

# Blue Garden



DESIGNING FOR SUSTAINABLE  
FOOD CONSUMPTION & FOOD  
CULTIVATION





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# Introduction

## **IT'S TIME TO MAKE A CHANGE**

Today's food production is not sustainable. In 2050 the estimated amount of people on earth is 9,7 billion<sup>1</sup> and the way we are producing food will not be enough to feed everyone. Agricultural expansion is one of the biggest threats to global biodiversity<sup>2</sup> and implies marine degradation and loss of species. Rain-forests are being plundered to give space for cows or soybean farms for animal feed<sup>3</sup>. Today agriculture accounts for approx. 70% of the global fresh-water use. Agriculture, together with food and land use, globally causes 23%<sup>4</sup> of the total greenhouse gas emissions. There is a need for a sustainable change in food production. A potential solution is seaweed farming, called Restorative Ocean farming, and to eat algae, "fish food", instead of only eating the fish.

## **WHAT IS RESTORATIVE OCEAN FARMING?**

Restorative Ocean farming is a poly-culture, meaning that more than one species are growing together. A seaweed cultivation combined with for example mussels and shellfish, in underwater sea gardens. This way of farming imitates the diversity of natural ecosystems and generates a positive ecological and social impact. It helps ocean life thrive!<sup>5</sup>

# Abstract

The way we are producing food today harms our lands and depletes our soils. With the increasing population, we will soon not have enough food to feed everybody. At the same time, we are accelerating climate change and destroying natural habitats, biodiversity and important ecosystems.

We have to make a change. There is a need for a sustainable, resilient and restorative food production model, creating carbon low food. Scientists have found a solution, which is Marine Permaculture. A restorative and regenerative way of farming, where seaweed is cultivated together with other species, like mussels and shellfish, in underwater gardens. This solution can provide us with a sustainable and healthy food source, while at the same time leading to carbon sequestration and restoration of our harmed ocean. The next step is to introduce this food culture and food cultivation to Sweden.

The overarching aim of this project was to normalize the use of seaweed, mainly in food, while restoring our ocean, by increasing the number of seaweed farms in Sweden. Therefore, I have designed a service that is introducing ordinary consumers to Swedish seaweed and making it accessible.

My research showed that there is a lack of knowledge about seaweed in Sweden. We are not used to eating it and it's hard to find. There's also an increasing desire to know where our food comes from and to eat locally produced food.

**The result is the service Blue Garden. Blue Garden links consumers, who want to try or buy seaweed, with Swedish seaweed farmers, enabling easy access to seaweed, an improved food connection and increased knowledge.**

Blue Garden consists of a mobile application, a Harvest box and a Try-out kit. The service allows users to adopt a part of a seaweed cultivation, a Blue Garden, in order to receive its harvest. While the farmer and nature are doing the work, users can follow the growth and increase their knowledge in the app. The app also works as a platform for the Blue Garden seaweed community, where users can share recipes, inspire and learn from each other. After the harvest, the users receive the Harvest box at home. The Blue Garden Try-out kit is for the curious user, who wants to try before adopting a Blue Garden.



**In-salted kelp**

**Like fresh.**  
To mix in or add on top. Put in water bath for 10 min & wash before use

Use in cooking



Try this sample  
it's the wild -  
grown seaweed  
specie Dulse  
picked outside  
Väneröarna.

Ready to eat



**Recipe - Kelp pesto**

**Meet the seaweed farmer John!**



John is one of the seaweed farmers who have been cultivating the seaweed included in your package. John grew up by the sea on the Swedish West coast. After working in the fishing industry for some years he changed the direction to seaweed farming and joined the company Nordic Seafarm. Today he lives with his wife, two kids and a cat on the island Saltö, which is located close to the cultivation. The kids like to help with the harvest and the family eat seaweed almost everyday.

Nordic Seafarm's cultivation of the seaweed specie Sugar kelp, is located outside the Koster islands on the north of the West coast. Here the water is healthy and clear, both because of the cultivation and the surrounding National Park.

Scan the QR code if you want to know more!



# Background

## WHY THIS TOPIC?

This story starts on an island outside the Swedish west coast where the smell of salt and seaweed is normal and makes me feel at home. I'm from the West coast and this island is where I have been spending my summers since I was a kid.

During the year 2020, I was living a "one-tonne lifestyle". Meaning that I tried to live on only one tonne of carbon dioxide (which we have to do in order to reach the Paris agreement). Because of that, I had to eat very carbon low food and I found out that seaweed is one of the most sustainable and healthy foods that you can eat. To eat the kelp growing around me had never reached my mind before.

The morning after my findings I picked some kelp while taking my morning swim. The idea I had was to try cooking and eating it. I made an Asian-inspired noodle salad with kelp and tofu, which I served to my family. It was very appreciated even though they were doubtful before!

After this, I was wondering why not all Swedes are eating kelp? I thought I have to do something about it which lead me to my thesis topic *Seaweed Cultivation*.





# Project scope

This project was aiming to find a way to introduce ordinary consumers to seaweed cultivation and a marine diet containing seaweed, mainly kelp. I wanted to explore the possibility for users to cultivate seaweed themselves, in Marine gardens or Marine allotments along the shoreline. Inspired by the growing community of today's "kolonilotter", which are allotment gardens on land. The project was limited to Sweden, mainly the West Coast, where some seaweed farming currently is happening and where most of the marine research takes place.

To understand this new topic, the problems, and the opportunities, I kicked off with wide research. Covering the future of seaweed and its possibilities, about seaweed and its cultivation process, and how it could be introduced to people.

## RESEARCH QUESTIONS

- Is seaweed the future of food and how can it help to combat climate change?
- How does seaweed cultivation work and how to make it sustainable?
- What challenges might appear with seaweed cultivation?
- **How to inspire and introduce people to seaweed cultivation and this "new" food?**

### WHY IS THIS TOPIC RELEVANT NOW?

Project Drawdown is the world's leading resource for climate solutions. In the sector *Coastal and ocean sinks* they present two vital solutions for reaching the Paris agreement - both included in this topic, making it extremely relevant.

1. **Protect and restore ecosystems** - including mangroves, salt marshes, and seagrass meadows that support ongoing photosynthesis and carbon storage.

2. **Shift agriculture practices** - select regenerative practices may augment natural carbon sequestration from seaweed and kelp while growing fibre and food from the sea.<sup>20</sup>

### RELEVANCE FOR SOCIETY

This project introduces a "new" food industry where Sweden has the potential to be self-sufficient, which additionally is decreasing the effects of climate change. Through a multidisciplinary collaboration between designers, marine researchers, ocean farmers, and seafood experts, I believed a valuable result with increased feasibility could be created. Furthermore, the project can help to commercialize aquaculture and be used as a concrete example for achieving necessary political change in laws within Swedish aquaculture.

**”We think of ourselves as  
climate farmers”**

//Bren Smith, Ocean farmer

# Collaboration



## COLLABORATION PARTNER

In this project, I was collaborating with Espen Jorgensen at EGG S Design, Ocean space sector, and with researchers, scientists, and seaweed farmers at Tjärnö Marine Laboratory. Maria Bodin is one of them, she's a project coordinator at Scary Seafood and a collaboration partner in *Marint gränsforum Skagerrak*. Right now she is, together with a group of farmers and scientists (who I call "havskolonigruppen"), testing the idea of cultivating seafood in Marine allotments along the shoreline, for small scale farming. In order to make aquaculture accelerate in Sweden, people need to be inspired, educated and introduced to this (for many people) new food, which is also something they started to work with by initiatives at Tjärnö and Gothenburg University.

During the project, I have talked with seaweed farmers from all existing companies in Sweden, but I had a closer collaboration with the company Nordic Seafarm, which was a valuable part for project. I was also talking to other experts and with a chef who is cooking with seaweed.



01. Maria Bodin showing me the small-scale ocean farming allotment she's testing at Tjärnö.

# Research

The future of farming  
The future of food  
Seaweed & its super powers  
Seaweed cultivation methods  
Existing solutions  
Legislation  
Traditional community gardening  
Exploring kelp  
User interviews  
Hopes & fears  
Personas  
Stakeholders





# The future of farming

## **A SWITCH FROM AGRICULTURE TO RESTORATIVE AQUACULTURE**

Restorative Ocean farming or Aquaculture is the most sustainable way of producing food on the planet. Mainly because it rebuilds marine ecosystems, supports biodiversity and absorbs carbon dioxide in the sea and on land. Where it also enriches the soil by using seaweed as fertilizer.<sup>5</sup> Seaweed is absorbing thousands of tonnes of carbon per square kilometre per year.<sup>24</sup> Restorative Ocean farming could provide us with healthy and environmentally friendly food at the same time as decreasing the effects of ocean acidification, marine degradation and global warming.

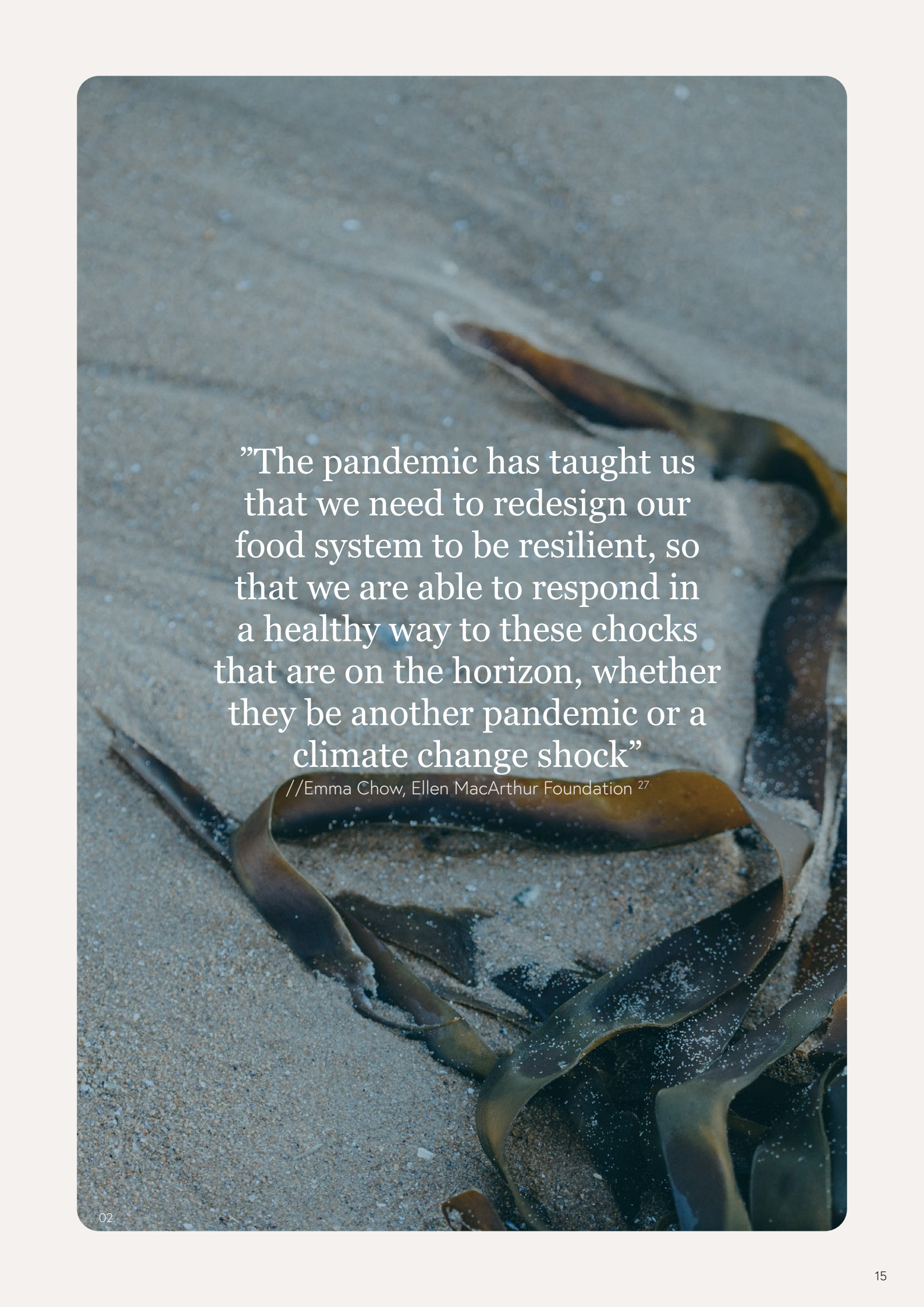
Unlike farming on land, Restorative Ocean farming doesn't require any fertilizer, nutrition or water as there already are enough nutrients like nitrogen and phosphorus in the sea.<sup>6</sup> This makes it sustainable and almost self-driven. The price of, for example, fresh water and fertilizer will increase, therefore a solution which doesn't use these inputs will also have an economical benefit.

Restorative Ocean farming is also a job creator. A study shows that 50 million jobs could be created by farming seaweed in only 1% of the world's oceans.<sup>12</sup>

## **SAVE THE BLUE PLANET**

The biggest threats for the world's oceans are over-fishing, littering, and pollution, as well as the effects of climate change. More than 1/4 of all carbon emissions are absorbed in the ocean, causing ocean acidification, as the carbon dioxide forms carbonic acid in the sea, lowering the pH value. This could lead to catastrophic consequences if not acting now. The pH value in the world's oceans are now the lowest for 400 000 years.<sup>13</sup>





”The pandemic has taught us that we need to redesign our food system to be resilient, so that we are able to respond in a healthy way to these shocks that are on the horizon, whether they be another pandemic or a climate change shock”

//Emma Chow, Ellen MacArthur Foundation <sup>27</sup>

## THE SOLUTION FOR OUR FUTURE

Marine Permaculture is a way of Restorative farming and a promising solution of tackling climate change and creating a sustainable and resilient food production. Researchers have estimated that we could absorb 53 billion tonnes of carbon dioxide per year if using 9% of the world's ocean surfaces for seaweed farming. Seaweed could even grow in already "dead zones".<sup>24</sup> Several authors are contending that seaweed aquaculture can produce several billion tonnes a year of Macro algae, providing a sustainable and healthy food source. In comparison, agriculture produces over 10 billion tonnes a year of various products (mostly plants).<sup>26</sup>

In the two latest films about climate change and its possible solutions, it has been clear that Marine Permaculture is the way to go. In the film *2040*, released in 2019, the climate guru Paul Hawken explains why Marine Permaculture is important for our future. This is also included as a solution in David Attenborough's film *A Life On Our Planet*.

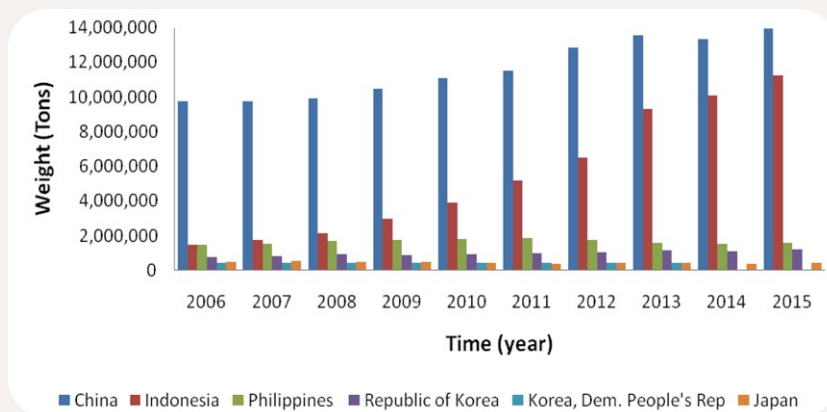
My conclusion from this was that it's a very relevant topic, and it's right in time.

**“It could feed 10 million  
people from protein from  
Marine Permaculture alone”**

//Paul Hawken, Project Drawdown

## TODAY'S SEAWEED INDUSTRY

Seaweed is one of the fast-growing industries in the World, increasing with approx. 9 % every year.<sup>31</sup> Today, China is by far the largest producer of seaweed in the world, but Indonesia is catching up. The seaweed is mostly used for food, at least in China, which mainly produces the kelp species *Saccharina japonica* and *Undaria pinnatifida* (Wakame). Indonesia produces mainly red algae, the carrageenophytes *Kappaphycus* and *Eucheuma*, which except for food are used for cosmetics and industrial manufacturing. These four species represent 98% of the world's cultivated seaweed production.<sup>26</sup>



03. Global seaweed culture production by the main country producers, in tons. Adapted from FAO-The global status of seaweed production, trade and utilization, 2018



04. The food of the future - a seafood buffet by Northerncompany.

# The future of food

## FOOD TRENDS

Food has become an important part of people's **experiences**, and travels connected to food are now common. Local food can for example help to create an understanding of a place's identity.<sup>14</sup> There's also a clear shift in people's values and attitudes towards food. People are getting more aware of what they eat, in order to eat healthy and environment friendly.

The desire to know where the food comes from and eat local food is increasing. In *Stylus Future Farming* report they mention the **connected cultivation** trend. Which connect consumers to producers (to increase locally produced food) and restaurants to grow their own ingredients. There are also different farming initiatives happening with a rising desire for hands-on **involvement with food production** among people. As well as digital systems and apps connecting consumers to the source of food production or "**remote farming**".<sup>15</sup>

At the same time, food brands are becoming more transparent as well as offering consumers more healthy and sustainable ingredients.<sup>15</sup>

## FOOD AND HEALTH

Except for traditional medicine, **food is our most powerful tool for physical and mental well-being**. Many illnesses can be prevented, treated and cured by dietary choices and the food's preventative and reparative powers are becoming more utilized. To manage the disease through food will become even more relevant as populations grow older.<sup>16</sup>

In the podcast *Climate Changers*, *Eve Turow-Paul* is talking about food and climate. She talks about the beautiful connection between what's good for us physically and emotionally, which also can be sustainable. To eat sustainably can help us feel more in control of our health, help us feel bonded to global communities, friends and families, and feel like we have an impact. Which are vital things for our well-being and will benefit human health on a physical level.<sup>29</sup>

Apart from food, there is a trend to be healthy in general, from nutritious diets to meditation and spending time in nature.

## KELP THE SUPERFOOD

The trend of eating kelp in Europe started 10-15 years ago and there are signs showing that kelp is also starting to become very popular here in the Nordic countries. Many of the luxury restaurants have started to put kelp on the menu.<sup>8</sup>

The protein from Algae consists of a lot of the amino acid creating the umami flavour, which increases other flavours in the food<sup>18</sup>. The umami taste has become very popular, in particular when designing good tasting vegan food options.

An ongoing project, called *ProSea-Food* at Lund University in Sweden, is exploring the health benefits of eating kelp. Scientists are speculating if there's a connection between the longevity of the Japanese and their seaweed diet. A hypothesis is that the fibre from the kelp increases the growth of the bacteria in the bowel, which empowers the immune system and maybe also longevity. The average Japanese eats 5 kg algae every year and they rarely suffer from bowel cancer and dementia.<sup>19</sup>

Some examples of seaweed food products already on the market are the Seaweed-burger from Vegme and the kelp-gin from the company Klocktornet. In Maine, they have also organized a seaweed food and drink festival to note the powers of kelp!



05.



06.



07.

# Seaweed & its superpowers

## WHAT IS SEAWEED AND KELP?

**Seaweed is the common name for all species of marine plants and algae.**

**Kelp is a large and brown type of seaweed or Macro algae.** It's the largest and fastest-growing marine algae. There are 10 000 species of algae which are divided into three groups depending on their photosynthesis colour - red algae, green algae and brown algae.<sup>17</sup> Different types of kelp (brown algae) grow in different places in the world. In Sweden all kelp is edible, and the most farmed one is Sugar kelp, also called *Sweet kombu* or *Saccharina latissima* (Sockertång in Swedish).

## KELP AS A SWEDISH FOOD RESOURCE

70%<sup>5</sup> of the earth consists of water, but it is an underutilized resource as only 2%<sup>5</sup> of the global food production is originating from the sea. Sweden imports 75% of the seafood consumed and contributes only with 1% of the total seafood production in the EU. Even though our long coastline and a high potential to be self-sufficient on this food industry.

Approximately 40%<sup>13</sup> of the world's population is living in onshore areas. Areas where also half of the world's fish and shellfish resources and the most important ecosystems (like coral reefs, seagrass beds and mangrove forests) are living. Ecosystems like seagrass beds and kelp forests are also existing in the Swedish sea.<sup>13</sup> We need to take care of these ecosystems, restore them, but also utilize them - in Restorative Ocean farming where we create a resilient and sustainable food system.

# Björn - the chef

Björn is a chef focusing on seaweed. Mainly because of its environmental benefits and the fact that it's a new and unexplored type of food where he can fully use his creativity while exploring it. He says that he is "very impressed of this creature".

For Björn seaweed is nothing new. He grew up by the kelp-rich sea on the Swedish west coast and he has worked as a fisherman and in fish stores before he started his chef career 20 years ago. At that time he also tried cooking with seaweed for his first time, now he is eating it on a daily basis.

When I met Björn he was making kelp-chips and hard bread with kelp in a kitchen on the Swedish island Tjärnö. He told me that the Sugar kelp should be mixed into food, and not be used as a main ingredient, in order to work well in a dish and for achieving its great flavour-experience. His guests at the restaurant where he works are often sceptic to order the seaweed-dishes, but always very positive afterwards. One seaweed-dish that really won the guest's hearts was the fried spring rolls rolled in the crispy kelp! I asked Björn if he would be interested in growing kelp in a Marine garden and the answer was "Right away, without a doubt, I know many who would like to". Before leaving Björn to focus on the cooking, he said;

**"Everyone seems very interested in using kelp as it feels good for them from an environmental point of view, but they don't know how to use it"**



01. Björn cooking with Sugar kelp at Tjärnö, Sweden

**"The Sea lettuce (havssallat) is fantastic to work with, it's probably a favourite"**

//Björn Ahlqvist, Chef

## ALL SUPERPOWERS OF KELP (AND ALGAE)

**Vital oxygen source** - algae produce 70 %<sup>8</sup> of the world's oxygen, which makes it a larger contributor than all the world's rainforests<sup>11</sup>. There are approximately 9 times<sup>8</sup> more of algae in the world's oceans than plants on land.

**Fast growers** - it's one of the fastest-growing plants on earth. The Macro algae *Macrocystis pyrifera* can grow up to one meter<sup>8</sup> a day.

**Superfood** - one of the most nutritious food on the planet with its high levels of minerals, vitamins, fibres, proteins, Omega-3, EPAs, DHAs, trace elements and antioxidants.<sup>19</sup> Many algae species contain more protein than meat, more calcium than milk<sup>8</sup>, more iron than spinach and more fibre than brown rice<sup>24</sup>. Kelp can minimize the risks of national diseases, like heart disease.<sup>14</sup>

**Multiple potential use-cases** - it could be used as food (for humans and animals), fertilizer, biofuel, fibre for the textile industry, for making medicine and cosmetics, as well as a substitute to plastic. **Imagine to eat your food and then eat the (kelp-based) package too!** According to the National geographic 9 million metric tons<sup>9</sup> of plastic packaging floats out in our oceans every year. Kelp could cope with this plastic problem.

