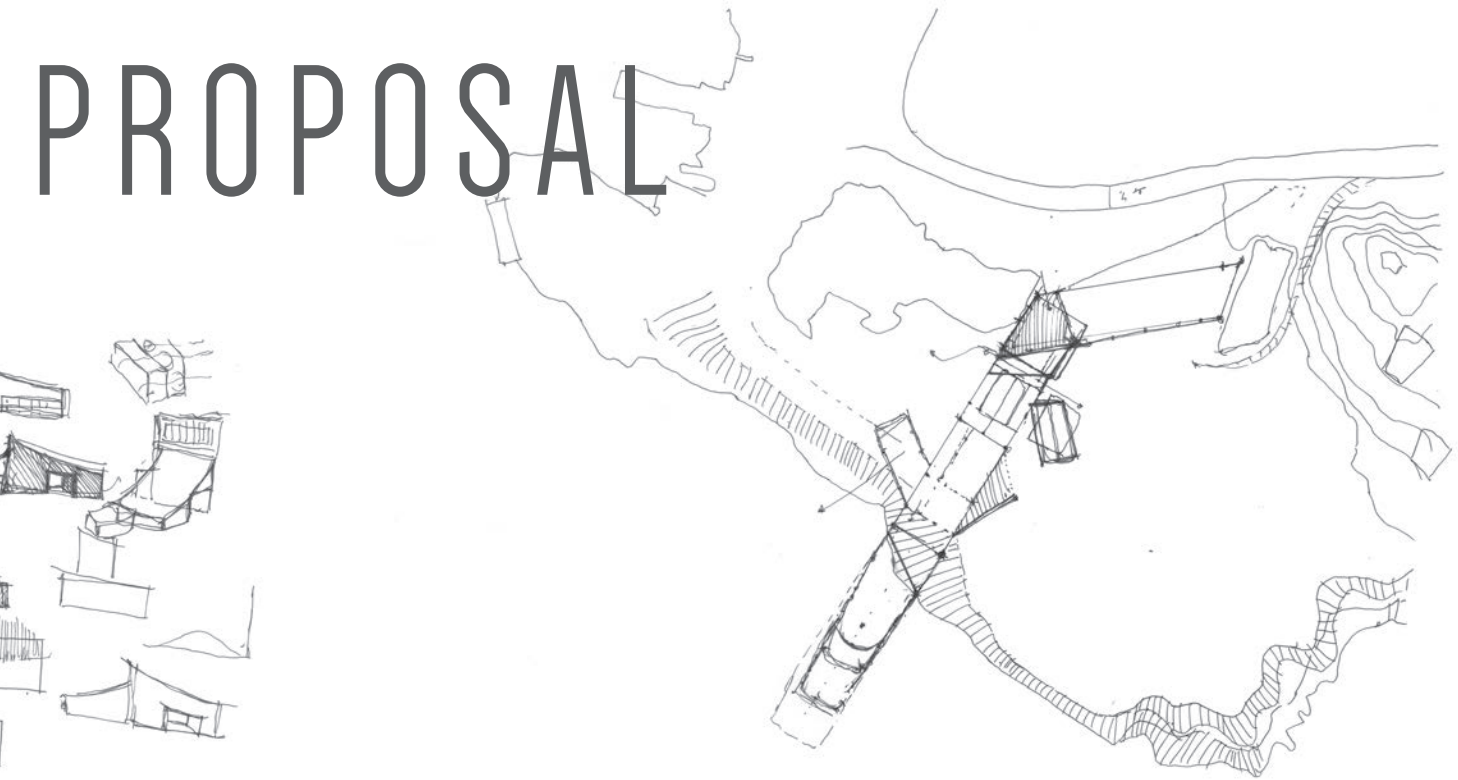
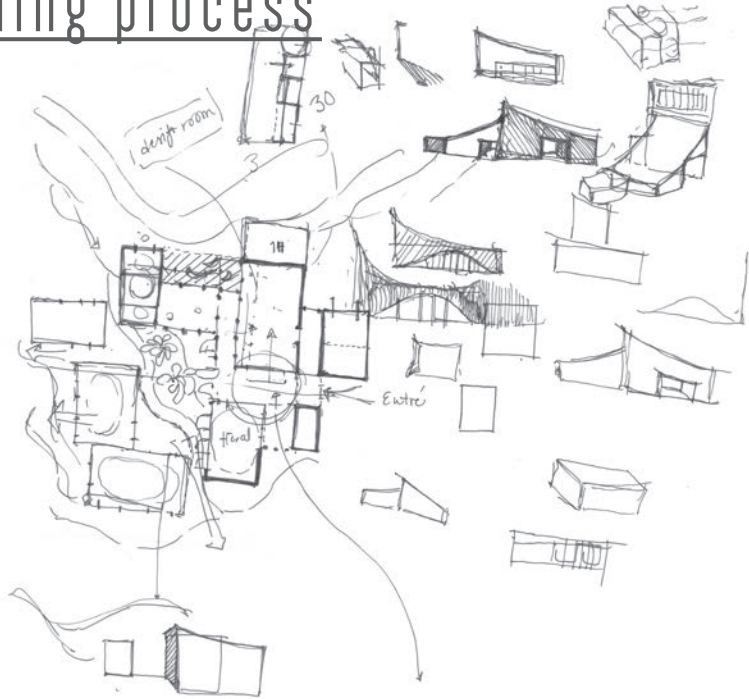
There are “fishing apartments” located near the site, which could be used during autumn/winter for people staying in the new fish farming facility

