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Creating Multispecies Neighbourhoods in the Oslofjord: Challenges and Opportunities

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Multispecies Neighbourhoods in Urban Sea Areas

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Episode 1 | The Trial Lecture

Creating Multispecies Neighbourhoods in the Oslofjord: Challenges and Opportunities

INTRO

Welcome to the Public Defence of the doctoral study “Multispecies Neighborhoods in Urban Sea Areas.” My name is Elin T. Sørensen, and my work happens at the intersection between visual arts, urban development, landscape architecture, and ecology. My deep interest lies in the possible interaction between ecosystems and society—especially in urban sea areas. And now, I will take you down under the surface of the sea, to share my research as a story to a wide audience. That’s why this Public Defence is disseminated using Digital Storytelling told in three episodes. Digital Storytelling is described as the modern extension of the ancient art of telling tales: today, interlaced with spoken-word, sound and moving images. And the good thing is that the Digital Stories can be downloaded to a personal device for easy listening anywhere.[1]

The Trial Lecture is an independent part of the Doctoral Knowledge Ritual, where the presentation revolves a pre-assigned theme that was determined my Ph.D. Evaluation Committee—consisting of marine ecologist Louise Firth, visual artist Susanne Winterling and landscape architect Jörg Sieweke. The chosen topic of the Trial Lecture is “Creating Multispecies Neighbourhoods in the Oslo-fjord: Challenges and Opportunities,” and I am thrilled to address this choice of topic: as the persistent human-centered attitude is something I’m passionate about fighting—despite it being a challenging and complex affair.

The creation of multispecies neighbourhoods is about making inclusive neighbourhoods. That is places where all local species can grow up and have a meaningful and healthy life through their lifespan: from childhood through adult-hood and not least in old age. This is important because if we are to tackle the on-going nature- and climate crisis, then multispeciesness—as a mindset and urban development practice—will play an important role.

To reach multispecies awareness for the blue environment, we must over-come the disconnection and neglect towards life below the surface of the sea. Life below water must become visible to us. We need to increase our awareness about the ocean, and this is called Ocean Literacy. As a landscape architect entering the urban blue, I soon realised that I could not solve things all alone: to act wisely as urban designers we need to forge new ties—both across disciplines and between species. The key message is that the solution lies in diversity: and then I mean diversity in the broadest sense. Diversity regarding nature dynamics, and diversity in the research process and team composition. To inform my marine landscaping research, I have drawn inspiration from nature’s own problem solving capacity. With this as the backdrop, I invite you into this world of new collaborative forms of learning and acting in the urban blue neighbourhood.

1 (Moursund, 2010; Cope & Kalantzis, 2009)

PART ONE | Marine neighbourhoods

In a neighbourhood, all inhabitants have something in common. We want meaningful and healthy lives, to eat enough food and to reproduce. All these needs require cooperation with other species beyond our own. Humans are no doubt connected to the blue environment. For example, the sea-food we enjoy makes us depend on the marine food-web, and our desire to live by the sea makes us part of a coastal community. The marine neighbourhood has a fundament of different structural levels: from individual to species and populations, that again build communities and food-webs with trophic interactions. The trophic level of an organism is the position it occupies in a food-web. And a food-chain is a succession of organisms that eat other organisms and may, in turn, be eaten themselves. And all together, these factors form what we call ecosystems with specific ecological functions.[2]

The ecosystem can be explained as a circular flow of energy-transfer from primary producers to top-predators and back again. In this system, some species are specialists, like the common eider (*Somateria mollissima*) who prefer to eat blue mussels (*Mytilus edulis*). Others are generalists and opportunists, like the herring gulls (*Larus argentatus*) trying out all types of food. Some groups of species are mobile, like fish, crabs, seabirds, and humans. Others are attached to one place most of their life, like the sea wrack of the blue forests, barnacles, and oysters.

In the span from geo chemical to biological factors, the interplay and interaction between the species and their environment form the foundation for ecological functions. Like how the eelgrass meadow provides places to hide and rest, nurseries, and food chambers for a great number of other marine beings. In the ecosystem, the species play different roles, have specialised skills and needs for survival. And it is exactly these abilities that provide us with different opportunities for coexistence and co-creation.

The Oslofjord in Norway is one of many blue neighbourhoods. In this fjord-ecosystem the *Homo sapiens* is just one of many thousands of species. As a species, humans have an advanced intelligence, capacities for language, social networking, and technological skills. And as a result, humans can showcase a unique ecological plasticity. Our species has developed a new ecological niche, that of the 'generalist—specialist.'[3] This strategy enables us to cope, endure and survive extreme environmental changes. We are a typical engineer species, that can transform a place to our advantage. Like other engineer species, such as elephants and beavers, we can create foundation for other types of species to thrive as well.

