How should we live not just by the sea but with the sea?

Urban Seascaping

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> [S]patial design disciplines understand space as a relational structure, by going beyond dualisms such as city – country, natural – artificial and placing the focus on the relations between humans and things and their dynamics.
>
> Sigrun Langer, Mapping as a navigational strategy (Langner, 2019, p. 51).

The coastline is a contested site between human and nonhuman forces. Due to the worsening impacts of climate change, the sea is encroaching on our coastal cities in the form of sea level rise and storm surges. For the creative spatial disciplines, designers are increasingly asked to address future scenarios with the growing presence of water and other interconnected issues, such as biodiversity loss and increasing water pollution due to anthropogenic activities. The complex entanglements between land and sea and human and nonhuman agencies pose challenges that require a new way of thinking and doing in increasing transdisciplinary complexity in the Anthropocene. In response, I explored these wicked problems in my PhD research with the Aarhus School of Architecture during 2019 to 2023 called "Urban Seascaping". It is a critical design proposition and initial hypothesis to integrate marine nature as an integral part of place-making. Urban Seascaping is a new neologism and an ode to the forgotten world below the sea, by presenting seaweed as one of the key ambassadors to bridge the physical and cultural chasm that currently segregates our cities from their neighbouring sea.

Therefore, as a researcher in this emerging field of blue urbanism and marine landscape architecture, I proposed four main design propositions (see Figure 1) to help other practitioners, researchers, students, developers and politicians explore the potential of integrating seaweed to re-envision alternative waterfront developments and coastal adaptation strategies in a wetter future.

Proposition I: Multispecies coexistence (with seaweed)

The first proposition of Urban Seascaping emphasises the need for a paradigm shift in the current view of the sea as a threat. Currently, the needs of humans and nonhumans seem to be in direct conflict with each other in urban environments. The first proposition thus seeks to reorient the dualistic, anthropocentric, and capitalist worldview toward one that recognises that nonhumans and humans are intimately linked and mutually interdependent. To this end, Urban Seascaping draws on *Multispecies Urbanism* by Debra Solomon (2020) to explore alternate ways to integrate nonhuman marine life forms into coastal cities. This means asking questions about how designers and planners can create coastal cities for the occupation of both human and marine lifeforms as a form of multispecies coexistence.

Marine stewardship and ocean literacy

However, to coexist does not simply mean to occupy the same space. It would be naïve to suggest that urban design and coastal landscape architecture alone would resolve the current nature-culture divide at the coast. Marine biologists, researchers, climate activists and people who work with ocean advocacy emphasise the critical role of creating a community around ocean literacy parallel to material initiatives (Hjerl, 2019; Kelly et al., 2022; Mouritsen, 2019; Palmgren, 2019; UNESCO, n.d.). These include marine education centres, community outreach programs, marine restoration projects, sea gardens and cultural initiatives with sea food. Here, seaweed plays a strong role as marine vegetation to influence sustainable food culture and educational opportunities. Local educational outreach programs for young students are essential as this generation will likely face the consequences of global warming and sea-level rise in this century. Therefore, the role of these initiatives is to help people develop "an ethical lens that extends beyond human self-interest" (Beatley, 2014). Hence, Urban Seascaping's first proposition of multispecies coexistence reflects the model of stewardship, which advocates integrating educational, restorative, and cultural initiatives with coastal urban seascape design interventions to help nurture and sustain the design interventions.

Proposition II: Invite the agency of the (rising) sea

Water as a connector, an actor, a living entity

Humans have conceived the sea in many different ways, and these conceptions influence how we shape our urban coastal environment. For more than a century of human history, the industrialised nations exercised a superior position of ownership and management of the water by expanding coastal cities into the sea. The typical physical design of the urban shorelines reflects this sentiment, as it demarcates a clear delineation between land and sea through land reclamation and hard edges. However, there are alternative ways of regarding this dualistic relationship manifested in physical form. For instance, alternative notions such as "archipelagic thinking" dissolve the divisive hard boundary between the sea and land by conceiving the water as a connector (Pugh, 2013; Shields, 2020). By developing this type of interconnected thinking, the second proposition of Urban Seascaping highlights that there is scope for new urban shoreline spaces to use the agency of the water as a connector where human and nonhuman actors can interact and develop over time. Moreover, Urban Seascaping seek to take departure and inspiration from alternate worldviews that acknowledge the agency of water bodies, such as seeing the water as a living entity by the indigenous Māori people of New Zealand (Rodgers, 2017; Te Awa Tupua (Whanganui River Claims Settlement) Act 2017), and New York City's proposal to include the coastal water bodies as a "Sixth borough" with legal representation and frameworks (Ameel, 2019b). Therefore, the second Urban Seascaping proposition seeks to depart from the current dominant utilitarian worldviews of water in the way we make decisions at the coast to one that also includes intrinsic value of water – to consider wellbeing of marine ecosystems for its own sake.