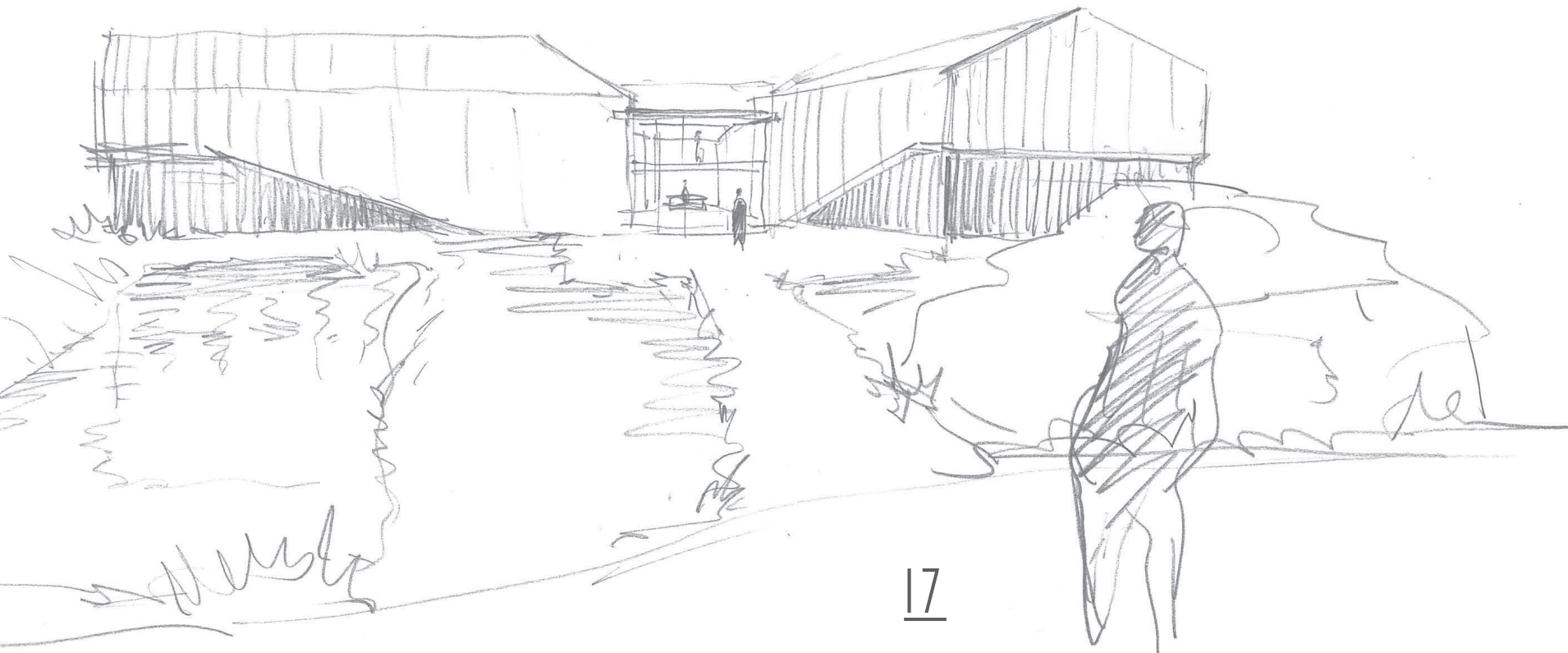
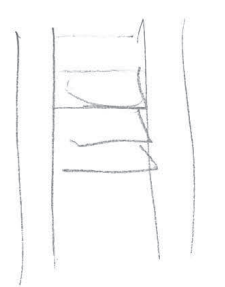
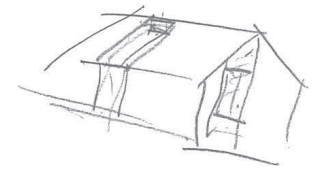


The area is close to the sea so it is easy to get saltwater for the aquaponic system.