But as cities grow, the needs and interests of humans take over the habitats of others. The result is that one single species dominates most of the ecosystems on Earth, leaving little space for others. Human beings are also a social species that relies upon co-operation to survive and thrive[4]—so we form neighbourhoods with our own kind. In fact, our inflicted stress on the ecosystems triggers a need to make a new "social contract" with all species that we share space with. If we think about our own human skills, this should be an easy task.

2 (Lindeman, 1942)
3 (Roberts & Stewart, 2018)
4 (Editorial Nature Human Behaviour, 2018)

We can create neighbourhoods that enrich the well-being factors for all its inhabitants through their life phases. The Oslofjord is one such common landscape—a bluescape—a blue neighbourhood. Let' take a closer look at it.

PART TWO | The Oslofjord

In this story, the Oslofjord is the lead character—this is because its inner and most urbanised parts truly need a multispecies approach to survive …

This fjord is my home: the place where I was born and raised: so, I could easily visit, and be together with the fjord during the years of the doctoral study. The Oslofjord looks like a swan, and its blue waterbody has supported its coastal settlers for a long time. Over the centuries, humanmade infrastructure has hardened and transformed a good portion of its landscape, and its coastlines are becoming extensively modified by humans. In fact, the entire fjord is marked by our actions: shallow banks and underwater-reefs are removed to create one of Norway's busiest blue high-way for ferries, charter- and cargo ships, fishing- and leisure activities. And close to land, the water surface is increasingly used as a blue parking space. As you can see in this landscape animation, the fjord has gradually been covered with floating marinas from 1956 and until today.

Now let's move from the surface and down to the bottom of the great plains in the outer Oslofjord. As you can see from the video-survey of the seabed, the seafloor looks like an elephant's wrinkly skin: but these marks are not wrinkles—they are the remaining trawl tracks from commercial fishing.

With the help from the vehicle "HUGIN," which is a robot traveling undersea, we are now on a journey deep down and close to the Tisler-reef—which is known as the largest known inshore deep-water coral reef in Europe. By becoming Norway's first Marine National Park, established in 2009, much of the area is protected. Despite this, even the plains close to the coral-reef are heavily trawled.

To give you an idea of how enormous this underwater landscape is, the shipwreck you can see in the recording is 30 meters long. I must tell you, that the trawling is completely legal. The fishermen only do their job, and it is up to the Norwegian state to regulate this activity. One key task would be to ensure that the fishing equipment neither harm the seabed nor pollute the sea. And according to the software architect, who controls "HUGIN," the solution is simple: it is only a matter of creating fishing trawls that float at least one meter above the seabed.[5]

The consequences of such degraded habitats, overfishing and pollution, is that the marine ecosystems are so stressed that they no longer can keep fish and seabirds with enough food. And the Oslofjord is even almost empty of cod. Without marine life, nutrients accumulate in the water, and together with surface runoff this makes the water "dark." Today, the sunlight reaches only half as far down into the water column as it did a generation back. And the murky water is bad news for the blue forest using photo-synthesis. The fjords' inner parts lack oxygen, and altogether life below the water struggles.[6]

5 (Personal communcation with Arne Hestnes, 2021)
6 (Rinde & Sørensen et al., 2019, pp. 15-17)

If this is not enough, there is also the challenge with the alien species: who override the functional composition and diversity of others. My friend Klaus Bareksten, who runs a small public aquarium in the small town Drøbak gives out weekly updates to his followers. “The Pacific oysters have invaded us!” he announces in his last report. And he continues: “to feed the aquarium’s crabs and lobsters, I usually search for blue mussels under the floating dock. Normally, there are clusters of large mussels attached to the concrete elements—but this time I didn’t catch a single mussel: Pacific oysters have taken over. They now live closely cemented together on the entire structure. How will this end, when just a single female oyster can produce millions of eggs?”[7]

The invasive pacific oyster is in fact similar to us. Because today, 1.6 million people live close to the Oslofjord, but we are only one of thousand species. And we share the space with a colourful myriad of inhabitants—from patches of blue forest to the tiniest critters.

When we look at the many measures that have been made to clean up the fjord—there has been much attention to improving the quality of bathing water, restoring food security, and to enable an active outdoor life for people. Less attention has been payed to the destroyed marine habitats that need restoration. And this is where the multispecies approach comes in.

PART THREE | Imagining multispecies neighbourhoods

To make things better, let’s imagine a multispecies neighbourhood approach in the Oslofjord, that will ensure an expanded exchange and co-existence. And to become inspired we can learn from a man with an extraordinary creative mind: biologist Jakob Johann von Uexküll. In 1934, he published the book “A stroll through the worlds of animals and men: A picture book of invisible worlds.” It starts with a walk, on a sunny day, into a flowering meadow—humming with insects and fluttering with butterflies. By entering this invisible world, that is “unfamiliar to us but known to other creatures,” we will discover something as manifold and varied as all the creatures living in this meadow-neighbourhood.