Wet territory as the new blue commons

The second Urban Seascaping proposition departs from the view that the sea is a key actor and a spatial design driver to influence the meeting place between humans and nonhumans, city, and sea in an increasingly wet reality. Therefore, we need to ask how much wetness we are willing to accept as the new reality of living in the Anthropocene. Many high-risk areas in coastal cities may need to be relocated to higher grounds by the end of the century. These vulnerable low-lying areas left behind after relocation provides a unique opportunity to experiment with – new blue urban commons (see Figure 2). Therefore, Urban Seascaping suggests making these risk areas available as a public space for both human and nonhuman interaction that provides new opportunities to design softer edge conditions that can cater for more dynamic movements of the sea. These zones can better respond to tides, periodic flooding, and long-term rise in sea levels that could aid the citizens in understanding the ephemeral nature of coastlines and more fluid notions of boundaries beyond the current hard, concrete edge conditions.

Proposition III: Beyond the edge (to a zone)

Seaweed as part of a marine nature-based solution

The third proposition of Urban Seascaping seeks to address the unexplored solution space (refer to Figure 3) by going beyond the dominant defence approach of sea walls and pumps to one of adapting to the changing conditions of the sea.

Going beyond the edge means thinking of it spatially as an interconnected zone. Marine nature-based solutions require a vast area to achieve a significant level of wave attenuation, carbon sequestration and water filtration. Therefore, coastal protection/adaptation should not be limited to the narrow boundaries of the urban shoreline edges but expand to a zone to address the interconnection between land and water. It means conceiving the site of intervention as a series of networks from a multi-scalar approach (i.e., macro to micro level). For instance, seaweed has two main potentials as part of a marine nature-based solution. First, to perform wave attenuating properties as the first line of defence for coastal cities. By the time the attenuated waves reach the coastal city, it reduces the need to implement harsher hard approaches to coastal protection, such as higher sea walls that sever the connection to the water. The wave attenuating capacity can only be performed by kelp forests (brown seaweed species) that inhabit deeper, colder, and saltier waters out of human sight (see Figure 3). Kelp can be grown on floating buoys and lines (or on rocks) as a potential method to simulate a dense kelp forest for coastal protection that will correspond to a rise in sea level in the future due to its buoyancy.

Moreover, other smaller and more beautiful seaweeds that grow near the shallow coastal shorelines can be integrated as an urban design element, e.g. "sea gardens" to be the new residents due to the encroaching sea (i.e., a new blue urban commons). These sea gardens need to provide an opportunity for citizens to engage with the sea and its lifeforms to envision them as an active part of the physical, ecological, and aesthetic coastal cityscape. These new blue urban commons should a place of tactile exposure, observation, and interaction with marine nature, but also a place that challenges our everyday terrestrial experience of the sea.

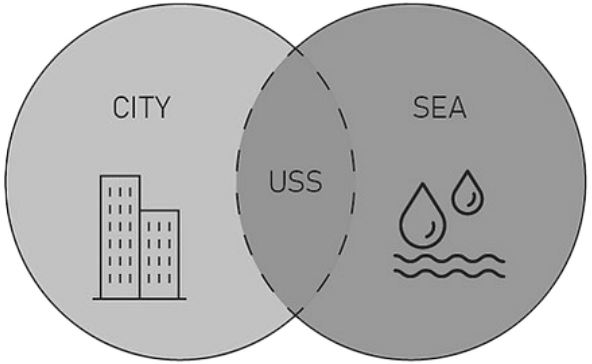
Proposition IV: Making the invisible visible

Seaweed as the visual and ecological symbol of coastal urban transformation

The fourth and final proposition is to uncover the beauty of the invisible marine realm into the visible urban realm using seaweed as a symbol of urban transformation in coastal cities. Urban Seascaping advocates going beyond territorial favouritism to extend solidarity towards the marine lifeforms by making them a key part of the identity of coastal cities. In spatial terms, it means to undo the current lack of exposure, understanding, inaccessibility and dualistic separation in coastal cities make the marine realm perceivably invisible. This also extends to departing from the current conventional visual depictions of the sea as largely dark, abstract, flat, that is devoid of the complex realities of life below the sea.