4. DESIGN PROPOSAL

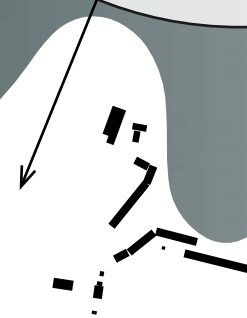
sketching process





4. DESIGN PROPOSAL

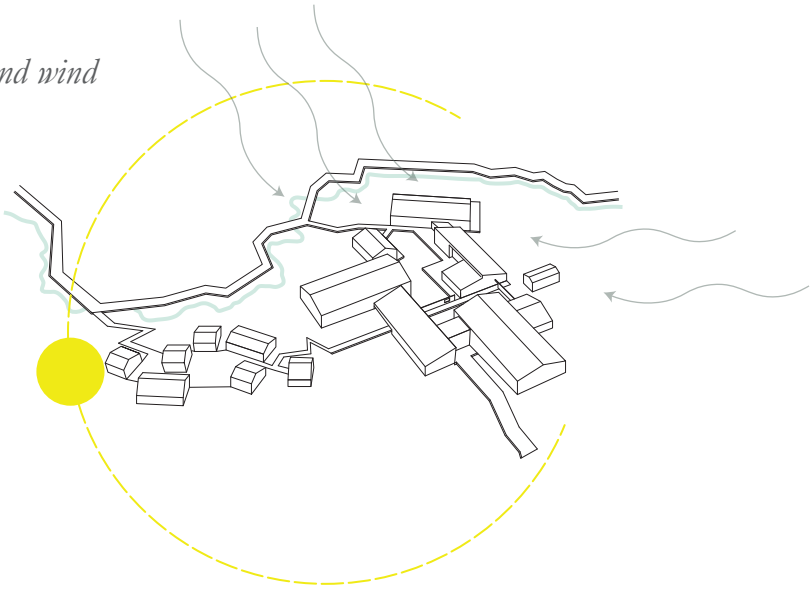
character



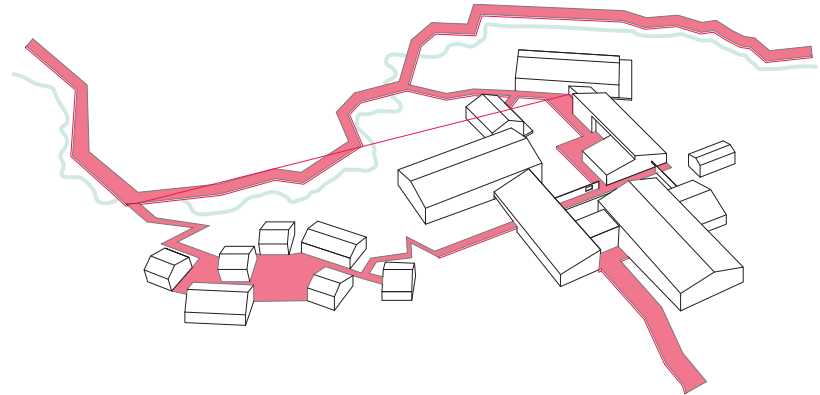
4. DESIGN PROPOSAL

how to work with different elements

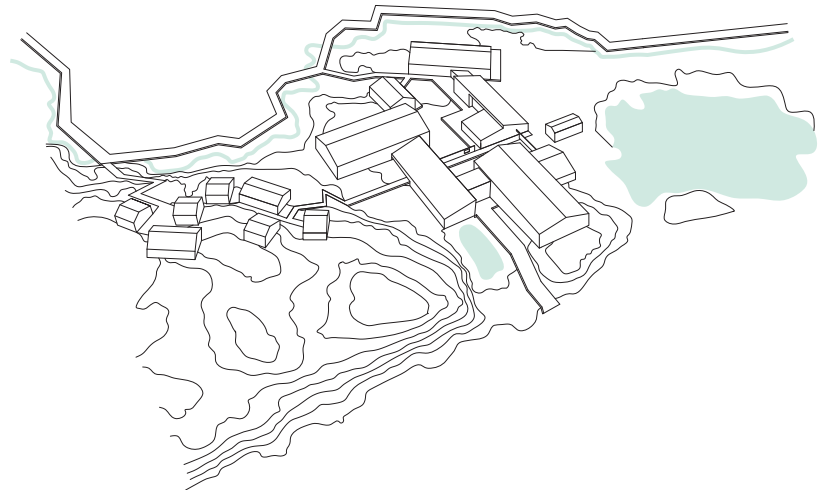
Sun and wind



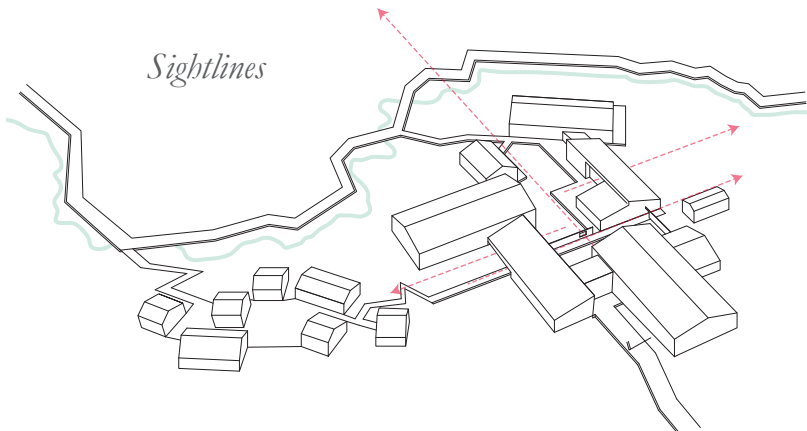
Extended boardwalk and accessibility



Topography and water



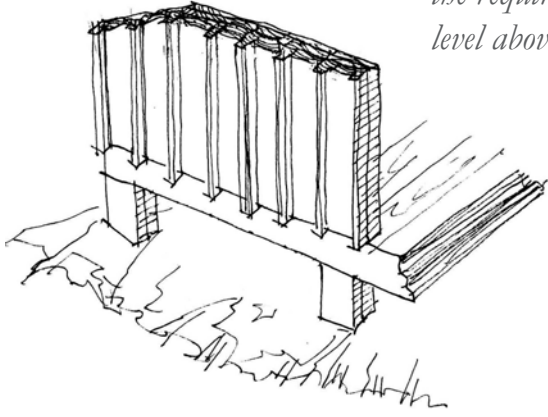
Sightlines



4. DESIGN PROPOSAL

materials

Buildings will be elevated to meet the requirements of a + 3.2 m level above the sea



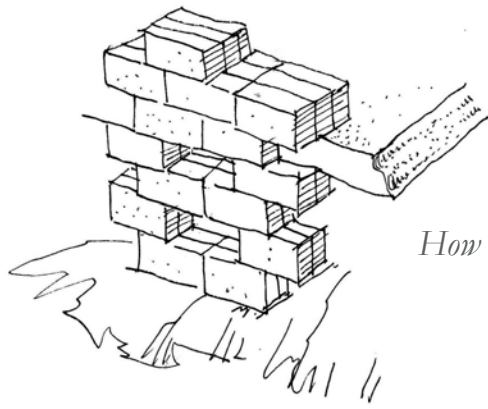
Cedar wood cladder



Brick



Wooden deck/boardwalk



How brick meets the ground

Granite



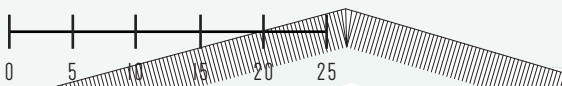
4. DESIGN PROPOSAL

site plan



4. FLOOR PLAN

1. Entrance
2. Exhibition
3. Reception
4. Office
5. Cloakroom
6. Bathroom
7. Classroom
8. Cleaning
9. Storage
10. Preparation
11. Fresh water facility
- 11.1 Stage 3 in production, start feeding
- 11.2 Stage 4 in production; ongrowth
- 11.3 Stage 5 in production; fullsize
12. Stage 2 in production; hatching
13. Control centre
14. Equipments
15. Filter and pumps for fresh water
16. Greenhouse
17. Stage 1 in production; brooding
18. Saltwater facility
- 18.1 Stage 4 in production; ongrowth
- 18.2 Stage 5 in production; fullsize
19. Filter and pumps for saltwater
20. Slaughter
21. Break for restaurant staff
22. Shop
23. Restaurant
24. Dishes
25. Cool storage
26. Kitchen
27. Bar
28. Terrace/ courtyard
29. Cooking class
30. Maintenance
31. Garbage
32. Shed
33. Staff parking and loading/unloading
34. Bicycle parking
35. Rental huts
36. Infographics along ramp
37. Balcony
38. Polychates
39. Feed production
40. Stage 3 in production, start feeding