As a first step, Jakob recommends us is to blow a soap bubble around each creature in our minds-eye. As he writes: “When we ourselves then step into one of these bubbles, the familiar meadow is transformed. Many of its colourful features disappear, others no longer belong together but appear in new relationships.” By this, “a new world comes into being. Through the bubble we see the world of the butterfly, or of the field-mouse; the world as it appears to the animals themselves, not as it appears to us.”[8] Jacob calls this the self-world of the animal.[9] From his studies of how living creatures behave in their environments, he created the term Umwelt, which is defined as “the subjectively perceived surroundings about which information is available to an organism through its senses.”[10]

Just like Jakob, we can also try to enter the self-world of other beings, by projecting ourselves emphatically into the other side of the transparent boundary separating subjects and objects of research.[11]

7 (Bareksten, 2021)
8 (von Uexküll, 1934, p. 319)
9 (von Uexküll, 1934, p. 319)
10 (Chien, 2007, p. 67)
11 (Espahangizi, 2011, p. 38)

And we are not the first to take inspiration from him. Jacob’s visionary and playful attempts to get to know our non-human fellows have shaped the field of biosemiotics: which is about studying signs, codes, and communication in the biological realm. This thinking has even inspired Artificial Intelligence (AI): that is the part of computer science concerned with designing intelligent computer systems.[12] So, let us now accept the challenge of seeing the world from Jakob’s point of view. If we do the soap bubble exercise when we study organism’s, such as jellyfish, sea urchins, fish, and crabs, we can develop empathy to value the life of marine species beyond commercial interests—and at the same time learn from nature itself to create solutions for co-existence.

For example, these last years I have spent a lot of time looking at seabirds. And I realised that the seabirds outnumber the people visiting the urbanised seaside. From there I started to imagine how it must be to live as a seabird. This left me with the idea that if I were to design a functional landscape in the intertidal space, then I would need to spend more time learning from my feathered friend so that I could enhance the bird-well-being qualities in the area. But, as Jakob writes, we must not forget that all people, including marine biologists, landscape architects and other participants in urban development processes, are enclosed in their individual soap bubbles too.[13] But these soap bubbles are also intersecting and have the possibility to merge. That’s why the first and easiest step on our way to make multispecies neighbourhoods is to start with ourselves, by establishing a deeper collaboration between earth-bound and water-bound fields of knowledge.

If we look at the language of the planning community, they talk about neighbourhoods as social units, generated by social interaction among people living close together. In urban planning textbooks you encounter concepts such as ‘shared space,’ ‘Lifetime Homes Standard,’ as well as the focus on ‘the life between buildings,’ and ‘multi-use.’ By example, this definition of ‘inclusive cities’ made by The World Bank: “To make sure that tomorrow’s cities provide opportunities and better living conditions for all, it is essential to understand that the concept of ‘inclusive cities’ involves a complex web of multiple factors”[14] comprising spatial inclusion, social inclusion, and economic inclusion …

Then when we look from the perspective of marine biology, the scientists recommend to model marine neighbourhoods on the principle of facilitation cascades. This means to safeguard positive interaction between the foundation species, like between eelgrass and blue mussel or mangrove trees and oysters. The marine conservation-biologist Brian Silliman writes: “Foundation species, such as kelps and trees, are defined as organisms that ameliorate physical and biological stress to enhance species diversity and productivity. To date, experimental studies have revealed direct, obligate interactions between foundation species and associated organisms in a variety of ecosystems, suggesting that the presence of a single, dominant facilitator can give rise to an entire community.”[15]

But humans have incorporated a mindset that hampers Futures Literacy, that is to “enhance our ability to prepare, recover and invent as changes occur.”[16]

12 (Barr & Feigenbaum, 1981)
13 (von Uexküll, 1934, p. 339)
14 (The World Bank, 2021)
15 (Silliman, 2021)
16 (UNESCO, 2019)

At school, and when we are educated, we learn too little about the worlds of non-human others. But to reach more inclusive designs for the urban sea areas, we must imagine and familiarise with other species ways of life. We must learn more about what is meaningful to other creatures: how they are attached to place, and how these place-relations carry ingenious stories.[17]

The image of intersecting soap bubbles points to the possibility of crossing borders and merging different worlds—between people, species, and disciplines—and this gives us a possible gateway towards gaining Multispecies Literacy.