Moreover, the continued anthropogenic activities such as the fertiliser runoffs from agriculture have made the world under the sea more invisible in a very literal sense (i.e., poor water clarity). To remediate the continuing degradation of the marine realm in coastal cities, the fourth proposition calls for coastal cities to bringing the invisible marine realm to the visible realm by providing better protection and restoration of coastal ecosystems and address various anthropogenic pressures, such as water pollution, ocean sprawl and climate change. This extends to including marine actors in the design decision-making processes of urban development, where human delegates represent nonhuman interests and wellbeing. Without addressing these barriers to coastal ecosystems, marine life forms will have difficulty becoming co-residents in coastal cities.

> By turning our gaze not just on land but also below the water, we can finally start to conceive the invisible, visible.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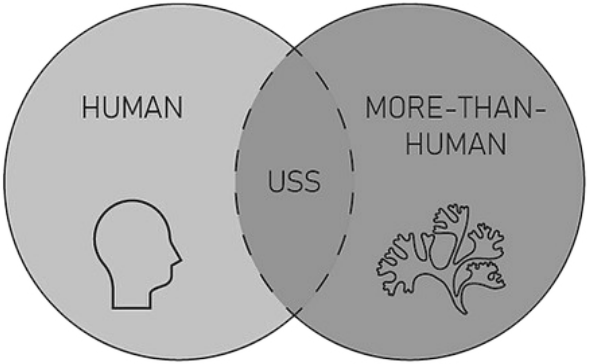
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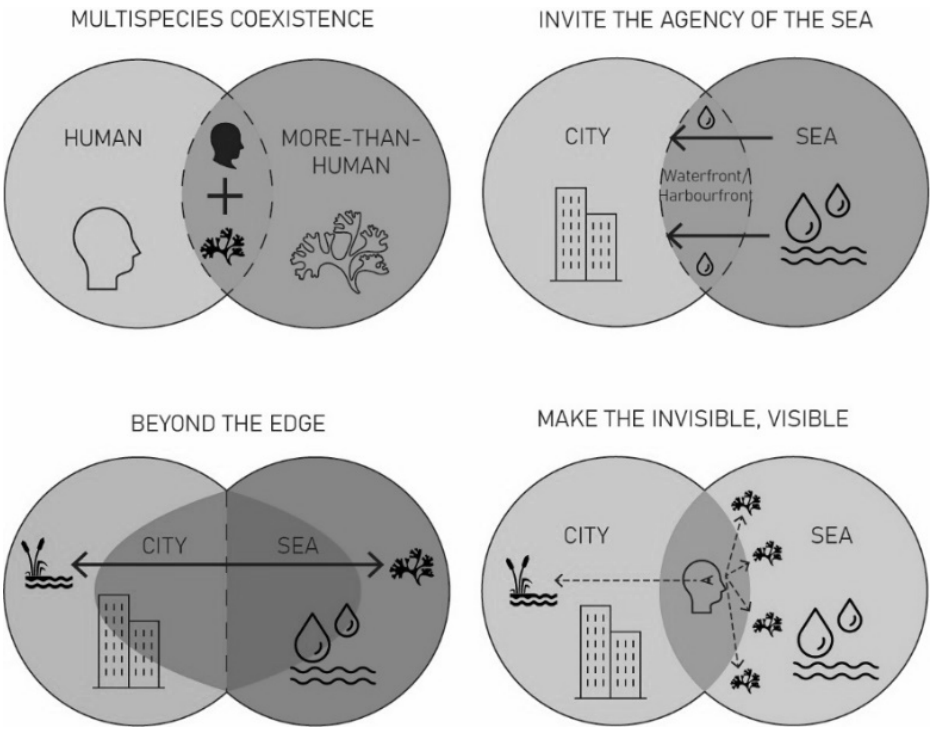

Figure 1. The four main Urban Seascaping design propositions.