**Enrich the soil and increase yields**<sup>5</sup>, using seaweed as fertilizer and compost. This creates an important nutrient loop, where all nutrients in the seaweed are brought to land.

**Reduce cow's methane emissions** - by feeding cows with Swedish kelp-based feed supplement the methane emissions from the cows can be reduced by up to 80%<sup>10</sup>. At the same time it increases the animals well-being and productivity. 5% of the world's greenhouse gas emissions come from all our cows. For comparison it's twice the amount of emissions by the world's airplanes. To reduce these emissions by including kelp in the cow's diet is therefore vital.



”Our food is gonna be the most affordable food on the planet and the reason is the climate economy”

//Bren Smith, Ocean farmer

#### HOW CAN SEAWEED HELP TO COMBAT CLIMATE CHANGE?

- By creating a resilient and sustainable food production and food security
- Creating sustainable fish farms, by growing kelp with the fishes
- Creating a sustainable agriculture, by connecting land and ocean farms in one ecosystem and creating a beneficial loop of nutrients
- Making plastic, biofuel, fibre for textile, medicine and cosmetics
- Thus reducing emissions and global warming.

With all these (summarized) extraordinary benefits with seaweed and cultivation of it, my conclusion was that it really can help to combat climate change.

# Seaweed cultivation methods

## HISTORY OF SEAWEED FARMING

History shows that algae were used in the Japanese kitchen 4000<sup>7</sup> years ago, but started to be eaten more frequently much later. In the 1800s the Japanese came up with a new technique of how to farm Laver or Nori, which was the start of the production of Nori sheets and sushi rolls. Laver, *Porphyra umbilicalis*, is a type of red alga, it has antibacterial properties why it's very good to wrap around food and to eat it like in sushi. Funori is a type of Laver that is used in Japanese architecture to protect house facades.<sup>22</sup>

One of the early methods of seaweed farming (offshore) they seem to have been using in Tokyo in the late 1700s was to throw bamboo branches in muddy water where the seaweed spores would jump onto the branches. After some weeks the branches were moved to a place, like a nutritious river with a current, where the seaweed would like to grow. These methods have developed significantly in Asia over the past 70 years, as well as more lately in America and Europe. Onshore cultivation came much later, it started in the 1970s–1980s.<sup>21</sup>

## METHODS USED TODAY

Since a couple of centuries back and until today the methods differ a bit depending on what species that are cultivated and in what country.

**There are three ways of cultivating seaweed; offshore, onshore and in aquaculture integrated systems.**<sup>21</sup>

The most common way is offshore cultivation, where seaweed sprouts are attached to ropes, lines, or nets that are stretched out horizontally, in between buoys that are anchored to the bottom of the ocean. In order to do that, the farm needs the sprouts of the type of seaweed that they are going to cultivate. This is the hard part. A lot of science, tests, and work is done to find a way of producing sprouts from a Mother plant (of the seaweed) from that certain area. It's only possible or allowed to cultivate a seaweed species that grows naturally at the spot where the cultivation will take place. Therefore, it's hard to take sprouts for cultivating, from another country or place, as every place is quite unique with different species.

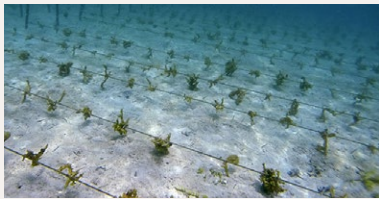
10. Ben Smith, Green Wave, North America



11. Cultivation at Bali



12.



13. Cultivation in India



14. Kelp farm in Rongcheng City, China

## HOW DOES RESTORATIVE OCEAN FARMING WORK?

The big-scale seaweed (ocean) farms existing today primarily use the classic off-shore cultivation method. There are better, more sustainable methods though, called Restorative Ocean farming or Marine Permaculture. Where a mix of species are cultivated together to mimic the diversity in the ocean and increase biodiversity. The American company Green Wave provides a model which they call Regenerative Ocean farming (see picture further down).

Bren Smith is an ocean farmer and the founder of Green Wave. I listened to some podcast episodes and a TED talk with him where I tell his story, from a fisherman to an ocean farmer. He also talked about Regenerative Ocean farming and the company Green Wave. The Green Wave model is about growing many different species in an area as small as possible. To cultivate Sugar kelp, mussels, oysters, clams, and scallops using the entire water column. Bren believes this model is a part of a solution for climate change. It has great resilience - for example if one crop fails they have others, and the farm is built to bend and sink in a storm and then pop up again after the storm. There are also other benefits with seaweed and this type of farming which are explained in the chapter *Kelp & its superpowers*. In the TED talk Bren also mentioned that, if you take 5% of the US waters for farming, you create 50 million direct and indirect jobs, based on a study from The World Bank.



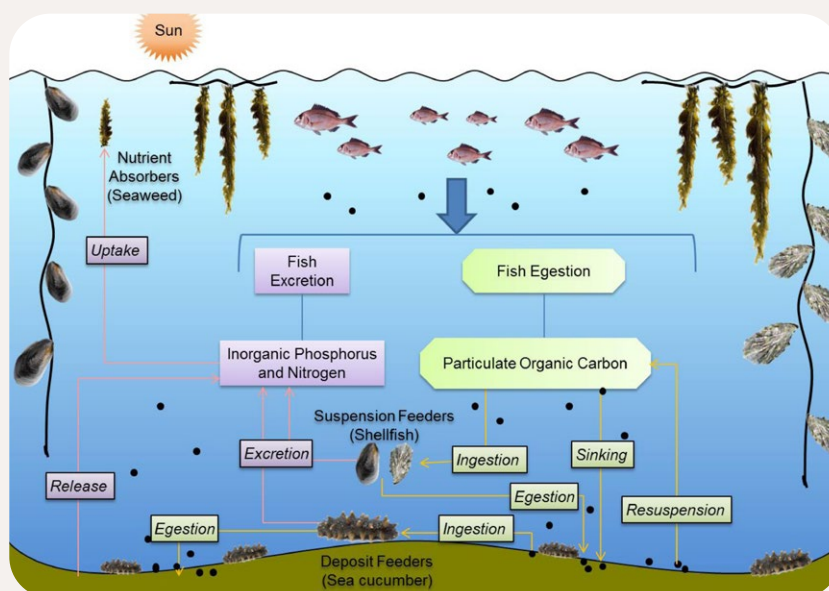
10. Picture showing the Green Wave model.

## MARINE PERMACULTURE

Permaculture is a way of working with the nature, rather than against. It's a holistic approach of farming that copies diverse natural ecosystems, creating closed-loop systems, regenerative agriculture and resilience.<sup>23</sup>

**Marine permaculture** or **Integrated Multi Trophic Aquaculture (IMTA)** are both methods of cultivating different species together in the sea, where the output from one specie is nutritional input for others. Creating a closed-loop system that is recreating ecosystems like seaweed forest habitat in the ocean. By using this method, seaweed and fish can be sustainably cultivated and harvested at the same time as absorbing carbon and increasing marine biodiversity.

In animal aquaculture, such as fish farming, this cultivation model could solve environmental issues if combining algae together with the fish.<sup>21</sup>



15. Picture showing the IMTA model.

# Existing solutions

## REGENERATIVE OCEAN FARMING IN DENMARK

Havhøst is an organisation about Regenerative Ocean farming in Denmark, providing seafood cultivation, events and education. They help groups in local communities start cultivating in the sea and by connecting them with other community-driven ocean farms within their network they can also learn from each other. Havhøst offers two different solutions of cultivation;

1. The traditional - cultivation in between buoys out in the sea
2. The "new one" - cultivation from a floating platform connected to land, called *Bølgemark*.

When talking to Bodil Sofie Espersen at Havhøst she told me that most of the farms are driven by voluntary com-

munities, some do it for the community, some for food or for sustainability. Anyone can sign up as a member for around 50 Euros a month. Most of their users are old people, but there are more young curious people in the city. The ones buying the cultivation solution in the first place are private fund, local funds, EU funds or the community.

Except their cultivation solutions, Havhøst offers a mussel-set and guide for starting mussel cultivation. Today they are cultivating Sugar kelp, mussels and oysters, but it differs from each farm depending on that certain area. Havhøst is also experimenting with the red alga Dulse (*Palmaria palmata*) and hopefully that one could also be cultivated in the near future.



08. Joachim Hjerl founder of Havhøst, article in SvD 2020-10-26



09. Harvest dinner party, Havhøst

**"We would really much like to work with other species of seaweed but we are not scientists and we wouldn't know how to cultivate them ourselves".**

Havhøst has its own cultivation platform Bølgemark in the centre of Copenhagen, where they educate (mostly school groups) about sustainable food, food systems, biodiversity ecosystems, climate change etc. Even

though they cultivate there - it's not for eating, as it's in the city centre. It's more like a "showroom" and an educational and experimental platform, where they also test different species.

**"The important thing for us is to combine the cultivating, with the possibility to showcase it and involve the citizens in it"** says Bodil Sofie Espersen.



**“In my point the biggest weakness of this growing culture is that we are not good enough to use it, it's not a part of our food culture”**

//Bodil Sofie Espersen, Havhøst



09. Both pictures showing future concept images by Havhøst

## SEAWEED FARMS IN SWEDEN

In Sweden there're some smaller companies that are picking and selling wild seaweed, for example *Vågrät*, *Tångkullan* and *Scandsea*, but there are only three kelp farms existing. Those are *Sea Culture*, *Ten Island Seafarm* and *Nordic Seafarm*. All are cultivating Sugar kelp between buoys in the sea on the Swedish West coast. What differs from the others is that *Sea Culture* gets their sprouts from Holland, where they collaborate with the company *Hortimare BV*.

**Ten Island Seafarm** is a small-scale kelp farm at 0,3 hectare, which started up last year in the Gothenburg archipelago. It's a cooperative farm where consumers buy a part of the cultivation from the two seaweed farmers Anna and Cassandra, who are farming and then giving the harvest to the customer. Their customers vary, some are "new" and some are "kelp-nerds" as Cassandra describes it. The kelp is mostly used as food, but some customers also use it in art projects and for skin and hair care.



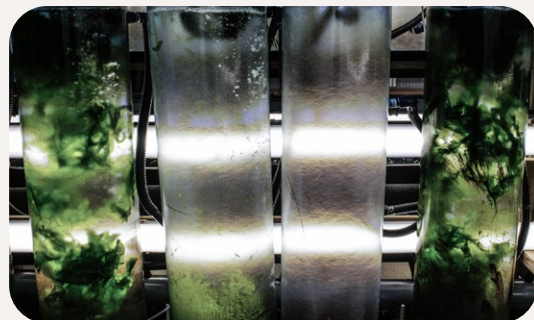
16. Ten Island Seafarm's kelp cultivation, reached with a SUP.

At the end of January, I did an interview with Cassandra, who's a sea-lover and one of the owners of Ten Island Seafarm. She told me that the sprouts from the Sugar kelp they cultivate are bought from Nordic Seafarm and come as pre-prepared lines with the sprouts on. Which they twirl around a rope and put out horizontally between buoys for growing. The Mother plant (of the sprouts) originates from the exact spot where the cultivation of it is located, to not mess up with that certain ecosystem.

**”I think that in 10 years we will have farms that may not only be for food but also purely for environmental reasons ”**

//Cassandra Köbbel, Ten Island Seafarm

**Nordic Seafarm** is a big-scale seaweed farm located on the North of the Swedish West coast. The company was founded in 2016 after they had found an effective and sustainable process for producing Swedish kelp (Macro algae).



01. Green algae cultivation at Nordic Seafarm.



## Jonatan - the Seaweed farmer

Jonatan has travelled around the world, working in many different places, but since some years back he has settled down on the Swedish west coast to become a Seaweed farmer! He is talking with great enthusiasm when he says that he loves his job, to be out on the sea and work with something meaningful like this.

Jonatan is one of the few Sea farmers (havsbönder) in Sweden. He's working at the company Nordic Seafarm. They have a kelp farm outside the Koster islands where they cultivate Sugar kelp. When I met him he was also showing me their indoor green algae cultivation.

**”I think anyone could have a marine allotment”**

Jonatan believes seaweed is the future! He thinks anyone with the right tools could start cultivating seaweed. Right now their biggest customer are restaurants and food companies, but they also want to introduce this extraordinary commodity to private people. Why they are about to launch kelp based food products with their own brand.

**”If you would get a bunch of kelp today, you would wonder what to do with it”**



01. Jonatan showing me pictures of the farm

**”The best thing would be if it was possible to lift up the whole cultivation from the sea so it could be hanging drying there on spot. Then we could just go out by boat and take down the dried stuff”**

//Jonatan Gerrbo, Seaweed farmer

# Legislation

## **PERMISSIONS FOR SEAWEED CULTIVATION**

There are some different permissions required to establish ocean farms. Establishing a seaweed cultivation or a Marine Permaculture cultivation seems to be easier, compared to for example big scale fish farms. The permits needed are:

- Permission to conduct aquaculture (fisheries legislation)
- Permission to release or move fish or shellfish
- Exemptions from the beach protection regulations (depending on location)
- Registration as a primary producer to the National Food Administration (if the product is going to be used as consumption)

The municipality or county administrative board of the location of the farm needs to be contacted in order to get a permit to establish the cultivation in accordance with the fisheries legisla-

tion. At the website of Swedish aquaculture ([svensktvattenbruk.se](http://svensktvattenbruk.se)) more information can be found as well as a permission guide and checklist for making the process easier.

The different stakeholders which could be involved in the process are:

- The County Administrative Board
- The municipality
- The Swedish Board of Agriculture (Jordbruksverket)
- The National Food Administration (Livsmedelsverket)
- Swedish Veterinary Institute (SVA)
- The Swedish Maritime Administration and the Swedish Environmental Protection Agency (Naturvårdsverket)

For creating an ecological aquaculture EU have some common rules and a strategy for sustainable aquaculture with the least possible environmental impact.<sup>25</sup>

**COULD ANYONE APPLY FOR THESE PERMISSIONS?**

Anyone could apply for the permissions for starting to cultivate seaweed. If it's a private person or a company doesn't seem to make any difference, regardless of the size of the cultivation.



09. Existing marine garden allotments, Havhøst

”Kelp is the new soil”

//Bren Smith, Ocean farmer

# Traditional community gardening

## ALLOTMENT GARDENS (KOLONITRÄDGÅRDAR)

In Sweden we have both Community gardens and Allotment gardens spread out in the country, most of them located close to the bigger cities. These gardens are areas, usually on public land, that people utilize for growing plants, fruits, and vegetables. In a Community garden, the cultivation is done by a group of people, who together takes care of the garden and share the harvest.

An allotment garden consists of different allotments available for individuals or families interested in utilizing the area.

The first allotment garden association in Sweden was accomplished in Malmö in 1895. The allotment gardens played an important role during the first World War when Sweden suffered from a huge food shortage. Today there are more than 200 allotment gardens in Sweden and it's a part of the Swedish cultural heritage.<sup>30</sup>

## COMMUNITY (MARINE) GARDENS

During my research I had an interview with Malin Lobell, who's a gardener, working with initiating community gardens, e.g. Bellevue Farm. Now she's also working on a project with the group "havskolonigruppen" (a group I'm also mentioning in the Collaboration chapter on page 9). Their project is about introducing the idea of starting up Community Marine Gardens along the Swedish coast. Their idea is that the west coast could offer small-scale farming initiatives to grow edible mussels, oysters, and seaweed for private consumption. While the Community Marine Gardens in the Baltic Sea with its so-called "dead zones", can provide restorative benefits for the sea, all its species, and shorelines.

When talking to Malin Lobell I was mainly curious to know **what the difference is between farming in community gardens or allotment gardens on land compared to in the water**. As well as **what can be transferred to a marine garden?**

**“It’s no difference really...  
What I think is the  
difference is that there are  
other materials and other  
organisms living there”**

//Malin Lobell

Malin thinks that a marine garden can be organized in the same way as traditional community or allotment gardens. In general, she believes more in the community garden concept as it creates a valuable social fellowship, where people can learn from each other. Compared to allotment gardens which are more individual, private, farming areas.



19. Photo from Bellevue Farm in Stockholm

Like a traditional community garden, a Community Marine Garden could be a meeting point over generations with an important exchange of knowledge. Malin also mentions the benefit of creating a marine garden that also can bring something to people passing by, who not are members of the Marine Garden Association. In order to reach, inspire and educate more people about the sea, its species, and food possibilities, as well as the benefits of Marine Permaculture.

**“You can handle more  
if working together and  
learning from others”**

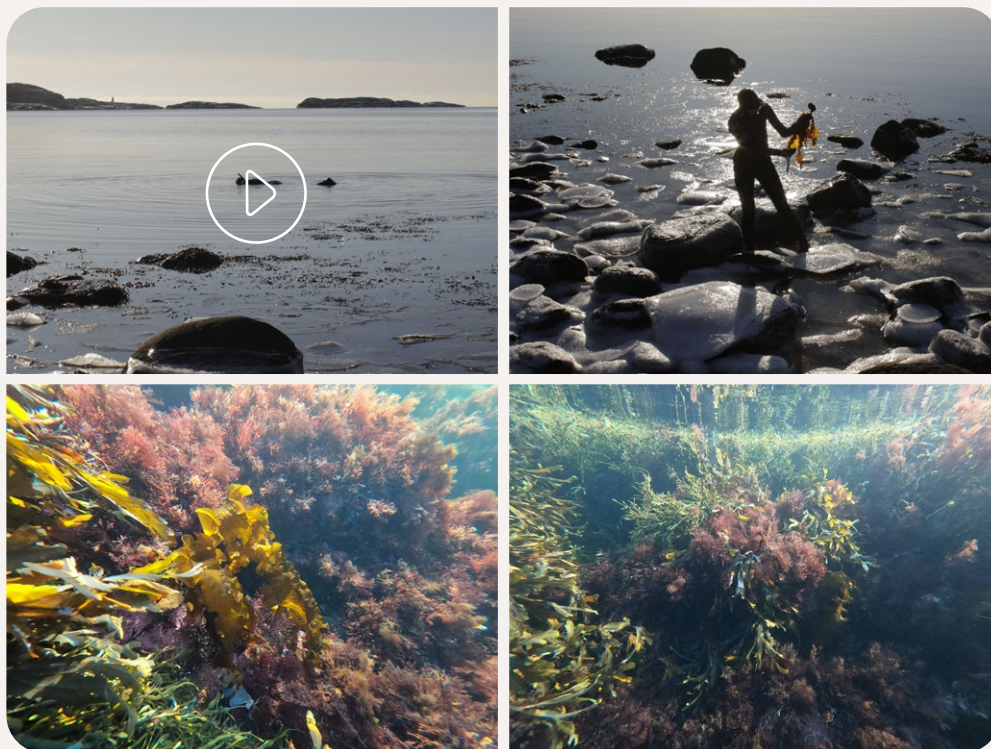
//Malin Lobell

# Exploring kelp

## PICKING WILD KELP

To learn more about the seaweed originating in our Swedish sea I felt that I had to explore and experience it myself, which I did in the end of January on the North of the Swedish west coast. It was incredible to see these amazing sea forests in a crystal clear and calm water. I was fascinated about that everything I saw was actually edible, something I didn't know before. I brought a scissor for the snorkeling adventure so I could harvest some Sugar kelp and try cooking with it afterwards. See an underwater video from my snorkeling by clicking on the play button further down the page.

Besides my own seaweed snorkeling adventure, I also did a snorkeling tour together with the expert Linnea Sjögren, working at the company CATXALOT. She taught me about seaweed, the different species and how to pick it.



01.

## Linnea - the expert

Linnea loves seaweed, the sea and everything that comes with it. By her company CATXALOT she is the one who has introduced Swedish seaweed as a new source of food in Sweden! Since 2014 she has been providing top restaurants and chef-competitions with seaweed that she picks in the wild, she's also running seaweed educations and events. Linnea says that;

**”It’s important to create passion for the sea... a way of doing it is by bringing people out to the sea and make them experience it.”**

Which is also what she did with me! I loved the sea and was interested in seaweed already before, but after our snorkelling and kelp picking in the cold and clear January sea, I was hooked! I could stand it for one day before I went out snorkelling and kelp-picking again.

**”It should be easy to have a marine allotment, it would be great if all equipment could be rented... I want to have a marine allotment myself!”**

//Linnea Sjögren, seaweed expert

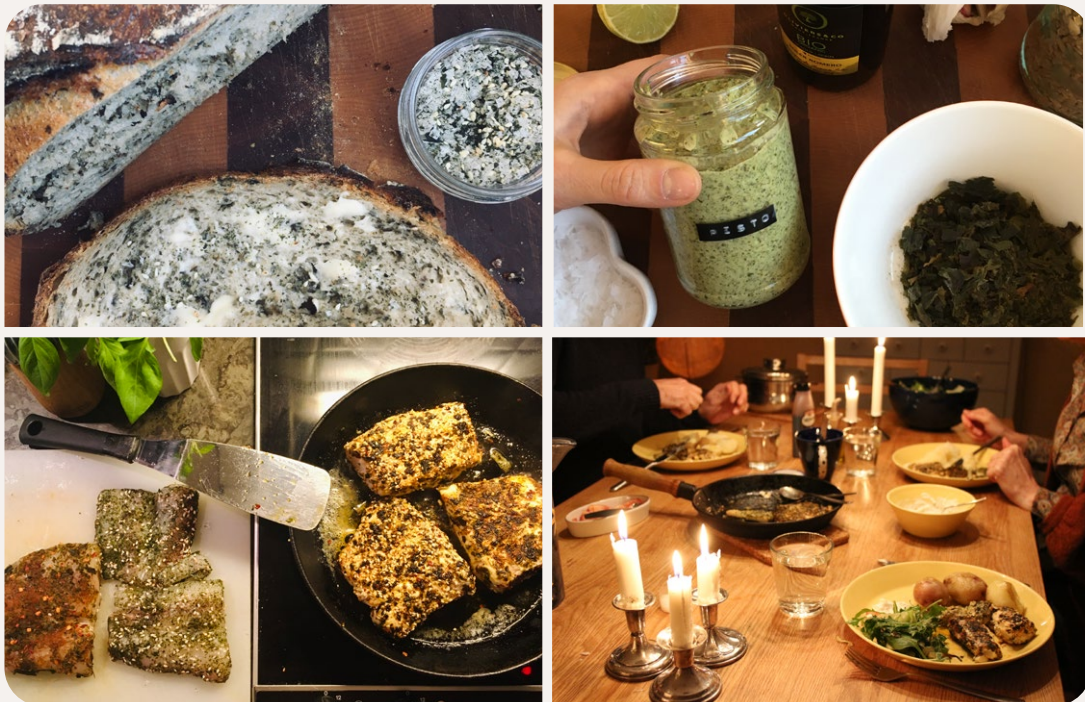


01. Seaweed course with Linnea Sjögren, CATXALOT

## COOKING WITH KELP

After I had harvested some wild Sugar kelp on the west coast I tried to cook with it. I did kelp chips, dried crushed kelp to add to different dishes later on, and used some fresh kelp to put around the fish for dinner. The taste was good, especially the kelp chips were amazing! Everyone that tried also liked it a lot. This was the point where all the seaweed cooking started, and after this, it just continued throughout the whole project. I got a big bag of farmed, dried, Sugar kelp from Nordic Seafarm and a 1,5 kg in-salted farmed Sugar kelp from Sea Culture that I have been using in my own cooking exploration and for user tests.