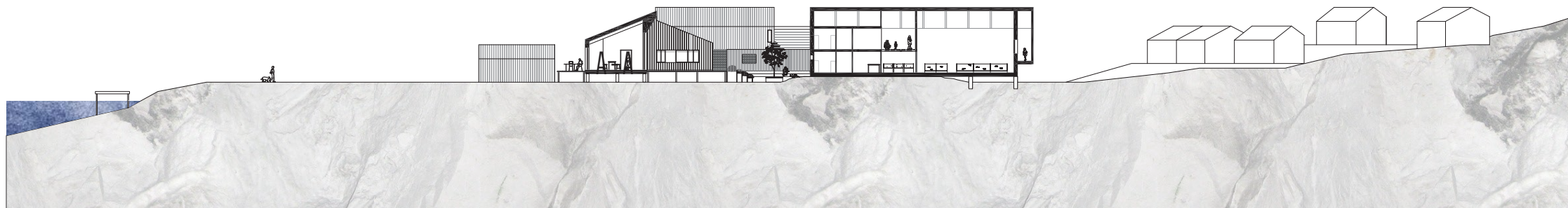
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4. DESIGN PROPOSAL

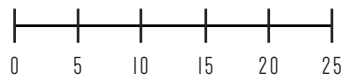
sections



A-A



B-B



VIEW FROM INNER YARD



AQUACULTURE FARM



5. EFFECTS

5. EFFECTS

final thoughts

With this project in Tuvesvik, there might be...

More social meetings; the project can work as a meeting place both for residents living in Gullholmen, Hermanö, Kåringön, other parts of Orust and tourists. They can come here to try or learn about new food, to share aquaculture skills, or just to take a walk on the site.

Higher awareness of how the future food can be; the norm of food might be easier to break since people can taste new kinds of seafood (compared to traditional diet), learn how to cook and farm them.

More activities during off-season; people may be attracted to learn cooking skills and stay here for a longer period.

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INSPIRATION

reference projects

Kvalitetskräftan in Fjällbacka

The project has received public co-financing from the national culinary team, as the project is in line with the vision of "Sweden - the new food country". The project has involved the development of a small company, consisting of three professional fishermen. The company fishes crayfish in cages, which are then stored in a saltwater basin. In the saltwater basin the crayfish are relaxed and detoxified for transport to luxury restaurants in living condition. The company have been supported by 91 471 SEK (Jordbruksverket 2017).



Image: Jesper Gunnarsson

Tirabolms Fisk in Halland

The company is working with small-scale fish farming of salmon trout. The fish is sold both in their restaurant and farmers shop. The fish farm exists of three cages that are placed in the lake Bolmen, Halland. The restaurant is today recommended by White Guide (Tirabolms fisk 2012).



Image: Tirabolms fisk

INSPIRATION

reference projects

Everts Sjöbod in Grebbestad

The company is housed in a 100-year-old building, traditionally built over the sea. It offers various activities and nature experiences linked to the archipelago of Bohuslän, but are mainly known for its oyster tasting and lobster safari (Everts Sjöbod Grebbestad 2016).

Nordiska akvarellmuseet in Skärhamn

The Nordic Watercolor Museum in Skärhamn, Bohuslän, is an inspiring meeting place for art, nature and people. Here you can see world-class exhibitions, dine at Vatten Restaurang & Café and go to concerts, courses and lectures (Nordiska akvarellmuseet 2017).

Fish for Thought in Malmö (under construction)

Fish for Thought is an ongoing project in Malmö, which consists of a learning facility for marine biology. The idea is to create a learning landscape to get more people aware of the changing climate and what all that entails. The project contains different educational activities with a principle focus on marine life (Nord Architects Copenhagen 2017).



Image: Nordiska akvarellmuseet



Image: Nord Architects Copenhagen



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