PART FOUR | Opportunities in the Oslofjord

The Oslofjord gives us many opportunities to do so. We can also gain experience from other areas where nature does not have enough space to secure its ecological functions. Then it is smart to learn from completed projects from other areas that has the same challenges as the urbanised waterfront of the inner Oslofjord. Yet, there are still few realized examples of holistic practices of enhancing the urban intertidal as a unified landscape—but I can share three super interesting examples.

One example is from Seattle, a seaport city on the West Coast of the United States. Here marine researchers, engineers, artists, landscape architects and urban designers have created a coastal protection structure that welcomes sunlight and wildlife. The innovative habitat-creation is paired with integrated public-realm design—including storytelling about the place historic, present, and future conditions. As such, this seawall both contributes to the health of marine life, and at the same time engages the public in understanding all the issues that are at stake.

Another example is Geneva in Switzerland, where the River Aire is restored by creating a new fluvial geo-morphology based on the diamond-shaped diagram you can see on the screen. As the river designs itself, this renaturing-technique is inclusive towards the river-course evolution. The interplay between the river-bed material and water result in a riverIne-landscape that emerges over time. As such, this project is a marvel in the way in which the design-team honours the waterscape dynamics.

And lastly, in Melbourne Australia, ingenious high-tech artificial nest designs—co-created between biologists, designers, and technologists—have resulted in tailor-made 'kit-homes' for a threatened and homeless owl. The idea came from observing that owls like to nest in empty wood-bound termite mounds. And the new homes were made in a similar way to meet all the needs of a successful bird-lodging. All these examples can be used as role-models for restoration-practices adapted for the Oslofjord.

These projects clearly show that innovation must build upon the exchange between a broad set of stakeholders and professionals—not least the watery world, with its landscape features and inhabitants. We can form a multispecies community of learners by projecting ourselves emphatically into the worlds of the species of the intertidal-zone. From this we can start making livable solutions for homeless marine species.

17 (van Dooren & Rose 2012, p. 3)

One option is to make marine-life friendly structures that provides re-growth opportunities for algae and sessile animals, who stay in one place and really need a clean and healthy habitat. The cascading effects of these new tree-dimensional systems can then again provide shelter and food for other species that have lost their homes. By mapping the habitat needs of wildlife that live in near shore environments, we can build tailor-made housing for many marine creatures, from small barnacle-colonies to larger lobsters.

But in our efforts, we must not forget to include the human neighbours, especially the future generation that will inherit the responsibility of managing the fjord-system from us. A new initiative called the Oslo Fjord School, has taken up the task to engage children and youth in the process of developing and learning from marine nature-based restoration-methods. This is inspired by the Marine Education Centre in Malmö, Sweden. They train young people as Ocean Ambassadors to increase the commitment and interest in the sea, sustainability, and innovation. As youngsters get the opportunity to build a strong relationship with the marine life, they can use their voice to empower their nonhuman marine neighbours.

So, to summarize, in the process of restoring the urban intertidal and help the homeless marine species, it is crucial to also develop a marine-pedagogic program that can encourage and enable the new generation to build multispecies re-search teams. Maybe the marine species cannot learn something directly from us. But we can certainly learn from re-connecting to the cyclic and dynamic nature of ecosystems. So far, I have only mentioned the opportunities. But as the title of this talk suggests, multispeciesness it is not a straightforward task.

PART FIVE | Human-centeredness: our main obstacle in the Oslofjord and beyond

Concerning obstacles, I must mention that, the Norwegian government, who are in power to make change, just launched a comprehensive action plan for the Oslofjord. Although it is packed with measures to reduce human footprints, the plan does not include an active marine restoration plan that puts the needs of all marine species into a holistic strategy.[18]

This gives a clue to the first challenge: if we are to restore damaged habitats, the people in power must see the value of marine life beyond commercial species. And as I see it, the prevailing human-centred world-view stands in the way. In his book "Cosmologies of the Anthropocene," the Norwegian philosopher Arne Johan Vetlesen, claims that human-centredness has become our second nature.[19] Vetlesen writes: "Internalized from early childhood, is a sense of being profoundly different from all other living beings, promoting an ethos of entitlement in treating all such beings as mere means for human ends [...] Owing to its seminal role in guiding all our practices, human-centeredness is one of the most deep-seated and pervasive features of modern culture, and of ourselves as products and reproducers of that culture."[20]

18 (Ministry of Climate and Environment, 2021)
19 (Vetlesen, 2019)
20 (Vetlesen, 2019, p. 2)

Sadly, this worldview leaves behind a future that looks species-poor, more stressed, and plagued. It is a very serious matter. The human species have gone astray and turning the ship around requires efforts from many generations ahead of us. Therefore, it is our greatest task to keep the spirits up: and give the future generations hope, courage, and skills to change the course. The solution is to internalize a multispecies worldview for the next generations: to give the future consumers, leaders, and politicians the opportunity to become practitioners and re-producers of Multispecies Literacy. Remember, that the presence of a single, dominant facilitator can give rise to an entire community.