When visiting Björn the Chef and Jonatan at Nordic Seafarm I also got to try some different kelp products which they are testing at the market right now. Some products I also brought with me back home. Everything was really tasty!



01.



# User interviews

## USER INTERVIEW INSIGHTS

I have done user interviews with a wide range of different possible users, to find who's interested and who I am designing for. I have asked about their food habits, if they like to grow or pick their own food and what they think about eating seaweed and/or growing it themselves or having someone growing it for them. The collected primary insights were:

- People are in general curious to try eating seaweed, mostly because they like to try new types of food, they like the umami flavour and because of the health and climate benefits of the seaweed
- Almost everyone I asked would like to cultivate themselves if living close to the cultivation, and if it doesn't take too much time. Otherwise not.
- Healthy and local food is mostly highly prioritized
- Lack of knowledge about seaweed - many are not even aware of the edible Swedish seaweed or the Asian seaweed existing in the sushi they eat.

View the summarized interviews on the next page.



01. User interview on Zoom with the environment conscious, Lisa Sehlin

#### **THE OLD PENSIONER**

Born and raised in the countryside, where they cultivated all vegetables and picked all berries by themselves. For her, local food means something they grow themselves.

**”To go out and clean in the kitchen garden was a bit like therapy, you relax”**

The old pensioner thinks she is too old for cultivating anything now, but she thinks that it might work if she could cultivate together with others.

#### **THE FOOD INTERESTED NATURE ENTHUSIAST**

Loves to cook and try new dishes, as well as spending time in nature, picking mushrooms and hunting.

**”There is something deeply satisfying about it, eating something you have shot, caught, picked or grown yourself”**

He is very positive to seafood cultivation. He's imagining an untouched place, an allotment with a clear border to minimize sabotage.

#### **THE ENVIRONMENT CONSCIOUS**

Interested in cooking and cultivating food - especially likes the feeling of independence and that it is linked to history. When talking to her she is eating the seaweed Dulse which she has at home. She says that it tastes a bit like reindeer meat. She would also be interested in growing it if living close.

**”To cultivate together sounds interesting, it would have been fun to be part of a community... I don't want it to require so much of me”**

#### **THE TEENAGER DAD**

The dad (one kid and two teenagers) living in the North of Sweden is not interested in cooking. They are not cultivating anything in the family or spending much time outdoors, or big fans of seafood, which is a barrier.

**”Don't like the smell of sea and seaweed around Gothenburg, then I miss Norrland”**

If it's something accessible, that's healthy and climate-smart - they would at least want to give it a chance.

#### THE STUDENT FROM ABROAD

Grew up in a culture where work and studies are prioritized, which still are the habits. The student says that it's tough both time and money wise to start cultivating seafood now, but is more positive for doing it in the future.

**"I think in the life I live right now, it's better if someone else cultivates and I buy... I don't feel that connected to my food, so it could be interesting to try that"**

#### THE CITY GIRL

The city girl lives the city life. She's cultivating a bit on her balcony and thinks healthy food is important. She really believes in a future with seaweed, she loves the umami taste and Asian food. She would like the harvest, but probably not want to cultivate it.

**"It depends on how much you need to take care of it, but it would have been very fun if someone else could take care of it... Also if you can use it in beauty products"**

#### THE MOTIVATED SENIOR

Very food interested. Cultivates in a small garden in the north of Sweden and believes healthy food is important.

**"You feel very rich when you go out with a bowl and come in with it full of salad"**

The motivated senior would like to try cultivating seafood and be a part of a community cultivating together. Also to travel south to meet the community farmers for harvest and harvest parties.

*"I wouldn't see it as an obstacle to go to south of Sweden for cultivating"*

#### THE FAMILY ON THE COUNTRYSIDE

This family with one small child are hobby growers. For them both local and healthy food is important. They want their daughter to grow up understanding where the food comes from and the effort it requires, therefore they are cultivating together in their garden.

**"What I grow I must be able to eat myself, and think that it's worth it"**

They are positive to seafood cultivation if close-by, and would like to try it together with others.

# Gustav & Sofia

Gustav and Sofia are hobby growers and nature enthusiasts living in Gothenburg. Until two years ago they were members of a community grower's association, similar to a study circle. Where everyone had a cultivation box for personal use, while a tomato and potato cultivation and berry bushes were shared. They met twice a week to take care of the garden together. Gustav explains it as "a nice little community" and Sofia liked to go there and grow stuff together and have a coffee.

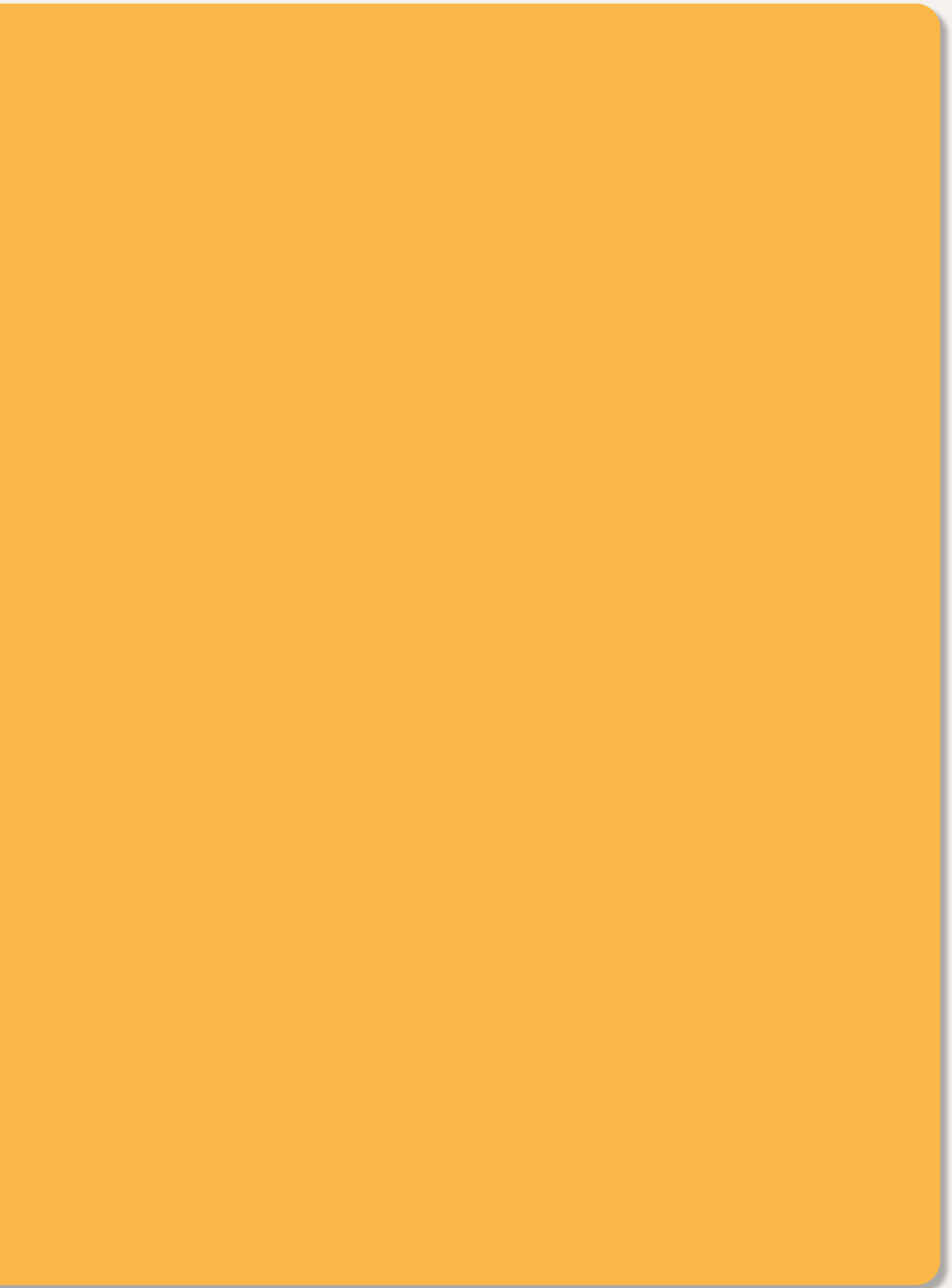
When I met them for an outdoor lunch in Gothenburg I asked why they are not members of this association anymore. Gustav explained that they would have liked to have more harvest, it took too much time compared to what they got out from it.

I told them about my idea of having a Sea garden community with marine allotments for growing seafood like kelp. They got very excited, especially about the fact that it's not much work at all in between setting the sprouts and harvesting.

**”It sounds awesome, just that it’s such a small  
work effort, so you can go there once in a while!  
It sounds very attractive”**

//Gustav Scherrer

Just like most Swedes, Gustav and Sofia have only tried to eat the seaweed you get when ordering sushi, but that doesn't seem like a problem. They are positive and Sofia's favourite flavour is actually umami.



# Hopes

During the user interviews, I collected the user's Hopes and Fears.

The primary hopes collected are that people, in general, want to learn about seaweed. If cultivating it themselves they would like to do it together in a community, to be more confident. They also want it to be easy and time-efficient.

Learn about seaweed as food

Support from others, confident

A community

Easy accessible

Easy to manage

Low responsibility & effort

Time efficient

Good profit

Follow the growth on distance

Membership, renting equipment

Cultivation of many species

An exchange - between people

Easy inspection of cultivation

Possibility to dry kelp on spot

Social areas

A meeting point

# Fears

The primary fears I have collected are insecurity, which mainly comes from lack of knowledge, fear of the time it might take, effort, and responsibility. As well as the fear of being disconnected from the cultivation and lose the relation to the food.

Lack of knowledge & insecurity

Disconnection to the cultivation

Time & effort

No relation to the food

Too much responsibility

Failure, no harvest

Accessibility

Destroyed cultivation

Dedication & organization

The inspections of it

To collaborate with strangers

Bad smell

# Personas

I created three personas based on my research insights and interviews. The possible users who could be interested in buying, using, and/or growing seaweed are:

- people interested in cooking and exploring new types of food, like the chef
- people who want an outdoor hobby, eat healthily, or teach their kids about marine life, where food comes from, etc.
- young adopters, wanting to be trendy, eat healthy, climate-smart, and local-produced food.



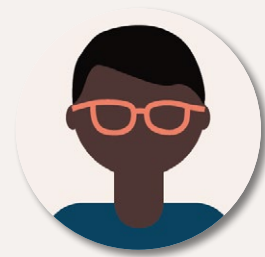
## The chef

Mo, 61 years old, working in a seafood restaurant on the West Coast. Want to grow their own seafood and tell the story for their guests



## The family

Live in Östersund, far away from the coast. Want to eat more healthy and teach their kids about where their food comes from



## City Sven

Sven, 27 years old, lives in Stockholm and is trendy and environment conscious. Wants to eat food with a low climate impact



## USERS NEEDS & MOTIVATORS

Why would people be interested in the solution I am designing?  
Because they would like to...

Buy seaweed

Be trendy

Eat healthy

Eat carbon low food

Reach a climate goal

Because of curiosity

Because they like the umami  
flavour

Explore new types of food, they  
like to cook

Increase their relation to food

Increase knowledge about  
seaweed

This is based on my user research.

# Stakeholders



18.

## **MOTHER NATURE**

Mother Nature was an important stakeholder in this project. Life is not easy for our loved Mother Nature right now and she needs help to restore nature and increase the biodiversity, which is under a big threat. A couple of marine gardens wouldn't make much difference, but big-scale seaweed farming would! There're great advantages with marine gardens though.

Advantages:

- increase biodiversity
- decrease ocean acidification
- educate and increase the aware-

ness among people - about food, the life in the sea and the sea itself. This could in the longer term, for example, lead to less plastic and other harmful stuff in the ocean, increased interest for seaweed and more investments in big-scale seaweed farms.

Possible risks:

- more clutter in the ocean, if the equipment of the marine gardens blow away in a storm.
- cultivation of species in wrong places, where they not live naturally and could harm the ecosystem.



18.

### **THE MUNICIPALITY**

If designing marine garden allotments, another stakeholder might be the municipality. They would probably be the ones buying and setting up the marine gardens.



18.

### **ENTREPRENEUR/ORGANISATION**

An entrepreneur or organisation or similar could also be a possible stakeholder. They might be interested in buying the service I designed and setting it all up, if they believe in it and want to do business.

# Conclusion

Design opportunities  
Goal & wishes  
Key insights  
Problem description





# Design opportunities

## PROJECT DEFINITION

What I believe is missing in Sweden is a service that is introducing seaweed, inspiring and educating people within this theme, and tools for people who want to try out small-scale seaweed farming. My question formulation is:

How to design a consumer-oriented product solution that, through guidance and simple tools, introduces the user to seaweed and seaweed cultivation?

Based on my research I created 5 different opportunity areas. They have their own focuses and challenges. On the next page, I'm explaining the opportunity areas with one How Might We question for each.

## 1. EDUCATIONAL TOOL

We are in a middle of a crisis and we need to switch to a sustainable food production, like seaweed farming, as soon as possible. The food culture in Sweden doesn't contain seaweed, people lack knowledge about it and only a few have tried to eat Swedish seaweed.

**How might we bring attention to this important topic and educate people about it?**

## 2. MARINE CULTIVATION HANDS-ON EXPERIENCE

There's an ongoing trend to be healthy, environmentally conscious, and to grow your own food (in home and in garden) as a hobby. People seem willing to try out new things why a tool for starting to grow sea vegetables in a marine garden could have potential.

**How might we guide the user through the whole cultivation process?**

## 3. A CENTRE FOR SEAFOOD CULTIVATION

People are interested in new places to meet, especially during this ongoing pandemic. At the same time we need to educate about the sea and its possibilities, and introduce seaweed as food for people. This could be

achieved by designing a meeting point in a public place, that is a centre for seafood cultivation. People passing by the cultivation would be able to experience parts of the cultivation and get inspired.

**How might we design a centre for seafood cultivation, where people can get introduced to seaweed & learn about it?**

## 4. CONNECTED SEAWEED FARMING

The trend is going towards stronger connection between customers and farmers. If interested in growing or eating seaweed - it should be accessible. Even if living too far away from the sea or only wanting the harvest.

**How might we design to not feel "disconnected" to the cultivation, if not physically there?**

## 5. COMMUNITY (SEA) GARDENS

Together we are stronger. Throughout history, we have always farmed together and shared the harvest, in order to get food enough to feed us. Support from others increases self-confidence and creates valuable social cohesion.

**How might we design marine community gardens for easy and efficient seafood cultivation?**

# Goals

## Solution goals:

- Increase the knowledge and interest of seaweed among people
- Make seaweed accessible and easy to cultivate, connecting the user to the food

## Project goals:

- Communicate the importance of sustainable food production and create awareness



# Wishes

## Solution wishes:

- Design the whole journey and cultivation experience, from starting up to finished seafood dish

## Project wishes:

- Inspire with a concrete example that can help to commercialize seaweed cultivation, for political change in laws within Swedish aquaculture



# Key insights

- **Seaweed is the future of food and a solution to fighting climate change**, it's a solution we have to take

- **Lack of knowledge about kelp** how to handle, cook and cultivate it

- **Disconnection to the food we consume**, we are in general very disconnected and have a bad relation to our food

- **People would feel more confident if learning and cultivating together** with others, and be a part of a community - as this is such a new thing

- **People want efficiency and low responsibility**, it should be easy, a membership and not ownership is desired

- **There's a connected cultivation trend; The desire to eat local food and to know where our food comes from is increasing**, as well as the openness to try new things, homegrown food and to spend time in nature.

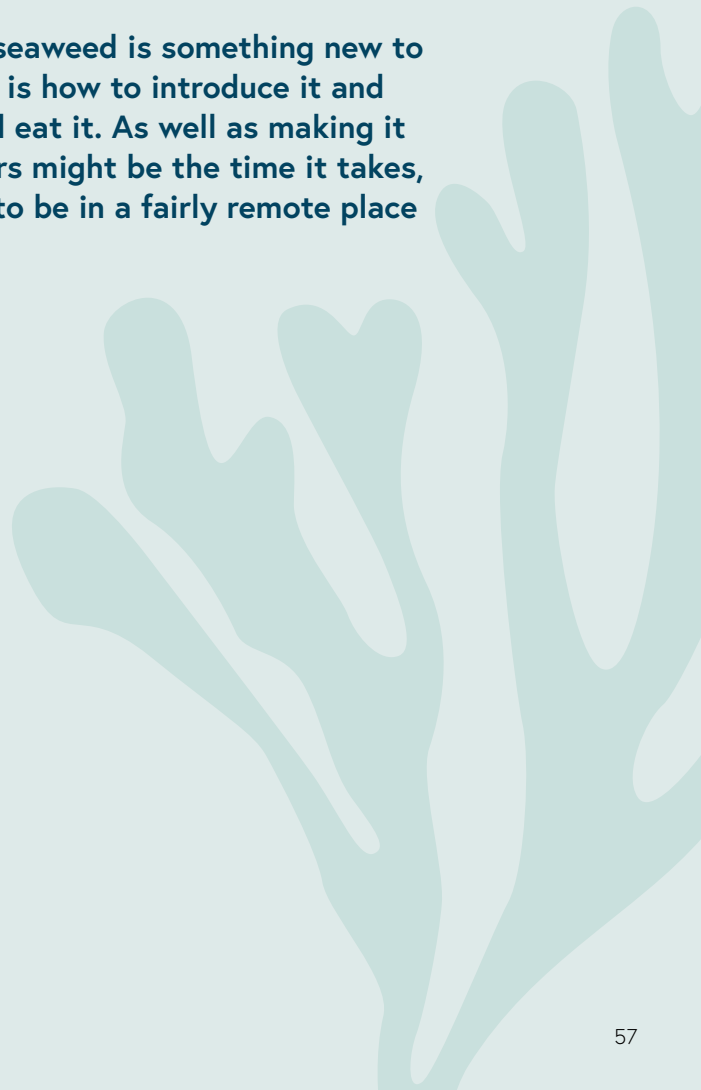
- **Marine cultivation requires some permissions** which is an obstacle to doing it, even though it doesn't seem too hard to obtain them.

# Problem description

We are over-fishing, littering, and polluting our oceans at the same time as plundering rainforests and using a big part of our land for (mostly) unsustainable food production. We are running out of food, destroying the global biodiversity, and accelerating climate change. This will have catastrophic consequences if not acting now.

Scientists already came up with a great solution, which is a restorative way of farming called Marine permaculture. Which will give us food in a sustainable way, at the same time as sequestration carbon and restoring our harmed ocean, but also our land. Now, we have to introduce this food cultivation and food culture to Sweden, which is the main task of this project.

**The main problem is lack of knowledge as seaweed is something new to most of the Swedish people. The challenge is how to introduce it and make people curious to try to cultivate and eat it. As well as making it easy and accessible. Obstacles for the users might be the time it takes, the location of the cultivation - which has to be in a fairly remote place on-shore, and the required permissions.**

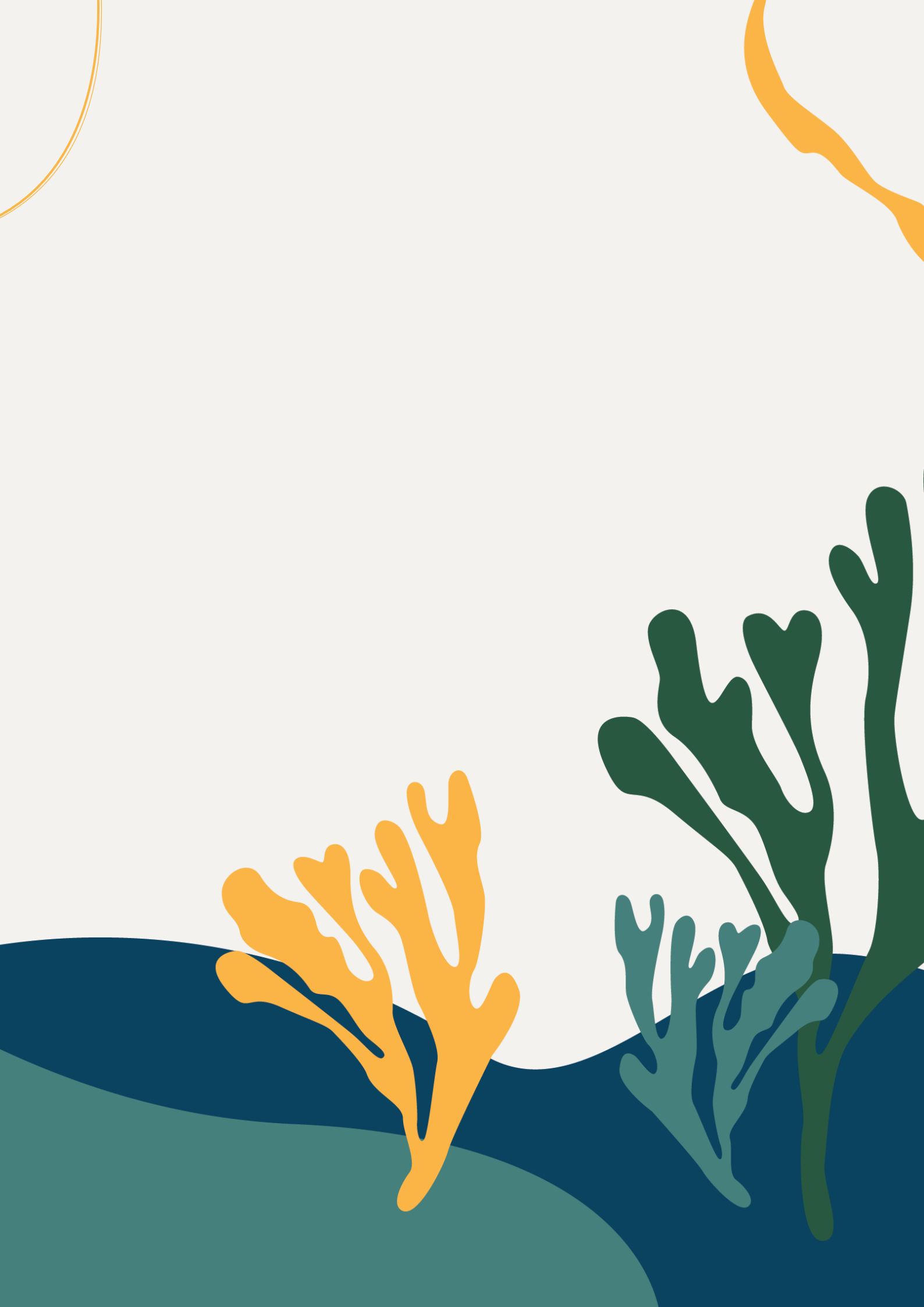


# Creation

Ideation  
Directions  
User cooking exploration kit  
Concept  
Inspiration  
Concept development

Design process overview:





# Ideation

## REMOTE WORKSHOPS

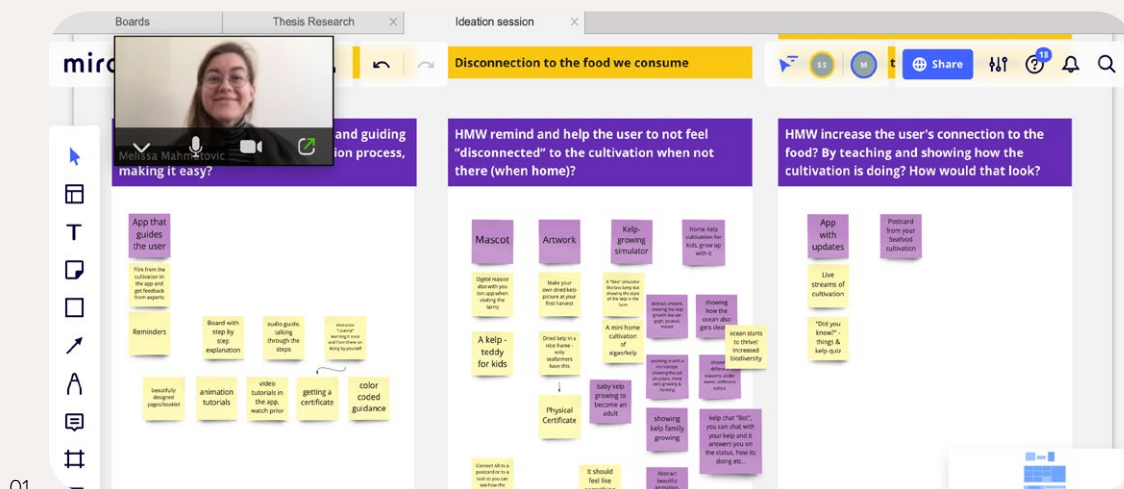
The ideation process started out with an intense 2 days HMW-workshop together with my classmates. We ideated on three How Might We questions from each student's project for one hour. This session gave me a lot of inspiration and many new and fresh ideas that later became the base of my three concept directions.

I also conducted a workshop and discussion together with three designers working at IDEO. With their great expertise within product and service design, and holistic and sustainable thinking they brought new thoughts

and perspectives to the project. The valuable input I got created a lot of good creative thinking for me when continuing the work and doing my own ideation sessions.

The last ideation session I did, was together with Melissa at IDEO. The session included both ideation and discussion and comparison of different ideas. After this, I defined my three concept directions.

All workshops and ideation sessions have been remote using the digital tool Miro, because of Covid-19.

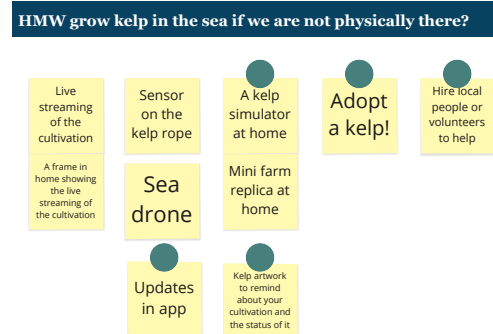
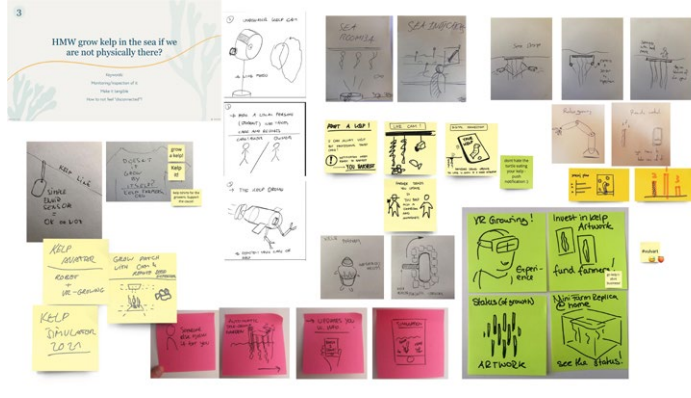
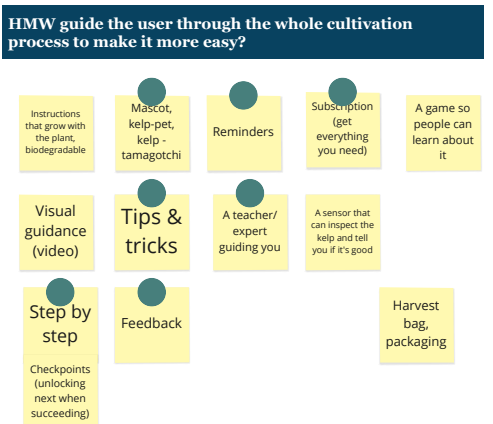
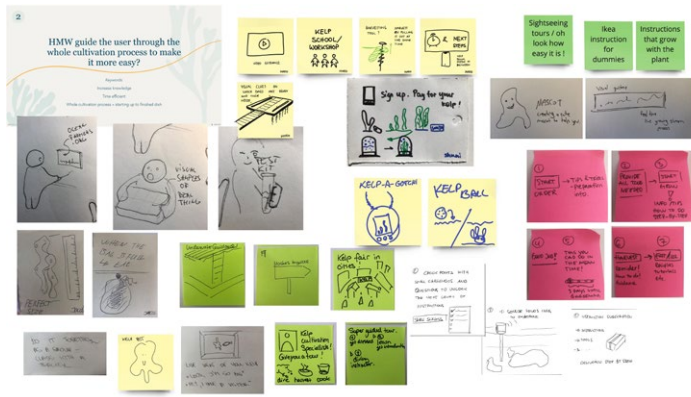


# HMW-WORKSHOP WITH THE CLASS

Miro board after the session



Summarized outcome



# 1. Hands-on cultivation guidance

Become a seaweed farmer



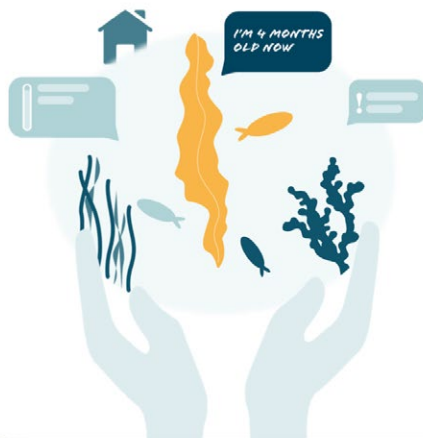
"It's important to create passion for the sea... a way of doing it is by bringing people out to the sea and make them experience it."

//Linnea Sjögren, seaweed expert

- Enabling easy seaweed cultivation
- Teaching about seaweed and marine cultivation
- An outdoor activity
- Increased connection and awareness of marine life

# 2. Interactive kelp mascot

Be reminded about the cultivation and learn about it from home



"The important thing for us is to combine the cultivating, with the possibility to showcase it and involve the citizens in it"

//Bodil Sofie Espersen, Havhøst

"It's easy to start with the children, they are interested"

//Linnea Sjögren, seaweed expert

- Reminding about the cultivation and the status of it
- Enabling interaction with the "cultivation" from home
- Teaching about seaweed and its benefits
- Increased awareness of marine life

# 3. Remote farming

Have a seaweed farmer cultivating for you



"It is important to have some connection that's beyond it gives me food and I'm gonna eat it.. It feels nicer when you have to care for it more, to see it grow. Even though you are not physically there, it's a feeling that matters to me"

//Zena Corda, student

- Providing the user with updates and information
- Enabling improved connection to the farm and the food
- Teaching about seaweed
- Reminding about your the seaweed cultivation



# Directions

## CONCEPT DIRECTIONS

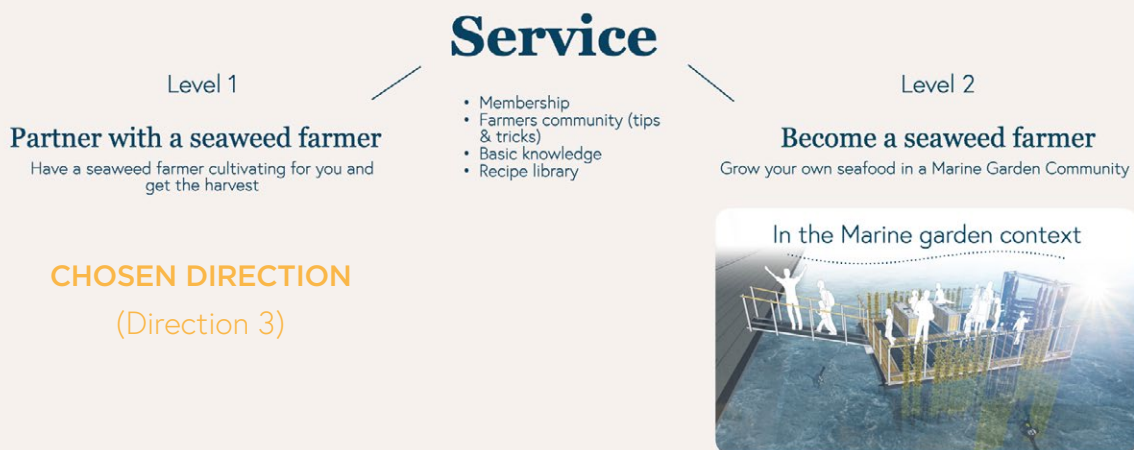
Quite early after the HMW-workshop with the class and my first own brainstorming session, I could create three different directions by sorting and clustering the ideas. Each direction was targeting one of the personas. To reach as many users as possible I started to think if the solution could be a service combining both direction 1 and 3. In order to give the users the option to either cultivate themselves or having a farmer doing it for them. If creating such a big service I would need to have one of the directions as a focus, anyway.

## EVALUATION OF DIRECTIONS

When looking back on the user interviews and hope and fears from the

research - it was clear that people are not willing to put extra time and energy into these things. If cultivating themselves most of them want to live close-by the cultivation, which is a problem as it's today only possible to cultivate seaweed on the west coast. This results in a limited amount of possible users for Direction 1. In order to get more valuable user insights I started to plan user testing with a kit.

I further evaluated the three directions within user group width, level of impact, and implementation, which gave me a clear answer on what direction to continue with - direction 3. See the evaluation in the appendix.



# User Cooking Exploration Kit

## COLLECTING USER STORIES

To understand the user even better and to see their reactions when testing seaweed I created a User Cooking Exploration Kit. The kit contained a package with 10g dried Sugar kelp and a dairy booklet with 3 steps instructions.

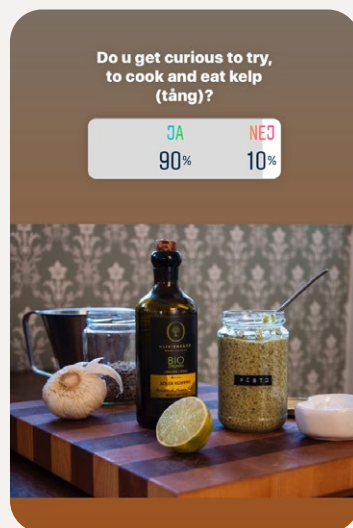
Step 1 - questions about pre seaweed knowledge, attitude and interest

Step 2 - instructions and recipe of a Kelp pesto pasta dish

Step 3 - questions about the kelp cooking experience, attitude after and reflections. I also asked the users if they would be interested to continue eating seaweed and/or to cultivate themselves. All users documented their experiences which gave me valuable insights.

## Conclusions:

- Low pre-knowledge about seaweed
- Positive to try
- Their attitude towards seaweed was between 3-5 (where 1 is low and 5 is high) before trying it which increased for half of the users after trying
- Easy to use and liked the taste
- 6 of 8 are interested to grow it themselves, but they would only do it if living close to the cultivation



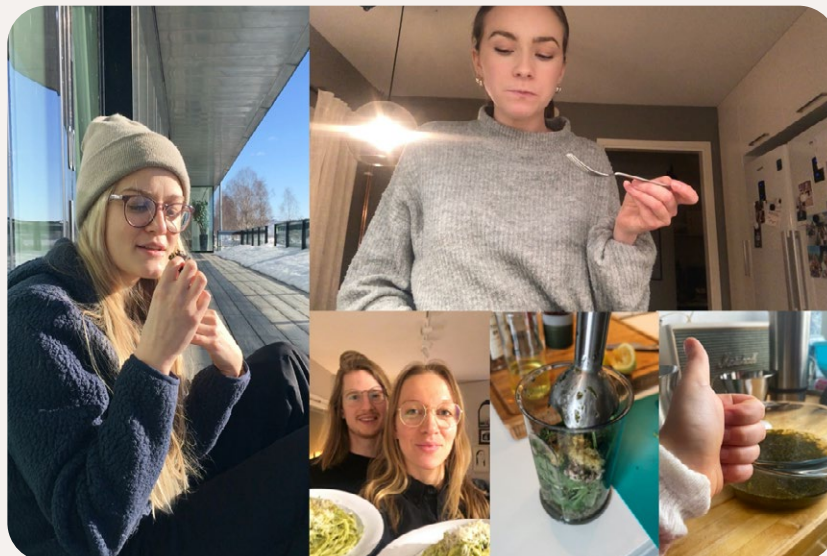
01. Asking questions and inspiring about seaweed on my instagram



01. Exploring different seaweed species



01. Users Cooking Exploration Kit



01. Users testing to eat kelp chips and making kelp pesto



01. Kelp dinner containing a kelp pesto pasta with kelp tofu & kelp sourdough bread

# Concept

## CHOSE DIRECTION 3

I chose to continue with direction 3. It made the most sense as people would rather start by buying and trying seaweed than by cultivating it themselves. The cultivation part is more like a next step (a level 2), which is mainly targeting the really interested ones. See the steps, with the question I was exploring, in the journey further down this page.

### Concept feedback

"It's more focused now. Even though I really liked the idea of becoming a seaweed farmer and cultivate yourself, I'm convinced. This is nice!" //Melissa, IDEO

"I think it is a right turn to focus more on the service and the links between consumer and producer. This is probably also where you can achieve the greatest effect in relation to the task's overall goals." //Espen Jorgensen, EGGS

Journey



#### STEP 1

Create interest to try seaweed

How Might We introduce kelp and make people interested to try it?

#### STEP 2

Buy and cook with seaweed

How Might We teach and guide the user through the kelp *cooking process*, to make it easy?

#### STEP3

Cultivate your own seaweed

How Might We teach and guide the user through the *cultivation process*, to make it easy?

How Might We design to not feel disconnected to the cultivation, if not physically there?

## Defining the concept

### WHAT?

A service that is introducing seaweed and making it accessible

### WHERE?

The cultivation will happen in existing underwater seaweed farms on the Swedish west coast and the harvest will be delivered to the user's home

### WHEN?

Now or soon (we don't have time to wait)

### WHO?

Ordinary consumers that are curious or interested to try seaweed and seaweed farmers that need help to introduce seaweed and increase their sell.

### HOW?

The service links consumers, who want to buy or try seaweed, with Swedish seaweed farmers, enabling easy access to seaweed, an improved food connection and increased knowledge. It's also offering a Seaweed Community platform where users can share recipes, inspire and learn from each other.

## THE CONCEPT'S PURPOSE

Main purpose - consumers	Make seaweed accessible	Enhance food connection	Increase knowl- edge & awareness
Functions	Order a Try-out kit	Follow the growth	Community network
	Adopt a Marine Garden	Story - connection to farmer	Fun facts
Purpose - farmers	Simplifying the selling process	Helps introducing seaweed & seaweed cultivation	Teaches about the product's use cases, benefits etc.

# Inspiration

## BENCHMARKING

On the market today, there are several services connecting customers to producers. Their aim is to empower the relation to food, especially local food, and to streamline the trade for small-scale farmers.

Services like Local Food Nodes, Mylla and Matmötet, or the REKO-RINGEN Facebook groups, enables customers to order local food from the local farmer, and later pick it up or receive it at their home. The service Crowd Farming is similar, but it also allows the customer to enter as a partner, for a long or short period, in a project. The customer can adopt a part of a cultivation, for example, a lemon tree, or a part of an animal producing the basic commodity. One project available in Crowd Farming at the moment is called "Organic Seaweed", making it possible for customers to adopt a square meter of seaweed in Spain and receive the harvest to the home.

These services are sharing information about how, where and by who the food is produced, showing a picture of the farmer and the history behind the food. However, **none is offering customers to follow the growth of their ordered food.** Is this something people would like to know or see?

Moreover, there are services connecting people with other people, for example, Panion and Disciple that are focusing on shaping communities. Services with sharing economy models like Uber, Airbnb, and Co-Grow are also becoming more popular. Co-grow connects people that want land for growing with people who have land but don't use it.

See how I mapped out different existing products in the appendix.



# Concept development

## CREATING THE SERVICE AND USER EXPERIENCE

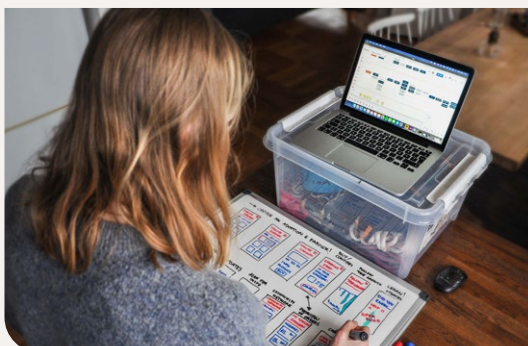
After taking a decision of what concept to continue with I started an iterative development process where I sketched, did mock-ups and user tests, many times. The first step was to define the User Journey. I explored many different UX flows until I defined how this service would work and its touchpoints.

With the user experience as the focus in the project I also had to experience

it more myself, which resulted in many seaweed dishes and exploration with different types of seaweed and in different forms (fresh, in-salted and dry).

The development of the User Journey started in Miro, but when exploring the UX flow for the app I sketched quick screens on a whiteboard that became the base of the app wireframes made in Adobe XD.

View the Service Blueprint in appendix.



01.





## SERVICE FUNCTIONS

### Need:

Adopt a kelp  
Sign up as a farmer  
Order a try-out kit

### Want:

Community Platform  
Book a seaweed experience  
Adoption details and farmer's story  
Follow the growth  
Positive climate effects  
Tips for you  
Reminders and updates  
Fun facts (about seaweed)  
Seaweed Stories (inspiration)

### Wish:

Adoption certificate/Story Card  
Draw your own kelp (on package)  
Receive a post card  
Chat with your kelp  
Reviews (of the farmers)  
Add adoption name  
Pay extra for physical name on buoy  
Support a project (without getting harvest)

## CHOSEN FUNCTIONS

To make a good decision on what functions to include I listed the three main goals with the service and connected the different functions to each goal. The functions that didn't get a spot under a goal were sorted out or lower prioritized.

The service goals are:

- **Easy access to seaweed**
- **Enhance user's food connection**
- **Increase knowledge and awareness**

I also thought about the question; **"How to continuously get the user to use the app?"**

Functions that might help with this are; Tips for you, Reminders and updates, Follow the growth, positive climate effects and the Community Platform.

# WIREFRAMES

## Adopt a Blue Garden!

By adopting a Blue Garden you are supporting the Marine life and receiving the harvest from your Blue Garden.

Choose a Blue Garden and farmer in the Blue market.

\*\*\*\*\*  
Already a member?

## Follow the growth

While the nature and farmer is doing the work you can follow the growth in your Blue Garden.

\*\*\*\*\*  
Already a member?

## Receive the harvest

Receive the harvest from your Blue Garden at home, and start exploring the culinary world of seaweed.

\*\*\*\*\*  
Already a member?

## Cook with support from others

The Community Network will support you with knowledge, tips and inspiration enhancing your cooking experience.

\*\*\*\*\*  
Already a member?

## Get started!

Seaweed, with its flavorful umami taste, is both healthy and climate smart. Become a member and start exploring the world of seaweed!

**Become a member**

Have you never tried seaweed before? Then, try it out first!

**Go to Try-out kit**

Order the Try-out kit with a click! Without signing up on anything!

\*\*\*\*\*  
Already a member?

### Adopt

Choose a Blue Garden to adopt!

**Koster Kelp** 21kft

Dried Sugar kelp from Nordic Seaweed's cultivation outside Koster

**Gothenburg Seaweed**

Fresh Sugar kelp from Ten Island Seaweed in Gothenburg archipelago

**Wild West-coast Seaweed** 20kft

Wild Seaweed species growing outside Göteborg

### Adopt a Blue Garden

**Koster Kelp** 590kr

Adoption: 1 Blue Garden

Estimated delivery: 24-28/5/2021

Owner of Blue Garden: Sonya

**Final price** 590kr

**Delivery details**

**Payment details**

**Adopt now**

### Follow growth

Receive notifications from your farmer

**Koster Kelp**

90% of the cultivation is done and the harvest will be delivered in approx. 20 days

**Adopt now**

### In season

My active Blue Gardens

**Koster Kelp**

Your seaweed is doing great and it's now a grow-up!

**Recipes of the week**

**Kelp pancakes**

**Farmer Jonatan**

Need help with hanging up our harvested Sugar kelp on the drying rack on Tuesday.

### Marine Market

See all Adopt Experiences

**Dried Sugar kelp** 21kft

Adopt a part of Nordic Seaweed's cultivation.

**Fresh Sugar kelp** 14kft

Adopt a part of Anna and Cassandra Sugar kelp farm

**Wild Seaweed** 14kft

Adopt one square meter of wild Seaweed growing outside Göteborg

**Indone-cultivated Sea lettuce**

Adopt a part of Nordic

### Adopt

Seaweed, with its flavorful umami taste, is both healthy and climate smart - are you curious to try?

**Order the Try-out kit**

Order the Try-out kit and start exploring the world of seaweed with all tools needed

**More information**

**Order now**

### Sign in with your BankID

Waiting for you to sign with Mobile BankID on a website or in another app...

### Growth graph

Congratulations! Your Blue Garden has contributed to the absorption of **15 tonnes CO2e**

Together with which is:

- Drive around the earth a time
- Approx. 7 flights each way from Stockholm - Bangkok
- Vegan food for 20 people for a year

It has also helped to increase the biodiversity in its area.