The second obstacle is the lack of cross-disciplinarity in research. As the examples from abroad show, the nature-based restoration projects all arise from cross-disciplinary co-creation. To make change, we must join forces with a wider range of collaborators than what we do today. We need to be more creative in our diversity and inclusion practices. On our quest to find the optimal ways for building into the blue, we must include the marine nature to act as our mentor.

The third and last challenge is connected to our narrow perspective of time. For quite a while, humans have tended to think in linear ways and with short-term perspectives. But the nature itself operates on longer time scales than our imaginative abilities. And more importantly, we all know that nature operates in circular, organic ways. For example, if we look at the linear processes which rule the public planning and the building industry, this movement looks like a high-speed rail. It is running so fast that no space is left for deviations from the route. There is little room for pausing when new knowledge tells us to take a new path. And there is just as little space to rethink prescribed decisions and solutions. To tackle this, we need a more explorative approach. For example, when it comes to climate and weather-proof urban designs, the ecosystem ecologist William Mitsch encourages us to follow a non-linear mindset and to take nature's capacity for self-design very seriously.[21] This implies to accept that natures processes happen in their own time, and with unpredictable outcomes.

One easily accessible option is to start using the urban development process as a living laboratory. Another step is to become more aware of the signs we receive from other creatures: like their responses and interactions with their habitat over time. By taking the landscape dynamics and the other creatures life stories seriously, we can create better housing and infrastructure solutions for all living beings. And in our explorative work, we must allow for experiments, trial, and error. Just like nature has done before us.

Visual and Sound works

"Our Perpetual Ocean" thousands of ocean currents captured between June 2005 to December 2007 (NASA's Goddard Space Flight Center, Greenbelt 2005-2007).
"Plankton ingesting tiny fluorescent microplastic beads" (Plymouth Marine Laboratory. Published by permission from Verity White/Five Films & Bo Eide © 2013).
"Bleikøya, the inner Oslofjord August 3, 2018"
(Elin T. Sørensen undersea fieldwork © BONO 2018).
"Soft bottom habitat, hard bottom habitat, an urban beach, and an urban hardscape"
(Elin T. Sørensen © BONO 2020).

21 (Mitsch, 2012, p. 11)

"Newly built Fjord City neighborhood and upcoming neighborhood in the Oslo Fjord City"
(Elin T. Sørensen shoreline fieldwork © BONO 2021).
"The inner Oslofjord" (map retrieved from norgeibilder.no February 2020 © Flo/Sørensen).
"Rowing in the inner Oslo harbour" (Elin T. Sørensen undersea fieldwork © BONO 2019).
"Bestumkilen/Frognerkilen 1956—1980—2008—2018" (Elin T. Sørensen © BONO 2020).
Underwater recording from the outer Oslofjord (Published by permission from Kongsberg Maritime Sensors & Robotics 2019, for the project "Frisk Oslofjord"). Trawling animation (Published by permission from NOAA 2019, for the project "Frisk Oslofjord").
"Pacific oysters (*Crassostrea gigas*) an engineer species at the beach"
(Elin T. Sørensen shoreline fieldwork © BONO 2021).
Jakob von Uexküll in his "Mobile Laboratory" in 1914 (Jakob von Uexküll-Archiv Universität Hamburg).
"Soap Bubbles" (Beachfront B-Roll: Free Stock Footage).
"Environment and Umwelt of the sea urchin" (Jacob von Uexküll 1934).
"Environment and Umwelt of the scallop" (Jacob von Uexküll 1934).
"Fjord City neighborhoods" (Elin T. Sørensen shoreline fieldwork © BONO 2021).
"The Elliott Bay Seawall Project"—2013-ongoing (Video-stills from Oldcastle Infrastructure CRH Company. Figure of the construction made by James Corner Field Operations. Patterns and artworks and the Project Art Programming Plan made by Haddad|Drugan 2013).
"Renaturation of the river Aire," Geneva—2002-ongoing (Atelier Descombes Rampini ADR with landscape architects Superpositions. Aerial Works Fabio Chironi).
"Making 3-D printed homes for homeless urban owls"—2020-ongoing (Nick Bradsworth and the University of Melbourne's System Garden 2020).
"Clay Works" The making of imprints from Frognerstranda (plaster works by Jean Waldemar Hoff © Sørensen 2020).
"Clay Works" 3-D printing a porcelain tile (printing and recording by Boris Kourtoukov © Sørensen 2020).
Documentation from "Under/sea" KORO documentary (Produced by True Stories Commissioned by Public Art Norway © KORO 2021).
"SOLARIS Revisited" (Elin T. Sørensen © BONO 2019).
"HAV" soundscape by Torstein Pedersen—Lyd Design © 2020, based on raw material from Elin T. Sørensen's undersea fieldwork. Commissioned by Norwegian BioArt Arena (NOBA) for the exhibition "HAV."