### Filters

**Kelp pancakes**

**Sugar kelp pesto**

**Seaweed salad**

**Kelp croutons**

**Seaweed chips**

**North rolls ready**

### Community group

**Adopter Joe**

Hey! Does anyone know if too much seaweed could harm a toddler? She doesn't want anything else than those kelp chips...

**Adopter Lisa**

What's your best advice for me to do with this seaweed mix?

**Farmer Jonatan**

Need help with hanging up our harvest! Sugar kelp on the drying rack on Tue

### Marine Market

See all Adopt Experiences

**Organic Seaweed**

**Organic Seaweed**

**Organic Seaweed**

**Organic Seaweed**

### Blue Market

Try-out kit Adopt Experiences

Seaweed, with its flavorful umami taste, is both extremely healthy and climate smart - are you curious to try?

**Order the Try-out kit**

**More information**

**What do I receive?**

A collection of Seaweed products to try directly, and raw Seaweed in two forms to add on top of food and use in cooking. Instructions and recipes are included.

**When?**

We will send it to you the next week day and it takes 2-5 days before it arrives. Try it or cook with it whenever it fits you. The products last up to one year, so no rush!

### Sign up with...

**Sign up** **Sign up as a farmer**

**Sign up with...**

**Email**

**Facebook**

Or add your details...

**Email**

**Password**

**Confirm password**

### Sign up

**Sign up** **Sign up as a farmer**

What do you offer?

**Adoption** **Experience**

**See an adoption profile example!**

**Adoption Name**

**Add a main photo of the adoption**

### Community group

**Adopter Joe**

Hey! Does anyone know if too much seaweed could harm a toddler? She doesn't want anything else than those kelp chips...

**Adopter Lisa**

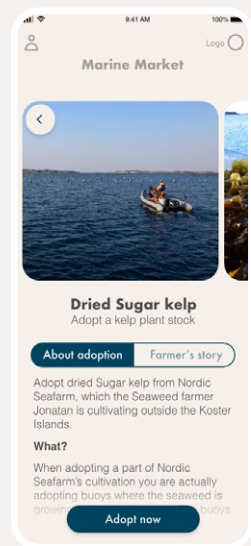
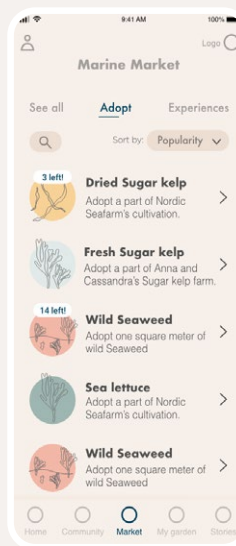
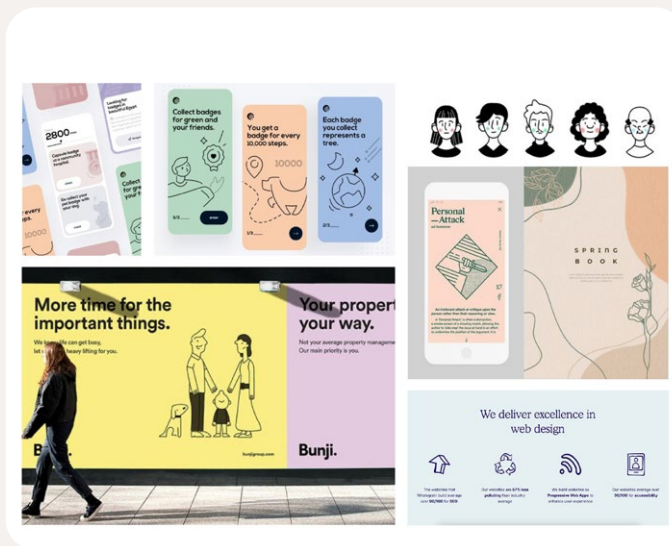
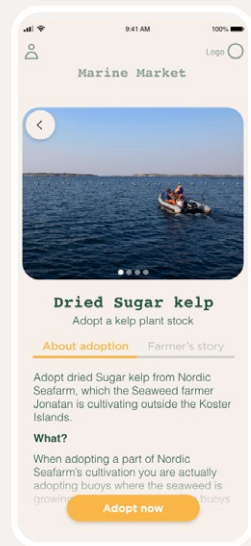
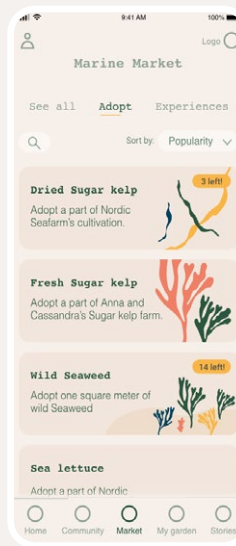
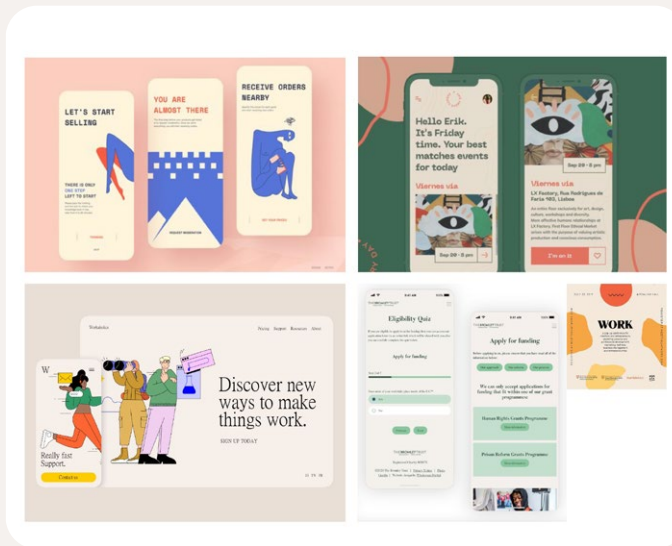
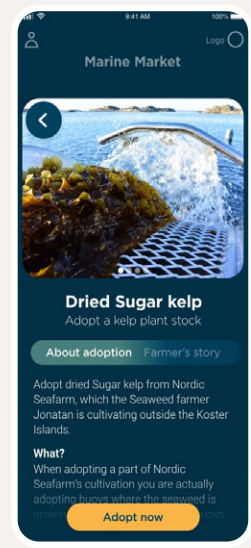
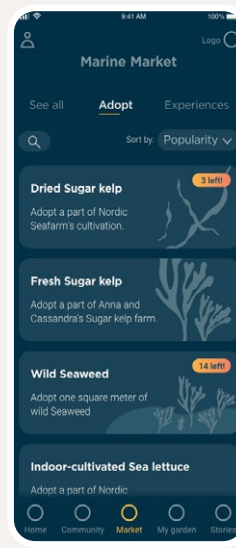
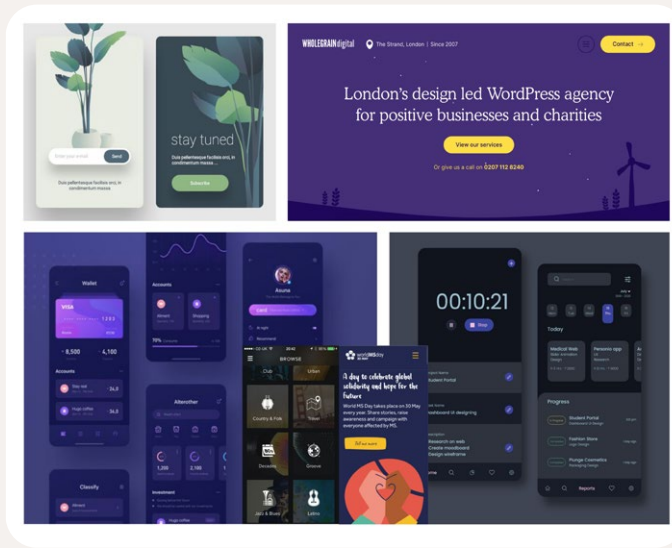
What's your best advice for me to do with this seaweed mix?

**Farmer Jonatan**

Need help with hanging up our harvest! Sugar kelp on the drying rack on Tue

## STYLE BOARDS

I have explored different styles that, according to my findings, should be more digital sustainable as they use less power. Here I'm showing three style boards together with test screens from the app interface, where the style is applied.



## APP USER TESTING

During the development process, I have tested the wireframes of the app many times in order to understand the UX flow and what the user would like to see on the different screens. After each test, I have taken the feedback and insights into account and updated the wireframes for the next test. I have done user testing with seaweed farmers and different users to get a wide scope of insights. I started off with a lot of functions and possibilities included in the app but ended up with a more clear and focused structure that highlights the important functions and increases the understanding for the users.



01. User testing with one out of many users

## EXPLORING THE SERVICE IDENTITY

If the service was a character, what personality would it have?

Positive and happy

Inspiring

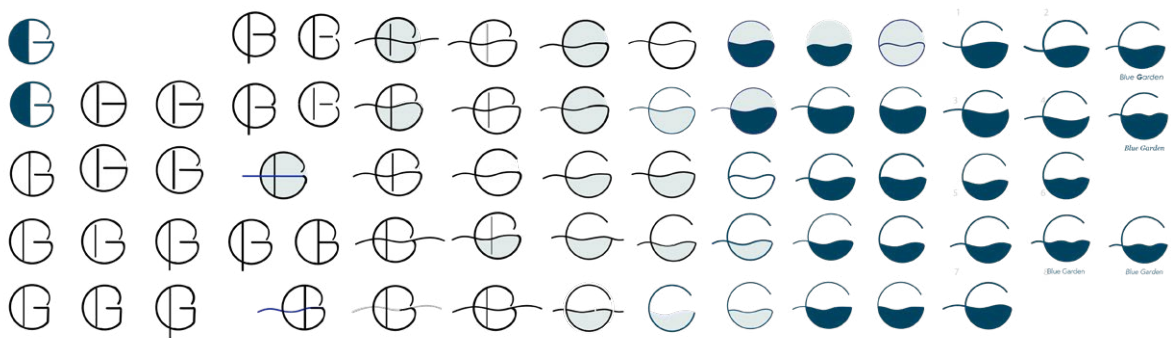
Simple and straight forward

In between fun and serious

Inclusive and supportive

Exciting and surprising

The name I decided on for the service is Blue Garden. When developing the logotype I was first exploring combinations with a G and B. It got a bit too much for my taste, why I chose a more simple direction, with a G which also looks like a sunset in the sea.



01. Exploring the logotype of the service Blue Garden

## EXPLORING THE DESIGN & CONTENT OF THE TRY-OUT KIT

The Try-out kit has an important function as "the door opener" to the world of seaweed for the users who never tried seaweed before. The main goal of the kit was to introduce the user to seaweed and how to use it in cooking. In addition, I wanted to make the user continue using the service by signing up and adopting a part of a seaweed cultivation to receive the harvest. To achieve this the Try-out kit needed to be:

- easy and fun to use
- include inspiring recipes and step by step tutorials
- include both ready-made products for the user to test directly, as well as the raw form of seaweed to try in cooking

To be able to find out more of what the users would like to have included

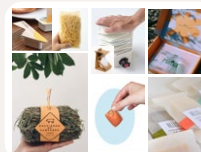


01. Exploring how much and what types of seaweed to include in the package

in their Try-out kits I made a questionnaire that I sent out to 6 users. I also asked the users if they would like to buy a try-out kit or start by adopting a part of a seaweed cultivation and everyone answered that they would start with buying the try-out kit. Some other findings were that users would like to have a surprise included in the kit, both physical and digital recipes, some fun facts, and seaweed enough to be able to cook dinner for at least 4 people.

Other ambitions I had with the kit were to make it feel eco-friendly with responsible materials and feel personal and handmade (directly from the farmer to you).

View the Inspiration board for the Try-out kit in the appendix.



01. Exploring the size of the final package

I also started to think about how to design the package to easily be reused, or if kids would like to colour the box if there's a line drawing of marine life and seaweed on the cover of the package.

### USER TESTING - TRY-OUT KIT

I made two mock-ups of the Try-out kit that I tested with three users. The conclusions were:

- likes the home-made look
- likes the included Farmer's story card

- likes to have the option of using the physical recipe or the digital recipe library (by scanning the QR code)
- want to have the information at the top part when opening the package
- want to have a free sample included
- want to include kelp powder
- want to have kelp for more than one dish

**”I like that it looks home made, feels like the farmer made it for me” //user**



01.

# Result

Overview  
Journey map  
Functions  
First Steps  
Seaweed boxes  
Details  
Inclusion  
Visual expression  
Stakeholders  
Development possibilities  
Impact  
Personal Reflection  
References  
Appendix





# Overview

The result is Blue Garden!  
A service that is introducing seaweed and connecting consumers to seaweed farmers on the Swedish West Coast, in order to reduce our climate impact on food and restore ecosystems.



Concept video  
<https://vimeo.com/556231489>



ood deed  
aweed



### Kelp flakes

**Dried to last.**  
Perfect in many dishes, to mix in or add on top

Use in cooking



### In-salted kelp

**Like fresh.**  
To mix in or add on top. Put in water bath for 10 min & wash before use

Use in cooking



### Seaweed Surprise

Try this sample  
It's fine wild-grown seaweed specie Dulse picked outside Väderöarna

Ready to eat



#### Hi Sofia!

Thanks for your order. We hope you will enjoy your Try-out kit and the food experience that comes with it!

Here is the list of content. The package box contains:

- This information paper
- Sticky card - meet your seaweed farmer

#### Meet the seaweed farmer John!

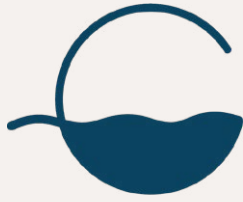


John is one of the seaweed farmers who have been cultivating the seaweed included in your package. John grew up by the sea on the Swedish West coast. After working in the fishing industry for some years he changed the direction to seaweed farming and joined the company Nordic Seafarm. Today he lives with his wife, two kids and a cat on the island Saltö, which is located close to the cultivation. The kids like to help with the harvest and the family eat seaweed almost everyday.

Nordic Seafarm's cultivation of the seaweed specie Sugar kelp, is located outside the Koster Islands on the north of the West coast. Here the water is healthy and clear, both because of the cultivation and the surrounding National Park.

Scan the QR code if you want to know more!





Blue Garden

The conclusion of my project research was that we need to start eating seaweed, as it's a healthy, sustainable and resilient food source that we have a lot of in Sweden. Blue Garden creates the prerequisites that lower the threshold and make it happen! By making seaweed accessible as food and providing inspiration, engagement, knowledge and support in one service. The Blue Garden service consists of a mobile application, a Harvest box and a Try-out kit.

What is missing in Sweden today is a place where to buy Swedish seaweed, that also inspires, educates and supports with recipes, as well as supportive tools and motivation for people who want to start small-scale seaweed farming. This is why I designed Blue Garden.

The concept is supporting, among others, Swedish ocean farmers, who mostly are small-scale farmers. Blue Garden simplifies their selling process and helps them introduce seaweed and teach about its different use cases to their customers. Today the seaweed farmers are trying to do

this themselves, which is hard and time-consuming. With Blue Garden they can concentrate on their actual job, to be farmers, as the service is taking care of the rest. This can motivate more people to start cultivating seaweed.

## The core of Blue Garden

### **MAKING SEAWEED ACCESSIBLE**

Blue Garden gathers all Swedish seaweed farmers at one place, making it easy for consumers to buy Swedish seaweed and have an overview of the different options on the market.

### **INCREASED FOOD CONNECTION, KNOWLEDGE & AWARENESS**

Blue Garden allows the user to follow the growth of the seaweed, whilst teaching about it. This creates an increased awareness about the food and the sea.

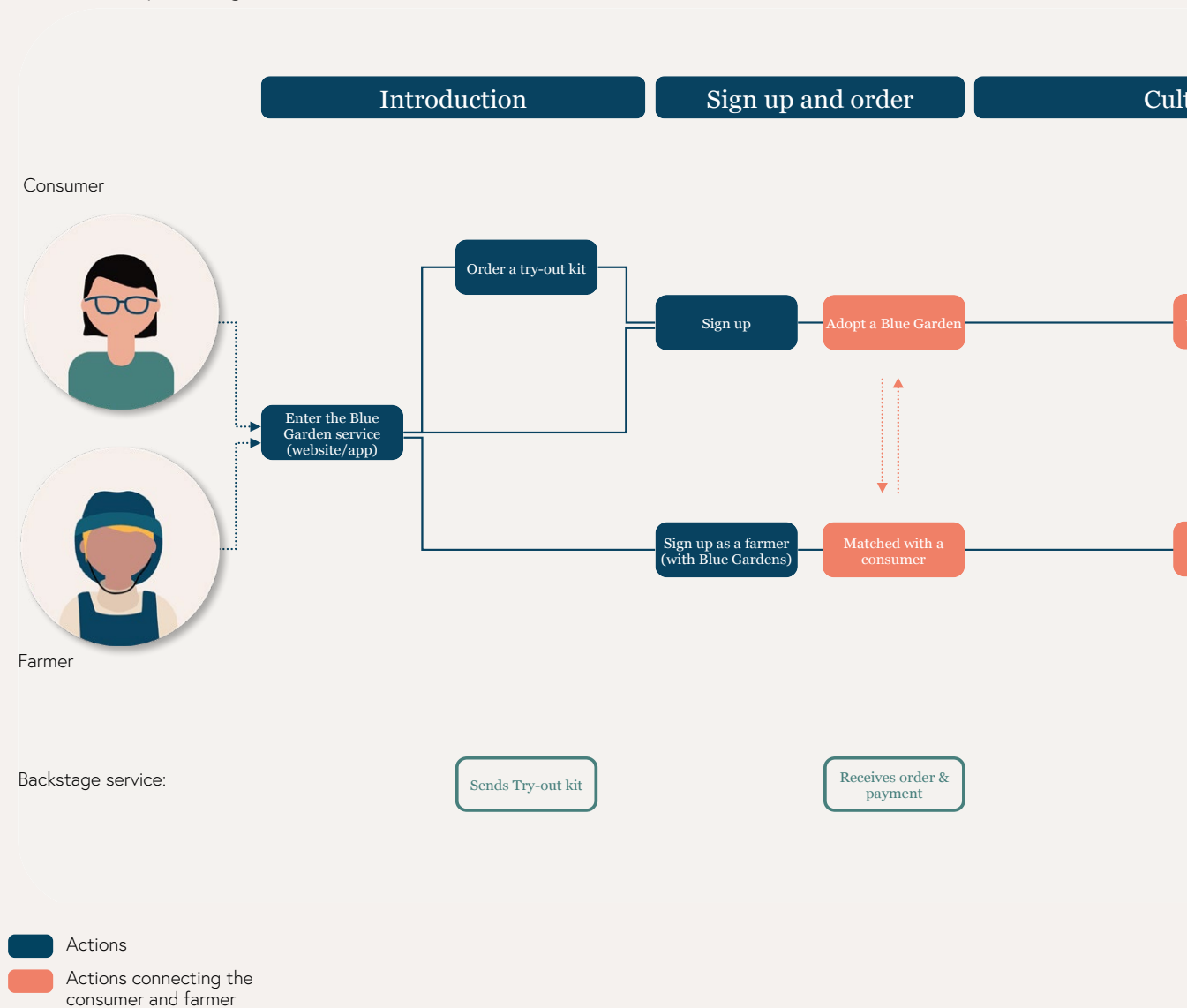
### **SUPPORT FROM COMMUNITY**

The user has the possibility to get inspiration, tips and tricks, and to post a question in the Blue Garden seaweed community.

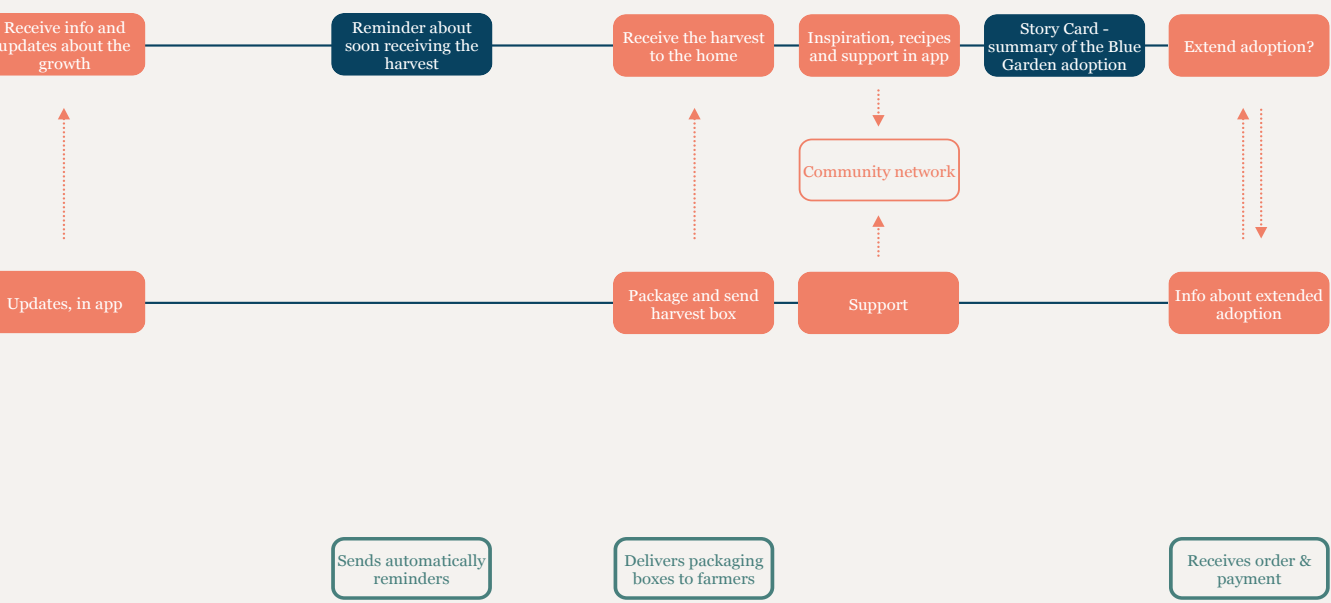


# Journey map

A simplified journey map explaining the users actions and the interaction between the consumer and farmer, who are depending on each other.



Adoption process      Harvest      Deliver      Cooking and eating      Extend



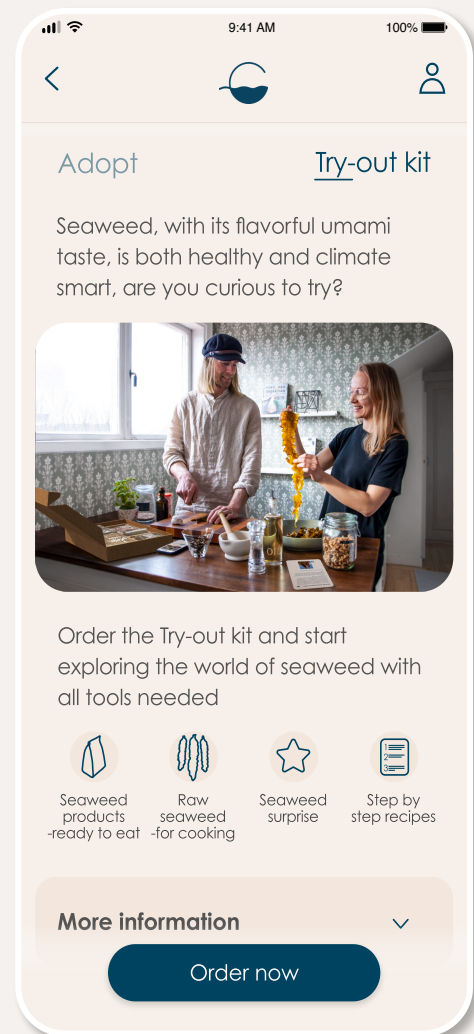
# Functions

## Making seaweed accessible

To reach my overarching goal of normalizing the use of seaweed in Sweden, I had to introduce it in an engaging and attractive way, lowering the user's thresholds. This is achieved by a Try-out kit and an adoption idea, that includes a remote farming experience. The user has the possibility to choose to either order a Try-out kit or adopt a part of a seaweed cultivation, a Blue Garden, in order to receive its harvest.

### TRY-OUT KIT

The Try-out kit is a door opener to the world of seaweed and the next step - to adopt a Blue Garden. It's designed to be easy and fun to use, consisting of a Story Card, recipes, tutorials and seaweed.







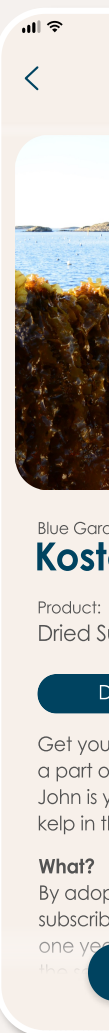
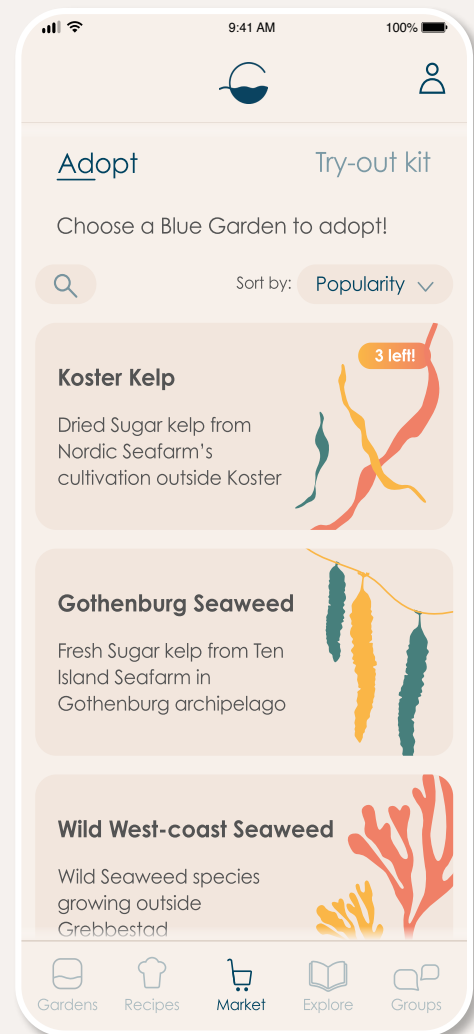
## Making seaweed accessible

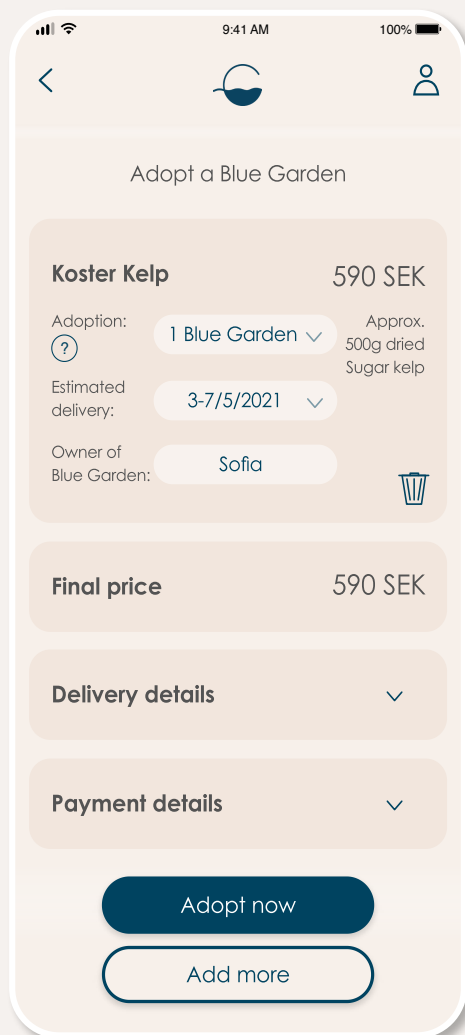
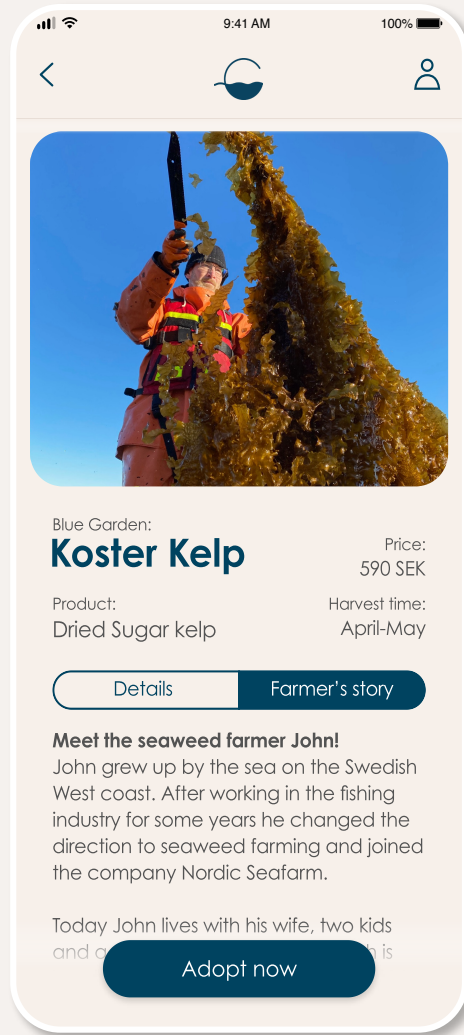
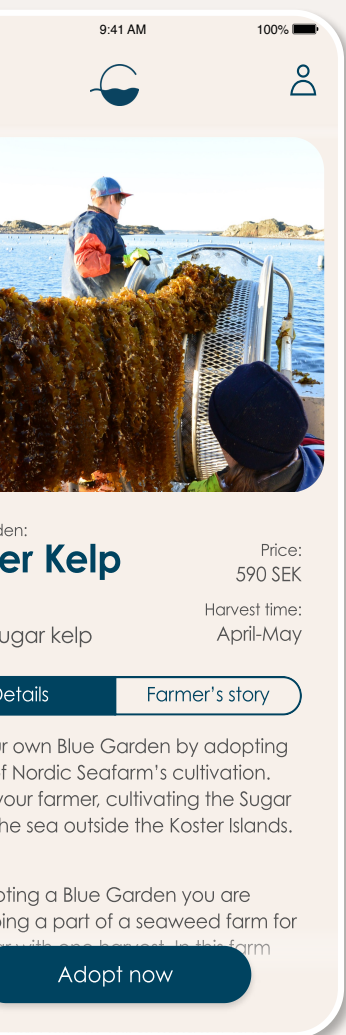
### ADOPT A BLUE GARDEN

By entering the *Market* in the Blue Garden mobile application, the user gets an overview of the different Blue Gardens possible to adopt. All Blue Gardens have different farmers, locations and harvest products, depending on the farmer and company.

The app provides the user with great transparency. All information about the cultivation and the farmer can be found when clicking on one of the Blue Garden options.

When doing the purchase the user can choose how many cultivation allotments (called Blue Gardens) to adopt, depending on how much harvest the user would like to receive.



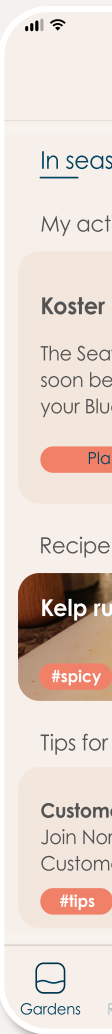


## Increased food connection, knowledge & awareness

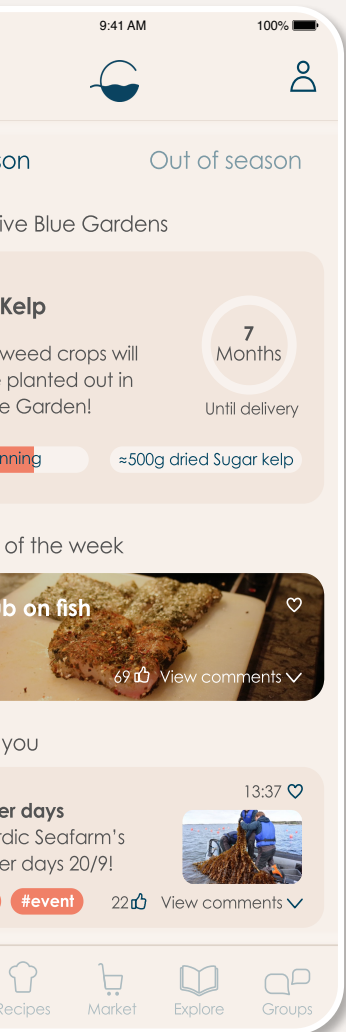
### FOLLOW THE GROWTH

The Blue Garden mobile application enables a "remote farming experience" where the user can follow the growth of the seaweed. The user has the opportunity to see the current state in the cultivation process, the amount of carbon dioxide absorbed, the current size of the seaweed, its growth graph, as well as pictures and videos of it. The seaweed farmers are uploading this information to the app and making the consumers feel included in the process, which is enhancing their experience, knowledge, awareness and food connection.

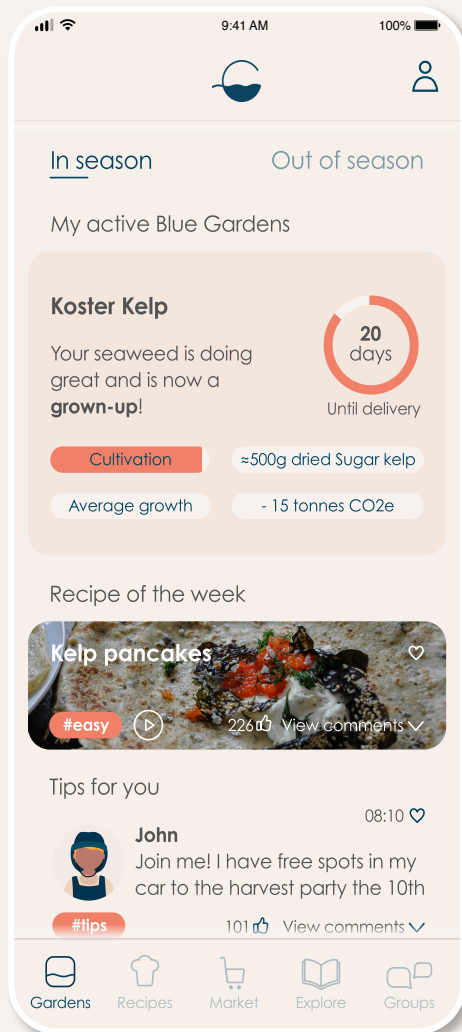
Blue Garden also allows the user to explore and learn about seaweed, by going to *Explore* in the app menu.



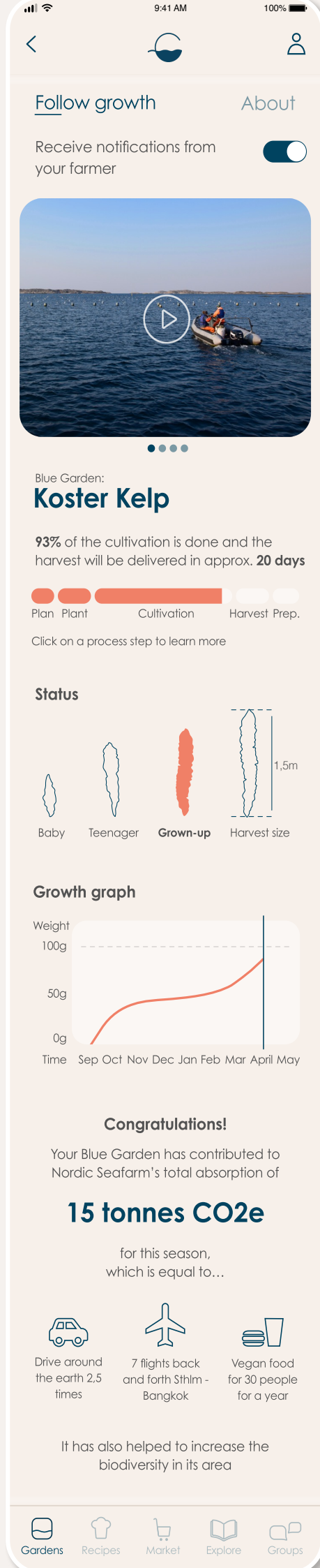
Example of  
have been



Example of screen when a Blue Garden just adopted.



Example of screen when it's close to the harvest of the adopted Blue Garden.

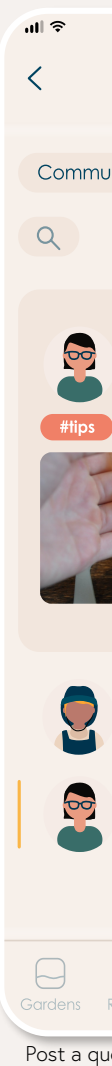
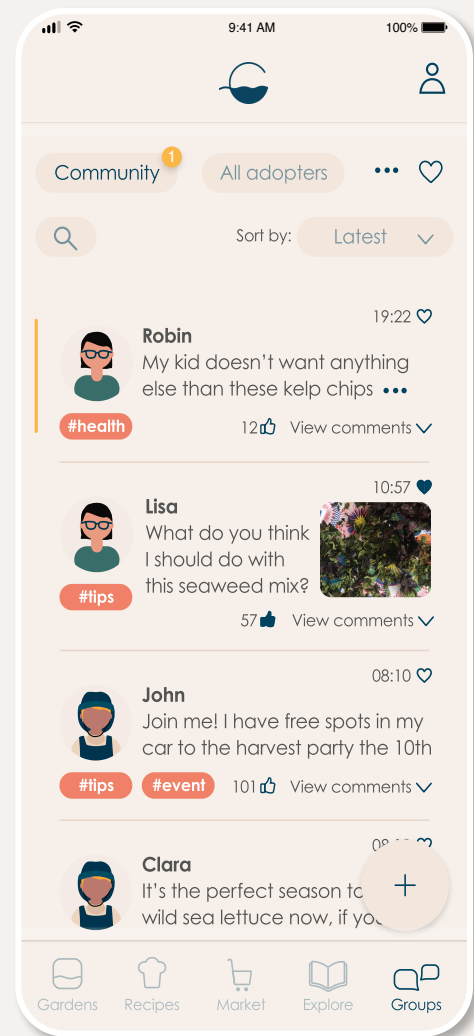


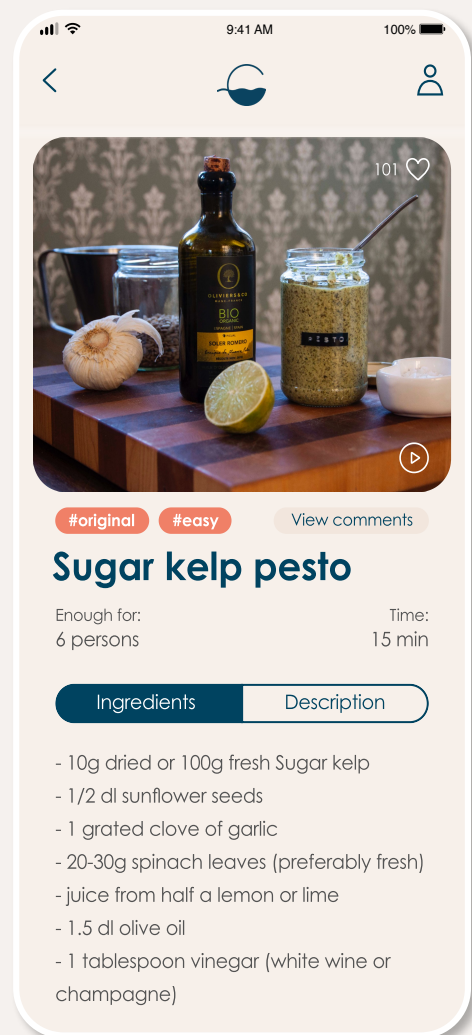
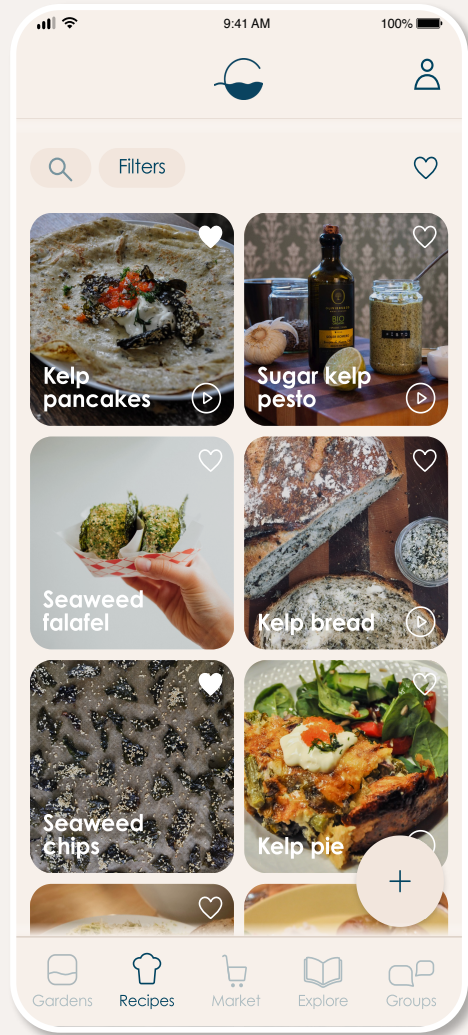
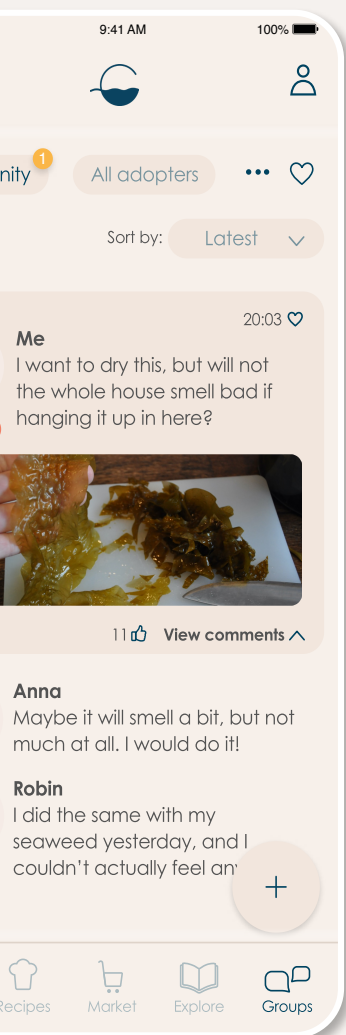
## Support from community

### SEAWEED COMMUNITY NETWORK

Once a member in the service, the user gets access to the Seaweed Community Network in the app. It's a neutral space for inspiration and engagement, where users can contribute with insights, tips and tricks, and with seaweed recipes from different cultures.

The community chat group invites inspiring discussions, users can ask questions and support each other. This creates a database of valuable information that we can utilize in the future. The Community Network enhances the level of inclusion, and creates a feeling of meaningfulness and belonging for the user. My research showed that we are more confident together with others, especially when exploring something new. This is why I included a supportive and inclusive platform in the service.





question in order to get support

# First steps

## ONBOARDING

When entering the app for the first time, five quick onboarding steps bring the user into the world of Blue Garden and seaweed.

In the last step, the user has the possibility to order a Try-out kit without becoming a member of the Blue Garden service.

## SIGNING UP

Signing up is only one quick step for consumers. The farmers need to fill out more information in order to get a membership and start selling through Blue Garden.





## Support ers

network will  
knowledge,  
enhancing  
experience!



member?



## Get started!

Seaweed, with its flavorful umami taste, is both healthy and climate smart. Become a member and start exploring the world of seaweed!

[Become a member](#)

Have you never tried seaweed before? Then, try it out first! Order the Try-out kit with a click! Without signing up on anything!

[Go to Try-out kit](#)



[Already a member?](#)



## Sign up

Sign up with...

[Gmail](#)

[Facebook](#)

Or add your details...

Email

Password

Comfirm password



I'm a farmer



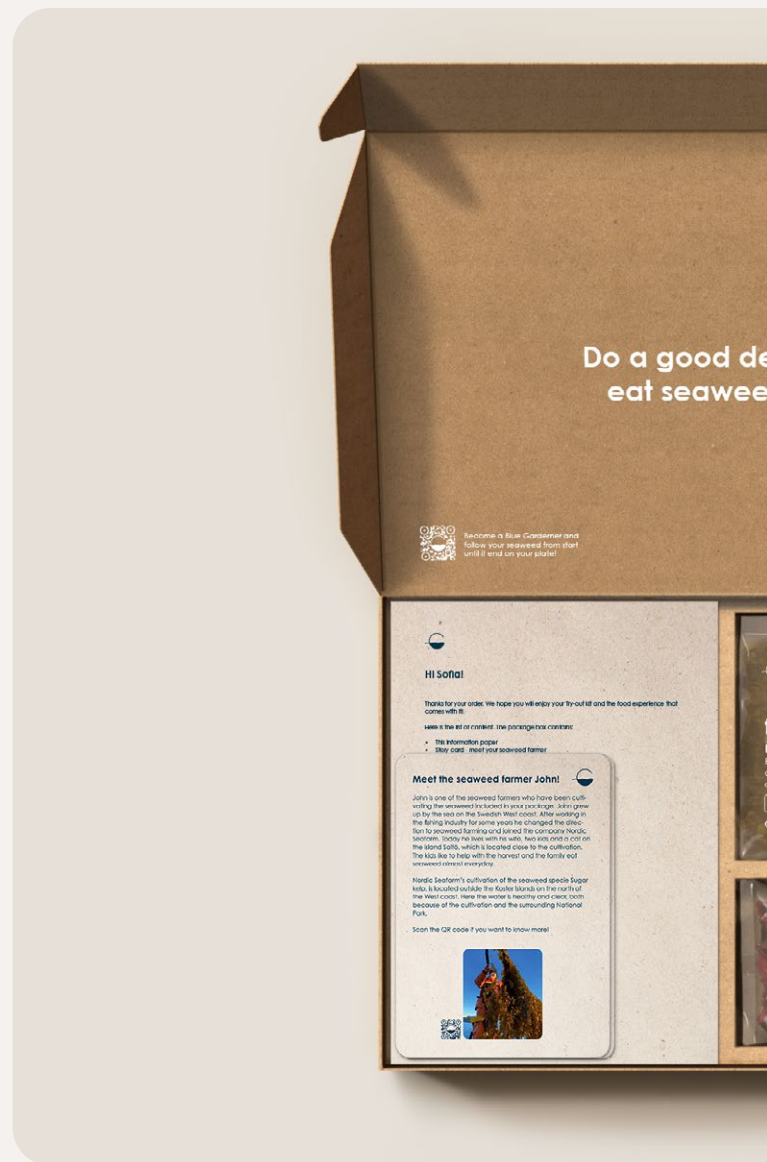
[Done](#)

# Seaweed boxes

Blue Garden includes a Try-out kit and a Harvest box. Both containing a Story and Recipe Card, a delivery note, and seaweed. The Story Card in the Try-out kit is introducing the farmer and telling the story of the seaweed. Whilst, in the harvest box, it's a summarized story from the user's Blue Garden. All seaweed products are packaged in edible plastic, called Notpla, made out of seaweed.