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Episode 2 | Presentation of the Scientific Work

Multispecies Neighborhoods in Urban Sea Areas

INTRO

Welcome to the Public Defence of the doctoral study, my name is Elin T. Sørensen and my work happens at the intersection between visual arts, urban development, landscape architecture, and ecology. My deep interest lies in the interaction between human activity and wildlife—especially with life below water.

As a landscape architect, I started out as a landlubber, and today, all I want is to reconnect with the blue environment. So, let's enter the wonders of the sea, and go behind-the-scenes of the doctoral study's creative processes—its questions, methods, and results: together we will explore new forms of collaboration and a marine landscape architecture.

The next 30 minutes, this talk will take you to the shore and undersea: to the capital of Norway, and its urbanised waterfront. The Fjord City of Oslo is developing along the innermost part of the long and narrow Oslofjord. A coastscape where more than 40 percent of Norway's population have chosen to settle. This is a body of water flowing into the North Sea and the Atlantic—feeding into the Ocean that covers the blue planet.

As the marine researchers tell us, "the Oslofjord is sick, and something needs to be done."[1] And as such, this waterbody's condition is part of a global trend. Over hundreds of years, human influence, like agriculture and industrialisation, has consumed natural habitats to satisfy the voracious appetite of the world's growing cities. Cities expanding into the sea—and changing the shoreline environments. Local divers—who uses the seascape as their favourite recreational space—tell that the altered seafloor and hardened shore looks like a desert. And by submerging myself into this neglected landscape, I too experienced a void: a murky wasteland.

By experiencing the urban waterfront of the inner Oslofjord from an underwater perspective, I have become strengthened in my belief that the ocean and humans are inextricably interconnected. But something is lost, and this made me think about why the landscape and life below water is ignored? And why does the urban waterfront development seem to stop at the piers edge? I think it is because the landscape undersea is unknown to most of us. So, I started to wonder what it takes to inspire people to invest in an invisible world. Therefore, I set out to unify the landscape between land and sea: both in people's imagination and by creating possible solutions for building into the sea in more inclusive ways.

PART ONE | Coastal Ecological Engineering and Nature-based Solutions

If you imagine how urban master plans portray the waterfront: for the most part, the sea is depicted as a blue concealing cover ... and the investigative story of this work started by realizing that the transition between land and sea is a blind spot in the planning industry.

1 (Moland & Knutsen, 2018, translated by Elin T. Sørensen)

It is a knowledge gap that clearly must be filled. To my mind, the most sensible step to take was to try bridging the earth-bound and water-bound sciences and practices.

To get below the surface, I knocked on the doors of the marine biologists. This is how I met Eli Rinde at the Norwegian Institute for Water Research (NIVA). She introduced me to coastal ecological engineering and to cut a long story short, I can tell that today we work as a close-knit team. More, to penetrate the current urban development practices, I have become a landscape activist, performing action research. By re/acting[2] to and with the urban actors, my ideas and pathways have been continuously sharpened against the real world. And to break the ocean's glimmering surface—and to get beyond the usual architectural narratives—I had to challenge my earth-bound senses and step into the sea. This is how snorkelling became my main field method.

One example of the impact of today's human coastal settlement is the fact that more than 60 percent of the natural shorelines of Singapore, China, and the Netherlands are hardened. Actually, all over the world, human coastal settlements have resulted in a uniform concrete and steel monoculture—without any consideration to the marine communities the coastspaces' used to support.[3]

One branch of research that tries to make a difference here is the field of coastal eco-engineering. And these researchers recommend the use of marine nature-based solutions to repair the world's extensively modified coastlines. Inspired from their practices, and eager to learn how to make space for marine life as a landscape architect, I satiated my thirst for knowledge by studying marine ecology: realising how the time-tested life-strategies of wild things can help us to build healthier and weather-proof cities.

Ecologist William Mitsch, for example, highlights nature's ability to self-design as one important approach in solving the mega-scale ecological problems of our time.[4] An eelgrass meadow, for example, is a self-designed neighbourhood for numerous marine inhabitants. The plants give oxygen to the water and keep sediments in place. Other species, such as the reef-building oysters and mussels' filter large amounts of seawater. They provide living space for hundreds of other species, living on or in-between them. Their irregular colonies function as a living breakwater, protecting harbours and shorelines from the full impact of waves.

For my own part, I really felt that I had to try becoming one with the aquatic environments. And therefore, as I told you, I began snorkelling. I just got hold of the basic snorkelling gear: a mask and snorkel, together with an underwater video recorder to extend my eyes. In this way, the world undersea became easily accessible. By seeking to become one with the water—these undersea field-journeys unveiled a myriad of new shapes, colours, and life forms. And guided by the landscape of the intertidal, and its living creatures, the concept of a marine landscape architecture arose. Now—maybe you're starting to wonder how this was put into practice?

2 (Brown, 2014, p. 218)
3 (Firth et al., 2016, pp. 199, 203, 214)
4 (Mitsch, 2012, p. 11)

PART TWO | Synthesising knowledge

If you are a landlubber like me, but nevertheless take the time to study the sophisticated patchwork of the intertidal, you soon discover that each creature has its specialized approach to survival. They prefer healthy living conditions and light is vital to many of them. Also, they need protective shelters, a clean environment as well as food security. To me this sound quite familiar ...

Material properties are equally important in the marine homes: and even colours play a role to the sea dwellers. In California, by example, the marine snail abalone, in their larval stage, live in a remarkable symbiotic relationship with coralline red algae. By the way, this is an organism looking like layers of pink paint splashed against undersea rocks. Like corals, the red algae create a skeleton made of calcium carbonate, giving off a chemical signal. This signal is picked up by the abalone larvae: leading it towards a habitable place to settle and grow into adult form. And before they are ready to eat their usual kelp diet, the tiny abalone even feed on the red algae.[5] Isn't this an intriguing example of nature's self-design and coexistence in a marine neighbourhood?

In Norway, we also have families of coralline red algae, and some of them form communities called a maerl-bed: and as these colonies of small rounded lumps grow and develop, they start looking like underwater 'carpets' of pink gravel. As they form vital micro-habitats to many marine organisms, maerl is recognized as an important marine habitat. Norway's maerl-beds are unique in Europe: and when it comes to maintaining the biodiversity of the Norwegian coast, the marine researchers envision these communities to be just as important as the kelp forests.[6]

But remember, the Oslofjord is sick! And along its urbanized waterfront there is a housing shortage for marine species. The unhealthy situation in the Oslofjord made me eager to help. And the close study of its coastline's geological diversity gave rise to the idea of transferring some of nature's complexity onto the urban shore.

To develop a hands-on method, I joined forces with 3-D expert Ivar Kjellmo, who is an associate professor at Westerdals Department of Film and Media. And together we set out to capture the rocky shore of the inner Oslofjord. We used photogrammetry, which is about extracting three-dimensional information from two-dimensional data: we recorded the local geological diversity through thousands of images and stitched them together into 3-D models. Our co-creation resulted in marine-life friendly architectural elements with diverse textures and structures—ready for production. Today we see a technological development including concrete 3-D printing robotics for onsite applications—such as printing your new home.[7] Digital fabrication represents a revolutionary way to create new architectural designs—and I think this is the beginning of a beautiful companionship between ecology and technology.

In my innovative exploration, I have embraced a collaborative spirit, in which multiple voices are heard, and multiple perspectives are expressed—including marine life. Still, the pressing question is what it takes for real co-creativity to occur?

5 (Vileisis, 2020, pp. 131-132)
6 (Anglès d'Auriac et al., 2019; Omsted, 2018; Rinde, 2018)
7 (Formlabs, 2020)

And from my artistic- and cross-disciplinary research, I have learned that during a project-development process, it is essential to sow ideas as seeds and let them grow at their own pace. By sharing, thinking, and creating solutions together—through a slow, organic process—the participants are given the opportunity to develop trust and interdependency, which in turn act as a strengthening relational glue. For example, marine biologist Eli Rinde and I, experienced a breakthrough in our collaboration when she joined the artistic experiments. I think the open-mindedness of both of us made it possible for our professional worlds to melt together.

As an artist, I have experienced that art opens other types of possibilities. In my eyes, this is one of the greatest potentials of using artistic methods in urban development. Artistic methods are process oriented, open ended and experimental. The goal is not to give a "right answer", but to let fresh, visionary, and surprising thoughts enter. Art director Anne Beate Hovind, claims that art can influence one individual, and even an entire generation, and work as a catalyst for change. Art, and artistic methods, can connect you to your senses, body, and mind, and make the world *felt*.[8]

With the art exhibition "HAV," I sought to evoke the spatiality of the undersea landscape and the wonders within this hidden, fluid realm. As you can see in the short video, the exhibition has many co-creators: from barnacles to marine biologists, porcelain, sugar kelp, saltwater, geologists, shore crabs, tube building annelids and many more.

PART THREE | The Way Forward

By moving between land and sea within the urban context, ideas have been collaboratively produced and revised to yield the best possible results. Some of the things I have accomplished by this work is to establish deep co-creational ties. From this, a community of learners have emerged: seeds are growing, and we are many blue stewards that will take the work further … Still, many questions remain to how we can create livable marine neighbourhoods—and let the many different life forms flourish in the city?