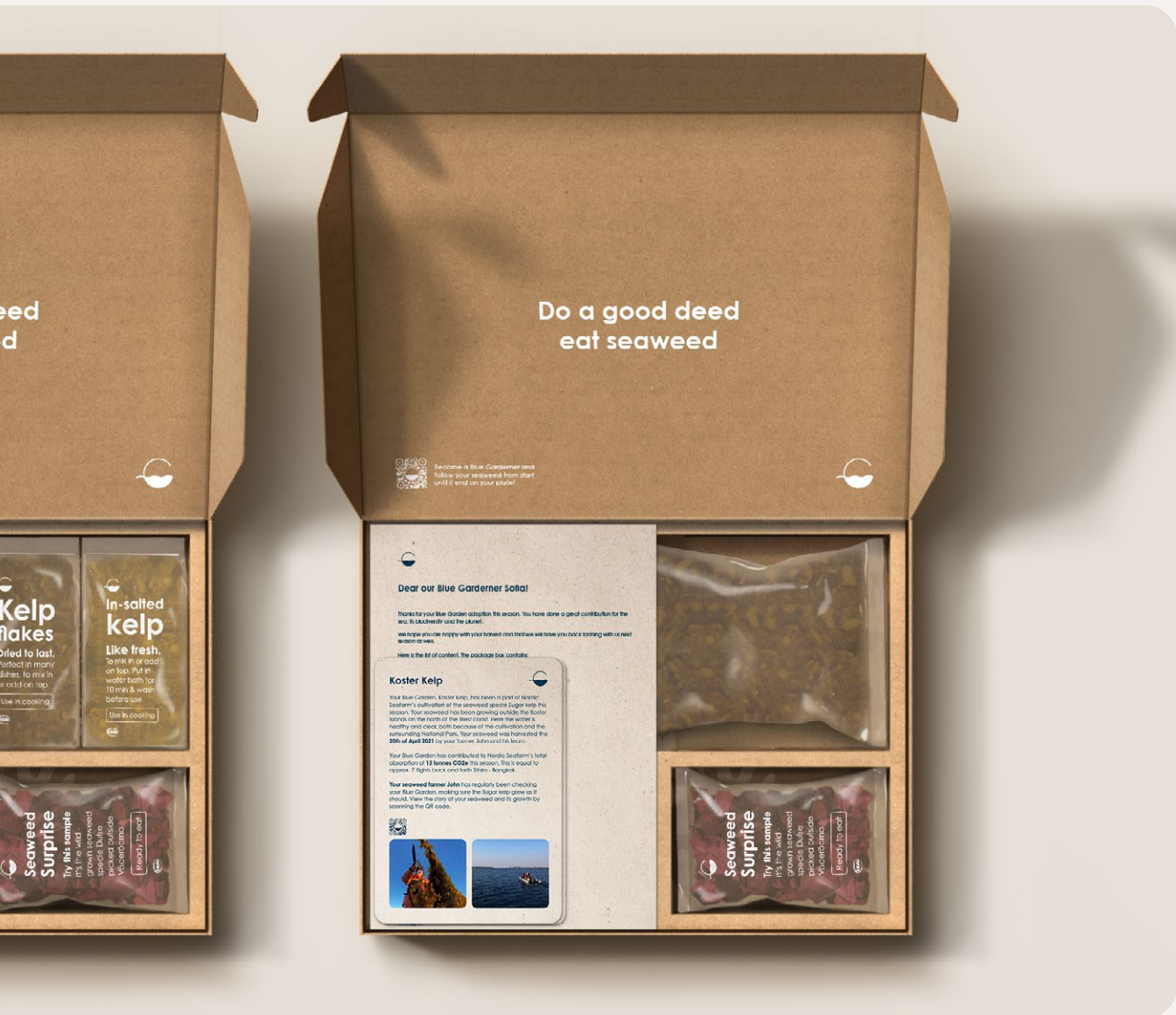
What distinguishes these boxes are that when using the Try-out kit the users are probably totally new in the world of seaweed. While receiving the Harvest box, the user most likely has tried seaweed before or used the kit, and learned a lot by using the app during the cultivation process. Therefore, they are designed a bit differently. The Try-out kit focuses on guiding the user through the seaweed cooking experience (without any pre-knowledge). The harvest box is the result of the Blue Garden adoption. It provides the user with the harvest and tools (in the app) to continue exploring it.

TRY-OUT



KIT

HARVEST BOX



eed  
d

Do a good deed  
eat seaweed

Kelp  
Flakes

In-salted  
kelp

ried to last.  
Perfect in many  
dishes, to mix in  
or cold on top.

Like fresh.  
Toss in or add  
on top. Put in  
water bath for  
10 mins & wash  
before use.

Use in cooking

Use in cooking

Seaweed  
Surprise

Try this sample  
of the wild,  
grown seaweed  
species Dulse  
picked outside  
Victoria, BC.

Ready to eat

100g

Seaweed  
Surprise

Try this sample  
of the wild,  
grown seaweed  
species Dulse  
picked outside  
Victoria, BC.

Ready to eat

100g

QR code  
Become a Blue Gardener and  
follow your seaweed from start  
until it ends on your plate!

Dear our Blue Gardener Sallia!  
Thanks for your Blue Garden adoption this season. You have done a great contribution for the  
sea. It's incredible and we're proud!  
We hope you are happy with your seaweed and that we will have you back eating with us next  
season or two.

Here is the list of contents. The package box contains:

**Koster Kelp**  
Your Blue Garden Koster Kelp has been a part of  
Seafarm's cultivation of the seaweed species Sugar kelp this  
season. Your seaweed has been growing outside the Koster  
Farm on the north of the best coral reefs the water's  
healthy and clear, both because of this cultivation and the  
surrounding National Park. Your seaweed was harvested the  
20th of April 2021 by your farmer John and his team.

Your Blue Garden has contributed to Nordic Seafarm's total  
production of 18 tonnes of Blue Garden this season. This is valued to  
approx. 7 rights back each month. Respect.

Your seaweed farmer John has regularly been checking  
your Blue Garden, making sure the Sugar kelp grew as it  
should. View the top of your seaweed until its growth by  
scanning the QR code.



# Details



## STORY CARD & RECIPES

A Story Card and a Recipe Card, with three recipes, are included in the kit. For the more engaged person, there is also a recipe library and tutorials to be found in the app, which can be reached by scanning a QR code on the box.



## SEAWEED PRODUCTS & RECIPES

The seaweed included in the kit can be used to test directly (kelp chips, crispbread, and three versions of the raw seaweed) in cooking. Those are, dried seaweed as powder, and in-salted kelp. The in-salted kelp is in-salted to last. The kit also includes a surprise, which is another seaweed product.



## RAW SEAWEED

The kit is both products to (crispbread, and soy sachets), raw form of Sugar kelp to use Sugar kelp as flakes and top, which is fresh kelp that also contains a seaweed species.

## FUN FACTS & INFO SECRETLY EMBEDDED

To include fun facts in the kit was a desire by the users, which I found out during the user interviews and testing. The users wanted to learn things while cooking, without getting too much information. It should just be there, when wanting it and be secretly embedded in the kit and cooking experience.

## STORY CARD

The connection to the seaweed cultivation and farmer is an important part of the service, which is mainly created by the Story Card. The Story Card tells the story about the seaweed, making the user feel more included and connected to the cultivation, and confident with the farmer taking care of the adopted Blue Garden.

The Story Card is designed to be saved, to be put as a memory on the fridge or on the kitchen table for the guests to see where the seaweed they are eating comes from. Imagine being a dinner guest at a restaurant or in a friend's home, being served this delicious seaweed dish, and having the possibility to read its story on the Story Card. By scanning the QR-code on the card there is also a possibility to get an overview of its growth and journey, from start to finished dish on your plate! My research showed that this transparency is an increasing desire for users to have, which is why I included it in the service.



## Recipe - Kelp pesto

### Ingredients

- 10g dried kelp
- 1/2 dl olive oil
- 1 grated garlic clove
- 20-30g pine nuts
- juice from 1 lemon
- 1.5 dl water
- 1 table salt
- 1/2 tea spoon pepper
- 1 spice

Soak the dried kelp in water for 24 hours. Then drain and chop. Add to a food processor with the other ingredients. Blend until smooth. Add salt and pepper to taste. Store in a jar in the refrigerator for up to 2 weeks.

## Koster Kelp



Your Blue Garden, Koster Kelp, has been a part of Nordic Seafarm's cultivation of the seaweed specie Sugar kelp this season. Your seaweed has been growing outside the Koster Islands on the north of the West coast. Here the water is healthy and clear, both because of the cultivation and the surrounding National Park. Your seaweed was harvested the **20th of April 2021** by your farmer John and his team.

Your Blue Garden has contributed to Nordic Seafarm's total absorption of **15 tonnes CO<sub>2</sub>e** this season. This is equal to approx. 7 flights back and forth Sthlm - Bangkok.

Your seaweed farmer John has regularly been checking your Blue Garden, making sure the Sugar kelp grew as it should. View the story of your seaweed and its growth by scanning the QR code.



# Inclusion

Blue Garden is an inclusive service from a social perspective. Except for the inclusive Blue Garden Community Network, the service makes the user feel inclusive in other ways too. The service is designed to make seaweed accessible for anyone interested, regardless of the location of living, level of income, culture, or social status.

To introduce seaweed in Sweden we have to build awareness. People need to hear, see, and try seaweed. Restaurants, which are the biggest customer of seaweed today, are a crucial partner. By providing them the Blue Garden service they will have the possibility to show their guests the story behind the seaweed on their plate, using the Story Card. This makes the people consuming the seaweed, also feel inclusive and aware of what they are eating.

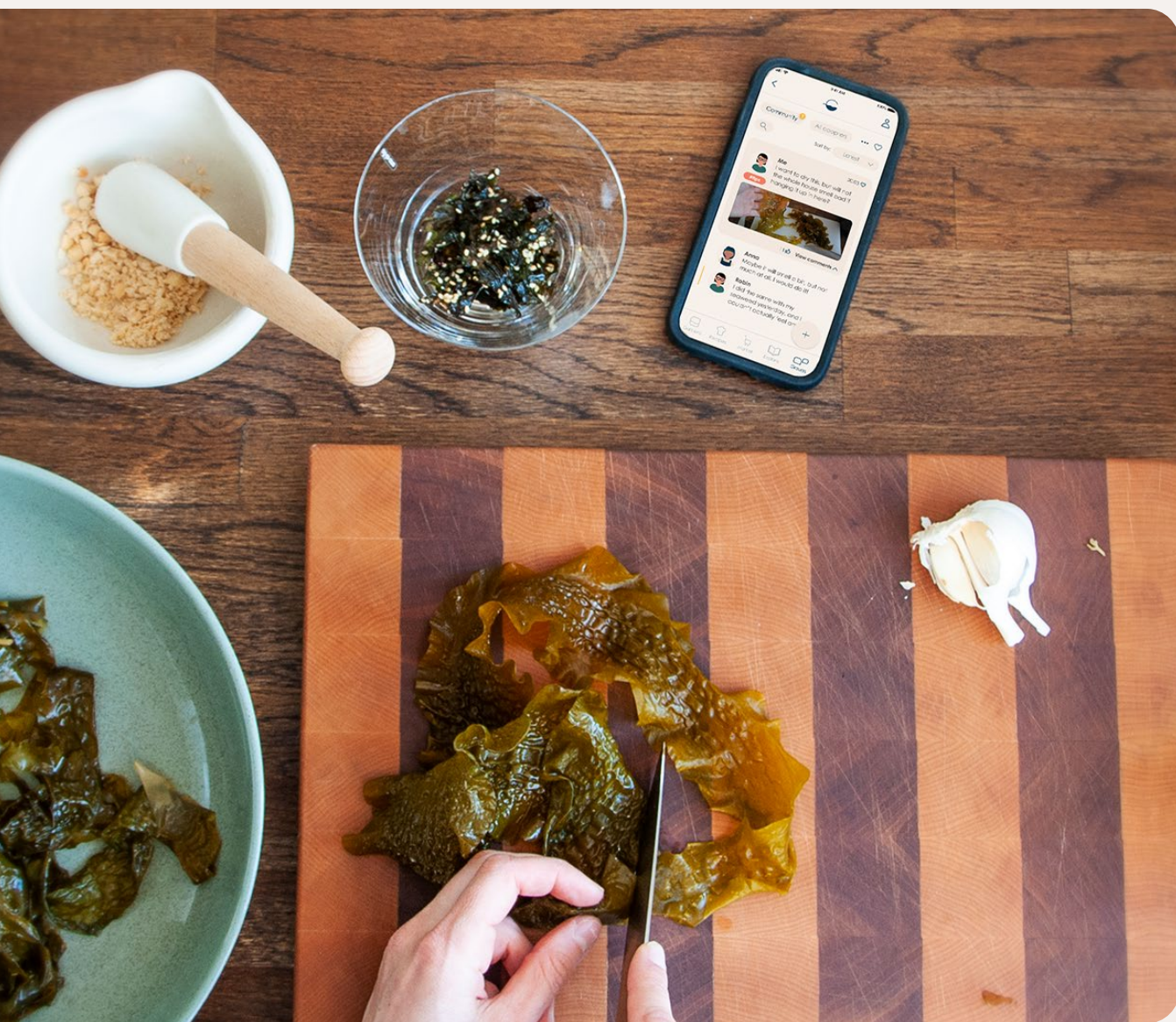
Another way of making seaweed visible is to involve citizens in a Blue Garden showcase cultivation, located for example in the city of Gothenburg,

with a seafood restaurant connected to it. A place for citizen engagement, where people can meet, learn and try seaweed. This makes it easily accessible for everyone, as well as for tourism and for educational purposes.

These ideas are also a way of introducing people to the service. If they get curious and want to get their own seaweed, they have the possibility to sign up for the Blue Garden service, which is affordable for all Swedish families.







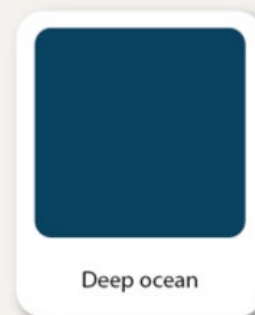
# Visual expression

The visual expression and the colours of Blue Garden are inspired by the sea. I have been using soft and round forms and fonts in a similar style, in order to express a more fun and friendly feeling. As the UI has to fit all kinds of people, from young to old, I chose to use the colour with the biggest contrast as the primary colour, which is a deep-sea blue. For secondary colours, I have used coral and sunset gold.

To reduce the energy use of the mobile application, I have designed the user interface using warmer colours. I chose to use a "sand" colour as the background, instead of pure white, which makes the expression calmer and reduces the contrast.

The logotype can be used in four different ways. It's inspired by a G and a sunset in the sea.

Primary color



Secondary color



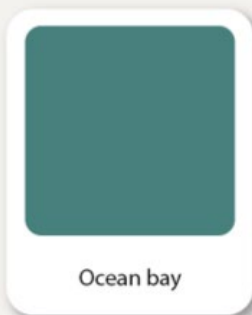
Blue Garden



Secondary color

Illustrations color

Background color

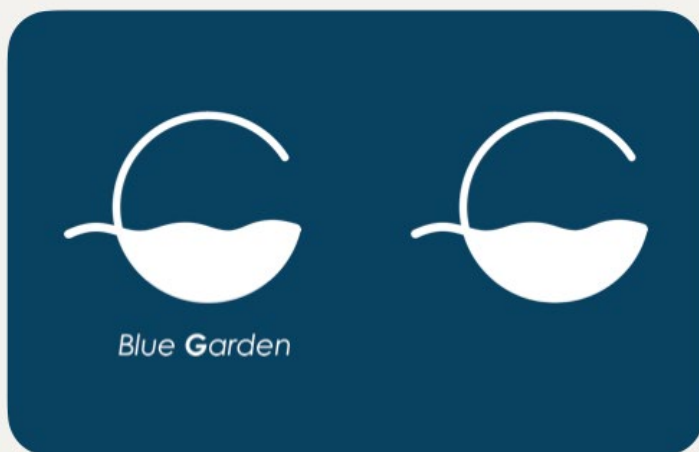


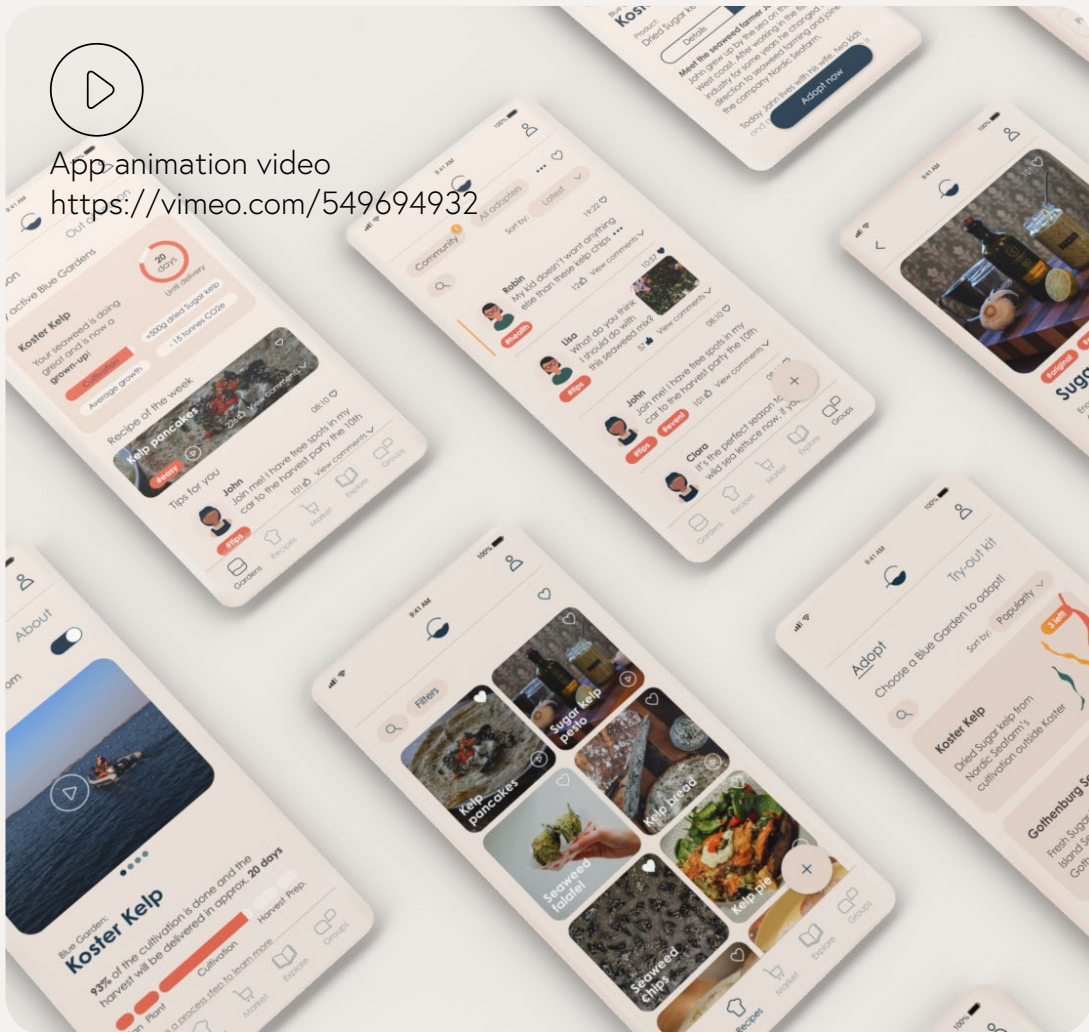
Typography:

Logotype: *Centry Gothic Pro*

Titles: **Centry Gothic Pro**

Text: Centry Gothic Pro





App animation video

<https://vimeo.com/549694932>

# Stakeholders

<b>Direct</b>	Seaweed beginners	Seaweed users	Seaweed farmers	Mother nature
Motivators	<ul style="list-style-type: none"> <li>- Curious to try</li> <li>- Easy access to seaweed</li> <li>- Get knowledge and support</li> <li>- Healthy, environment friendly, Umami taste</li> </ul>	<ul style="list-style-type: none"> <li>- Easy access to seaweed</li> <li>- Increased knowledge</li> <li>- Inspiration, tips and tricks</li> <li>- Healthy, environment friendly, Umami taste</li> <li>- Other use cases</li> </ul>	<ul style="list-style-type: none"> <li>- Increased sells</li> <li>- Increased consumer knowledge</li> <li>- Support</li> </ul>	<ul style="list-style-type: none"> <li>- Increased biodiversity</li> <li>- Decreased ocean acidification</li> <li>- Improved ecosystems</li> <li>- Increased local food production</li> </ul>
<b>Indirect</b>	Friends & family	Restaurants	Municipality	
Benefits	<ul style="list-style-type: none"> <li>- Get a possibility to try</li> <li>- Inspiration</li> <li>- Increased knowledge and awareness</li> <li>- Healthy and environment friendly food</li> </ul>	<ul style="list-style-type: none"> <li>- Easy access to seaweed</li> <li>- Increased supply of seaweeds</li> <li>- A great meat substitute, better tasting vegan dishes</li> <li>- Food production transparency</li> </ul>	<ul style="list-style-type: none"> <li>- More jobs</li> <li>- Increased local food production</li> <li>- Increased environmental sustainability in the surrounding sea</li> </ul>	
<b>Potential</b>	Lower footprint	Job creator	Health & wellbeing	Self-sufficiency
Benefits	An important factor for meeting the climate goals of 2045 and for lowering our personal carbon footprints to 1 tonne	There might be an increasing demand of seaweed which will create more jobs for seaweed farmers	Could help us feel bonded to a community and feel like we have an impact, which is vital for our wellbeing. It also has many health benefits and could empower the immune system and minimize the risks of national diseases	Sweden has a potential to be self-sufficient on this food industry

# Development possibilities

There are a lot of development possibilities for the Blue Garden service.