Throughout this work, nature has been my mentor. In this respect, we can learn a lot from the blue forests. The blue forests make up three-dimensional bio-systems: offering shelters, local food suppliers, nurseries, and caretaker services—even graveyards. I imagine the blue forests as living multi-dwelling units, representing the life-time home standard of the sea. This insight forms the basis of a participatory method that aims to improve the cohabitation between land and sea dwellers. By including all the users of the shore habitat, a myriad of species emerges in the neighborhood. This is a diversity worth knowing. Especially when we need to take care of a complicated and complex biological world.

To take care of the diversity undersea, I think it is essential to invest in Ocean Literacy. Therefore, to facilitate close encounters between the amazing microcosm of the intertidal and children, is my attempt at taking a practical approach towards the multispecies perspective—which means to show care in the interaction between humans and non-human others.

8 (Hovind, 2019)

To put this into further practice, we are a bunch of ocean enthusiasts having established a Fjord School. The vision is to build up young people's empathy for marine nature: to nurture hope and lasting commitment that can unleash the power to create future ocean-improving projects.

But there is still a lot of work to do. So far, the blue common is not yet acknowledged as equal to the parks and public green spaces on land. Coastal eco-engineering is still in its infancy and there are many limitations and unknowns to this practice.[9]

In dreaming of a brighter future, my hope is to become part of a long-term re-search project that happens as a one-to-one experiment—on location. To be involved in placemaking where the restoration of the urban blue is based on learning from local marine communities and landscape dynamics. To make human-built environments that coexist with living systems. To make shared housing that connects us all in diverse marine neighbourhoods. To achieve this, it is important to make sure that many dedicated communities of learners can emerge. Long-term perspectives and slow time matter. Good relations matter and the partner we first and foremost must come to terms with is nature.

I'd like to end this story by quoting ecologist Carl Safina, he writes: "Endangered species and wild things need us to care for them not selfishly but selflessly, for their sake, the sake of everything and everyone who is not us, for the sake of beauty and all it implies."[10]

Let's rethink our built environment, both on land and undersea.

Let's make room for everyone—let's make Multispecies Neighbourhoods.

Visual and Sound Works

"Our Perpetual Ocean" thousands of ocean currents captured between June 2005 to December 2007 (NASA's Goddard Space Flight Center, Greenbelt 2005-2007).
"Plankton ingesting tiny fluorescent microplastic beads" (Plymouth Marine Laboratory. Published by permission from Verity White/Five Films & Bo Eide © 2013).
"The Oslo Opera House and Sukkerbiten, the inner Oslofjord"
(Elin T. Sørensen undersea fieldwork © BONO 2019).
"The inner Oslofjord's glimmering surface" (Elin T. Sørensen shoreline fieldwork 2017).
"Bonnebukta, the inner Oslofjord August 26, 2018"
(Elin T. Sørensen undersea fieldwork © BONO 2018).
"Lohavn/Sørenga, the Oslo inner harbour September 19, 2018
(Elin T. Sørensen undersea fieldwork © BONO 2018).
"The Koster Islands in Sweden August 18, 2019"
(Elin T. Sørensen undersea fieldwork © BONO 2019).
"Håøya, the inner Oslofjord August 4, 2018"
(Elin T. Sørensen undersea fieldwork © BONO 2018).
"Arendal, to the southeast by the Skaggerak August 15, 2018"
(Elin T. Sørensen undersea fieldwork © BONO 2018).

9 (Firth et al., 2020; O'Shaughnessy et al., 2020)
10 (Safina, 2019)

"Coralline red algae at the rocky shore of the inner Oslofjord"
(Elin T. Sørensen shoreline fieldwork © BONO 2021).
"Maerl-bed from the island of Vega, in Nordland county, Norway"
(Eli Rinde NIVA undersea recording 2020).
"From the 3-D animation "In Search for a Marine Landscape Architecture"
(Ivar Kjellmo & Elin T. Sørensen © BONO 2020).
"The Shore Crabs at Solbergstrand" (Elin T. Sørensen undersea fieldwork © BONO 2019).
Documentation from the exhibition "HAV" (Produced by Inspire to Action & Norwegian BioArt Arena 2021).
"Blue Forest by the small island of Ona in Møre og Romsdal county, Norway"
(Hartvig C. Christie NIVA undersea recording 2019).
Documentation from "Under/sea" KORO documentary (Produced by True Stories Commissioned by Public Art Norway © KORO 2021).
"HAV" soundscape by Torstein Pedersen—Lyd Design © 2020, based on raw material from Elin T. Sørensen's undersea fieldwork. Commissioned by Norwegian BioArt Arena (NOBA) for the exhibition "HAV."

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