Even though the service is focusing on seaweed, the adopted Blue Gardens don't need to only contain that. What if you can adopt a Blue Garden where different species are cultivated together - a marine permaculture garden! That would give the user the possibility to receive a harvest containing mussels, shellfish, seaweed, and sea cucumber from one adopted Blue Garden. This is something I wanted to include in the service already, but unfortunately, Sweden is not really receptive to this right now. Instead, I see it as a great development possibility.

Another development possibility, which could be the next step from this service, is to create Blue Garden Community allotments. Where users get the possibility to rent an allotment and cultivate their own seafood, with support from the Seaweed Community.

I can also imagine the Swedish West coast as a seaweed destination, where people travel to pick, test, cultivate, and explore seaweed. Making seaweed as a food tradition. It would be beneficial to partner with already existing marine exhibition areas, like Naturum at Koster, in order to create a Marine Farm Village for tourism.



17. Picture showing a Harbour Farm project by Effekt Design in Copenhagen.

# Impact

## UN DEVELOPMENT GOALS

The project is tackling several of the UN Sustainable Development Goals and global problems, about food production, biodiversity and global warming. Seaweed is one out of a few resources that can contribute with a positive impact on both the environment, society and economy.

### Environment:

The overarching goal of the Blue Garden concept is to make more Swedes eat seaweed and increase its demand. Because **a higher demand will increase the number of seaweed farms, which can provide us with a lot of climate-smart food, restore ecosystems, decrease ocean acidification and absorb carbon dioxide.** This will be an important part of reaching our climate goals. If doing this in a smart way, using Blue Garden and an elaborative implementation plan, my hope is that it can inspire other countries to do the same and have a significant impact.

### Society:

If scalable, **the Blue Garden concept could potentially decrease poverty in coastal areas where seaweed farming is possible.** It could also help

to support small-scale farmers and ensure sustainable and resilient food production systems that help maintain ecosystems. As well as providing us with healthy and locally produced food. Seaweed is one of the most nutritious foods on the planet and it can minimize the risks of national diseases.<sup>14</sup>

### Economy:

Unlike farming on land, Marine permaculture doesn't require any fertilizer, nutrition or water. The ocean provides what's needed. This makes it sustainable and almost self-driven, with a great economical benefit, as the expected price for fresh water and fertilizer will increase.

The Blue Garden concept can help with food security, contribute to responsible (food) production and make efficient use of this natural resource and food industry, with the potential for Sweden to be self-sufficient. It could also encourage industries to facilitate sustainable development, reduce food and post-harvest losses during production and **create jobs that promote a lifestyle in harmony with nature.**



## Recipe - Kelp pesto

### Meet the seaweed farmer

John is one of the seaweed farmers cultivating the seaweed included in your recipe. He grew up by the sea on the Swedish West coast, worked in the fishing industry for some years before he decided to transition to seaweed farming and joined Nordic Seafarm. Today he lives with his wife and three kids on the island Saltö, which is located close to the coast. The kids like to help with the harvest and John harvests seaweed almost everyday.

Nordic Seafarm's cultivation of the seaweed, kelp, is located outside the Koster Islands on the West coast. Here the water is very clean because of the cultivation and the surrounding nature park.

Scan the QR code if you want to know more.





er John!



who have been culti-  
r package. John grew  
coast. After working in  
e changed the direc-  
the company Nordic  
two kids and a cat on  
se to the cultivation.  
and the family eat

seaweed specie Sugar  
lands on the north of  
althy and clear, both  
urrounding National

ow more!



# Personal reflection

One year ago, I started to think of potential topics for my MFA thesis. I was looking for an unexplored topic (at least in the design world), that was touching upon one or several of the UN Sustainable Development Goals. I wanted to work with sustainability and behavioral change, focusing on the user experience. The topic I chose was exactly what I had in my mind.

The project started out with a wide research scope. I had a lot to explore and learn about. I wanted to know if seaweed and seaweed farming really is a potential sustainable food source and production model. I was researching a lot about seaweed cultivation and exploring the possibilities of designing a service for Marine garden allotments where users could cultivate their own marine food. I really liked the idea about Marine garden allotments and when I realized that it was not the most relevant direction for me to go, I had a hard time leaving the idea behind. For a time I was exploring different models of how it could

be combined with the Connected/Remote sea farming idea, but it got too big and I didn't find any way to explain it in a clear and relevant way. The most logical and relevant direction was the one I finally chose. When reflecting back on it, I wish I could have made the decision about the direction earlier, as I lost a lot of time when investing in the possibility to combine the two ideas.

The project time plan overview and my daily schedule have been key elements for me during the project, even though there have been some changes along the way. The planning helped me to get an overview of the project and the upcoming tasks and deliverables. I also tracked all the time spent on the project. In my daily schedule, I have written down how much time I spent on what things, each day. This helped me to understand where I put my time and keep track of it, to not work too much or too little.

I have achieved all my main goals and wishes, with both the solution and the project. When looking back on my function list there's a lot on the wish list that I didn't include in the final design. Mostly because those functions were not highly prioritized. I wanted to keep the solution as simple as possible, in order to have time to explain all its functions during the presentation. Instead, those wish functions could be implemented later, as development possibilities.

Except for my wish for faster decision-making about the direction, I wouldn't like to change anything in the project when looking back on it.

This project is very different from all other projects that I have done. It's about food and service design, two things I have never worked with before. I have learned about the topic, cooking experiences, how to design a service (create a service blueprint and service identity), improved my skills within UX and UI, and designed my first mobile application concept.

If I had more time to spend on the project, I would have liked to further develop and explore the UX/UI of the app and the Try-out kit. To test the final solution with users and make some improvements.

I'm overall very happy about the project, my work methods and the result. I have achieved all the Expected Learning Outcomes of the course. Furthermore, the topic is highly relevant and important, and there's an empty space with solutions within this field. I believe my work has and can make an impact. There is already a company interested to take the work further.

The project has been fun and interesting to work with from the start to the end and I actually wish it could continue for a longer time. My biggest satisfaction is that I inspired people along the journey!

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# Appendix

## Method

### **BROAD RESEARCH SPECTRUM**

Desktop research & literature  
Listen to podcast, watch documentaries

### **Future forecasting & trends**

- Why is this topic relevant now?
- How can seaweed cultivation help to combat climate change? Is it the future of farming?
- Is seaweed the future of food? What's the effect for the climate of eating seaweed?

### **The history**

- What methods have they used for seaweed farming in the past, e.g. in Asia?

### **Market overview**

- What design have been done so far in this field?
- What competitors or similar solutions are already existing on the market today?



## USER RESEARCH

### Qualitative

Field research

Interviews with experts to collect stories

Workshops with users

Journey mapping

- How does ocean farming work?
- What is needed for on-shore seaweed cultivation and what can be cultivated there?
- What is different from farming on land? What from the on land farming experience can be transferred to on-shore seaweed cultivation?
- Are people interested to cultivate themselves or would they prefer someone else cultivating the seaweed for them?

### Quantitative

- How to inspire and introduce people to seaweed cultivation and this "new" food?
- What are the users hopes and fears?

## IDEATION & CONCEPTUALISATION

**Ideation session** with students from UID.

**Co-creation workshop** with experts and designers, mainly for ideating on different solutions within the chosen focus areas. A great help when creating concept ideas.

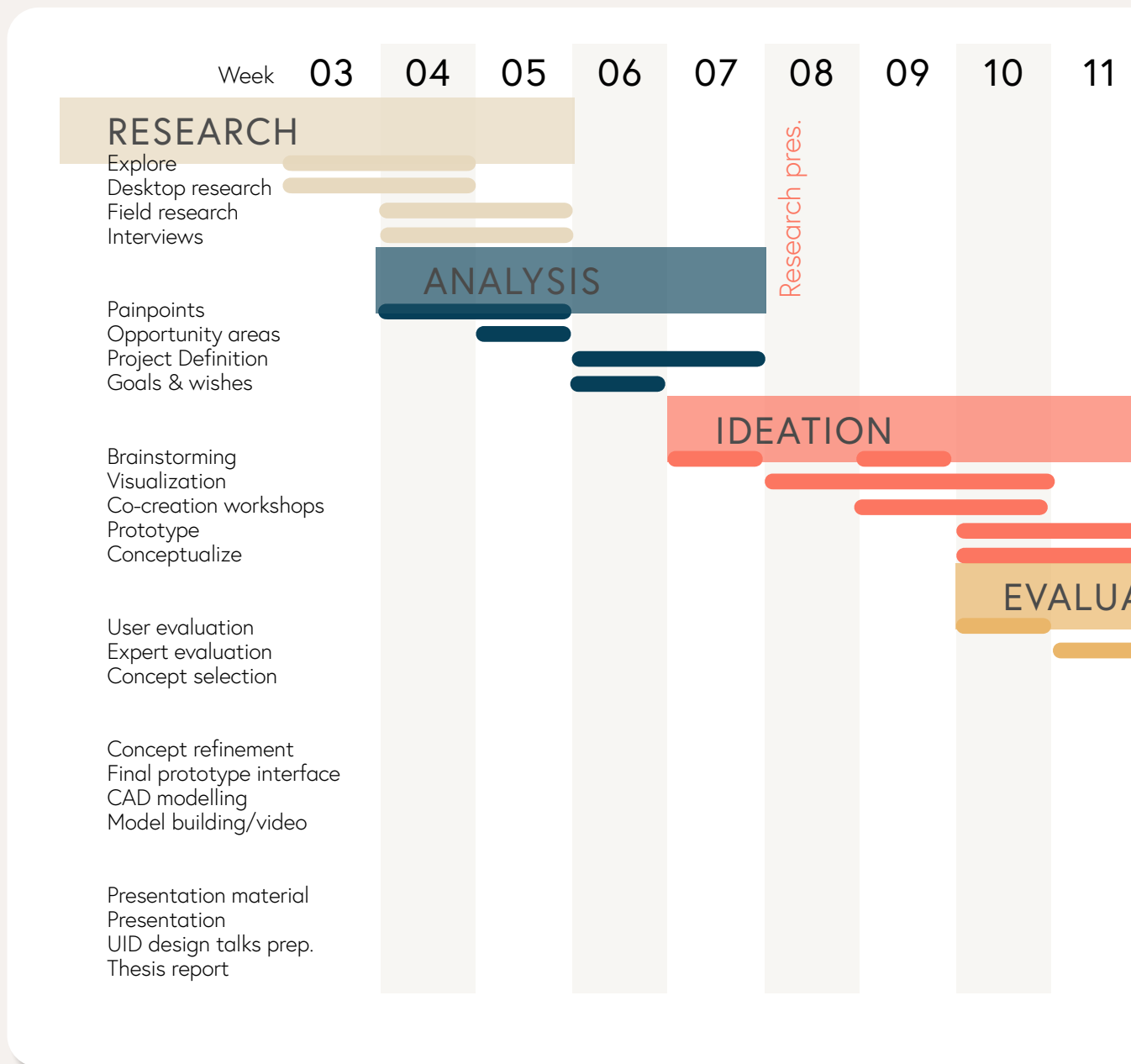
**User testing with concept prototype** and evaluation of concept functions with users and experts. Updates of prototype, based on the user-testing-feedback.

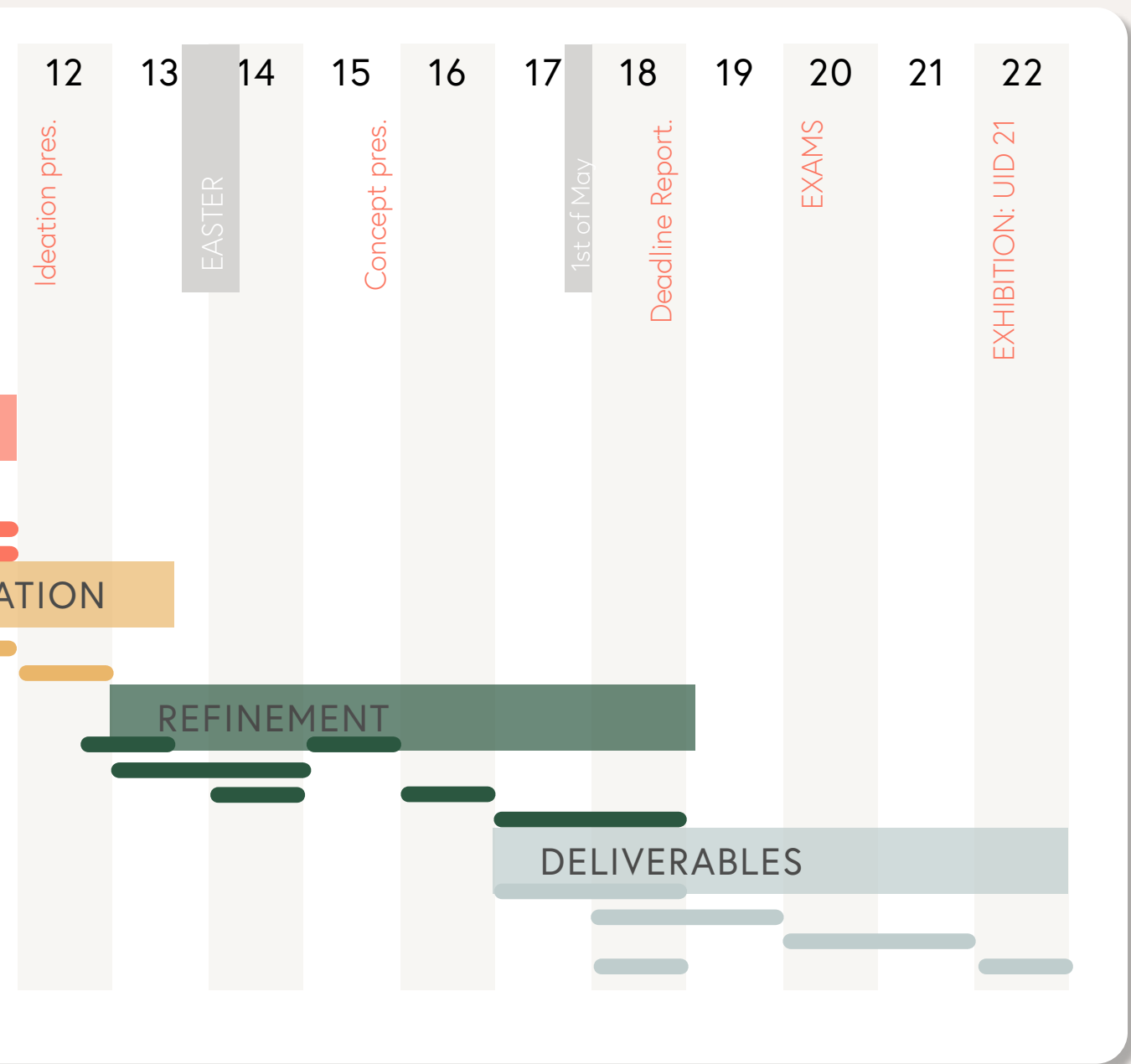
**Concept development** where I further evolved, visualized and tried out different designs of the concept idea(s) in order to be able to choose the final design after an additional evaluation.

**Refinement** of the chosen concept idea, creating final visualizations and a video.



## TIME PLAN





# Evalu

1

## Cultivation guidance



2

## Keep m



Impact level



Wide user group



Level of implementation



# ation

mascot



3

Remote farming



2 1

3

+

1

2

3

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2

1

3

+

Provides increased connection to the



These services provides local food, but no seaweed



Provides the ordered product



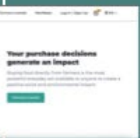
Doesn't provide an the food &



ed knowledge &  
farmer & the food

Interesting area

The only seaweed  
related products on the  
market in this area are  
seaweed experiences



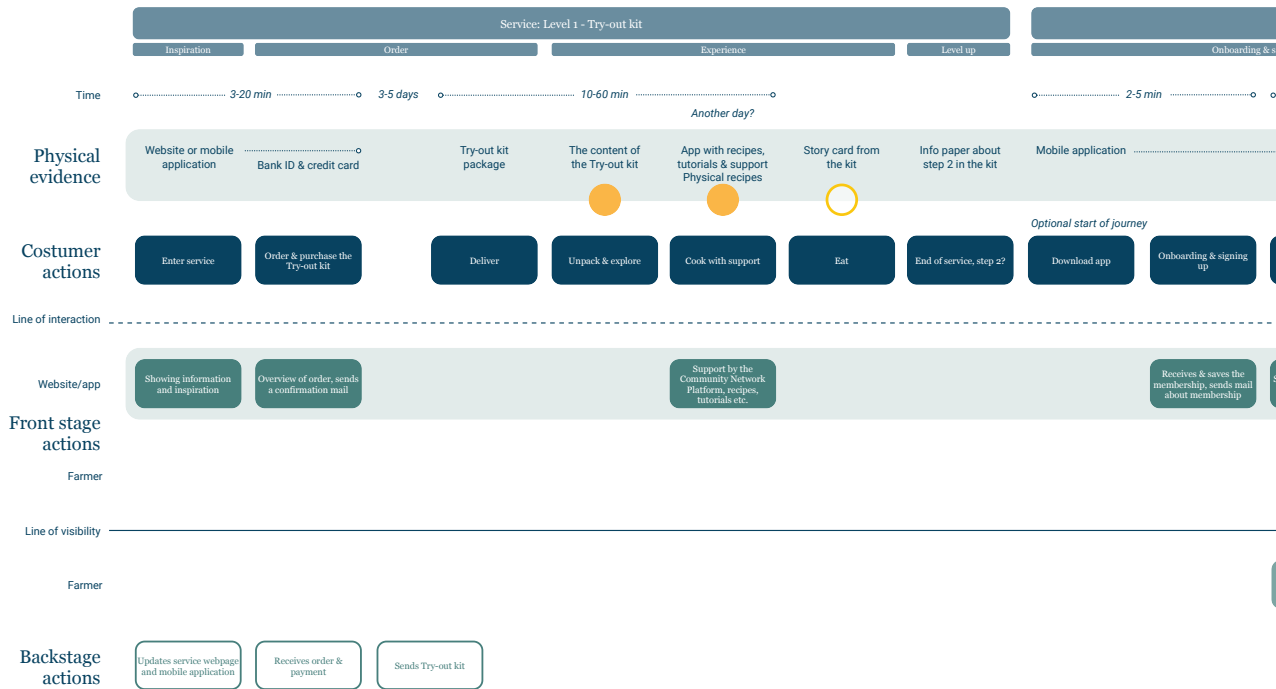
Provides an experience  
(with the product)

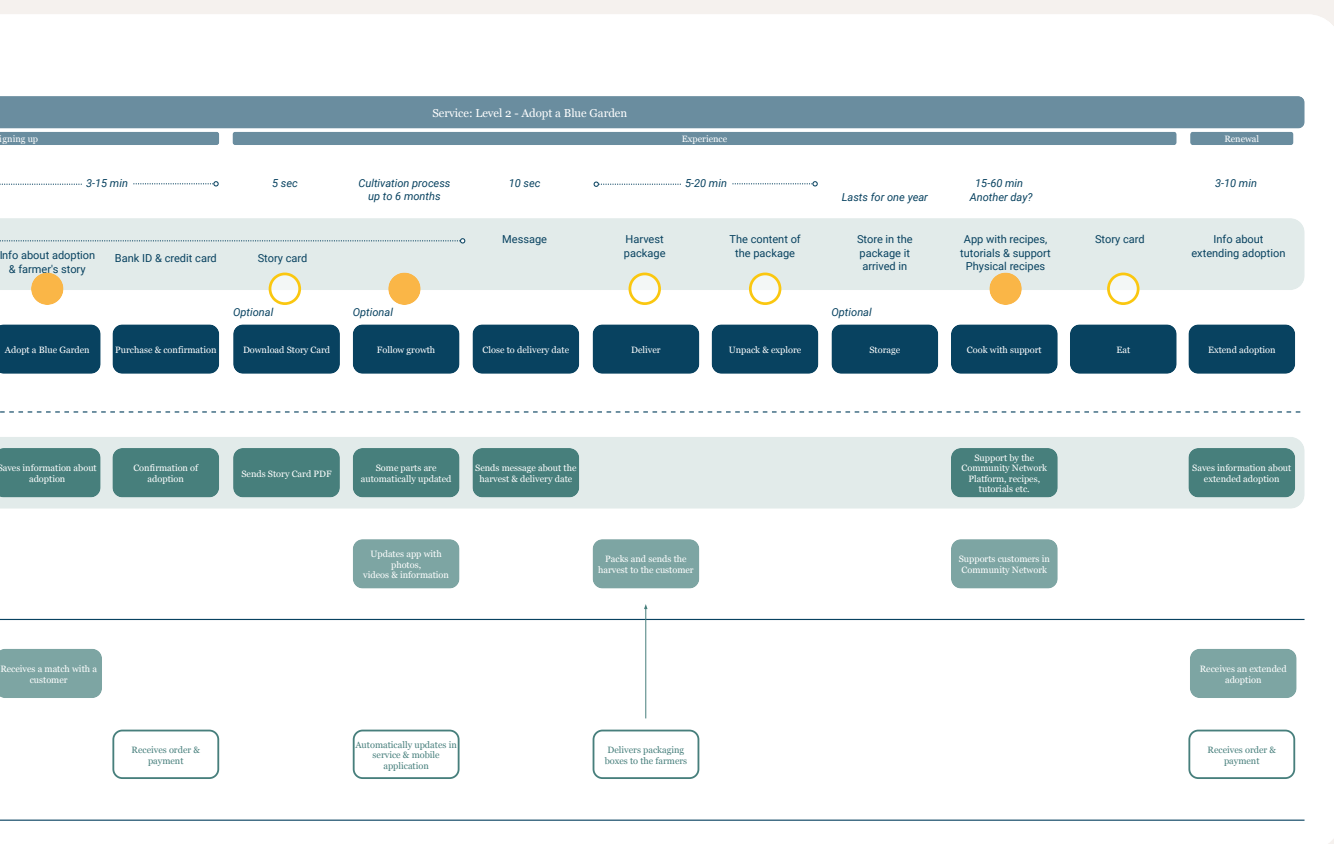


y knowledge about  
& its origins

## SERVICE BLUEPRINT

● My primary focus areas ○ My secondary focus areas





## INSPIRATION BOARD - TRY-OUT KIT