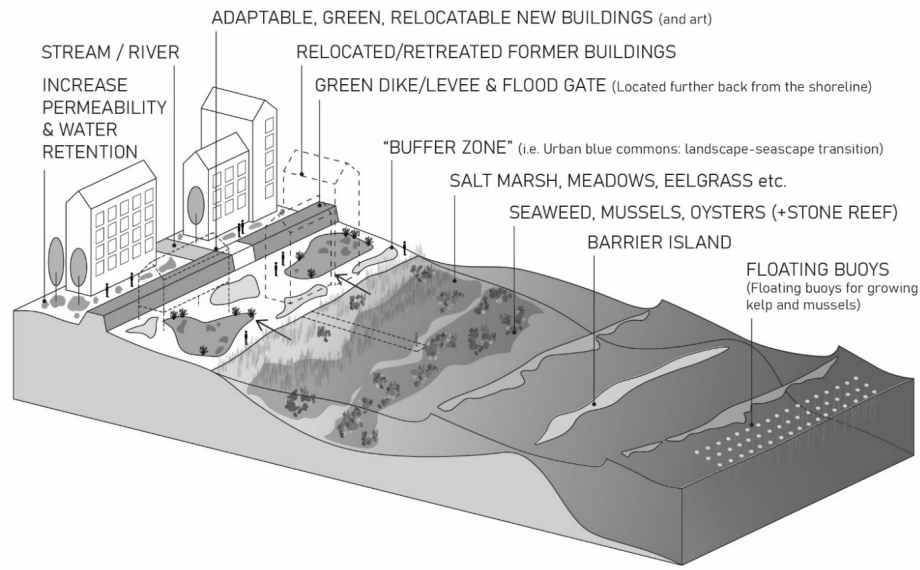

Figure 2. Illustration of the various ways to incorporate more marine nature-based approach to rethinking the boundary between the city and sea. The illustration is not to inform final design-specific solutions, but a general approach developed for this research (based on Sutton-Grier et al. (2015)).

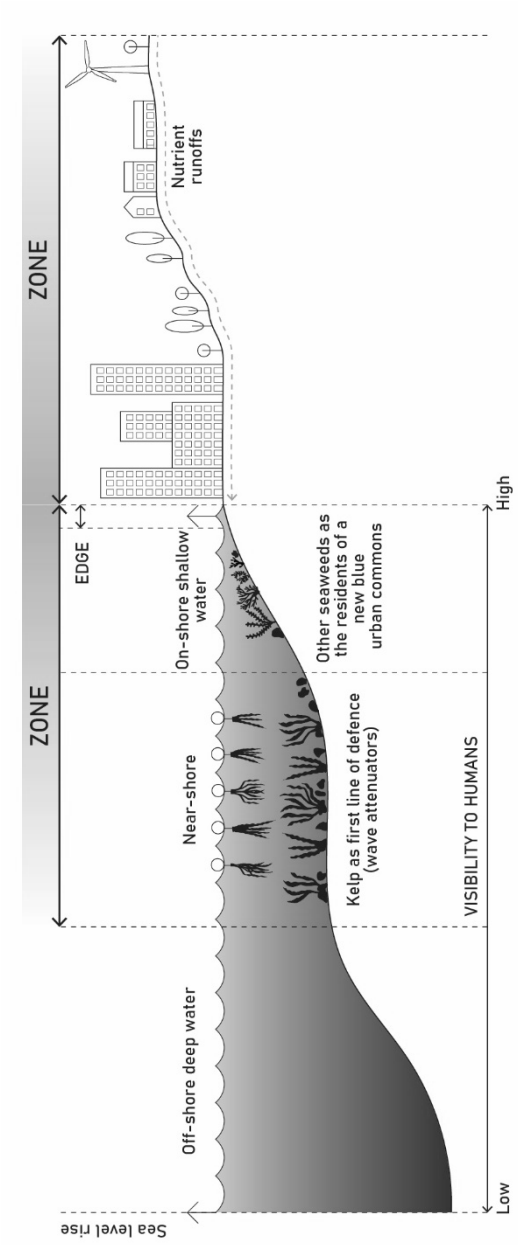

Figure 3. A diagram that illustrates thinking beyond "edge" conditions of the urban shorelines to a "zone" when considering the sea and its marine lifeforms as part of coastal adaptation strategy. The zone stretches further in land with its connection to the river valleys that eventually joins the sea. Moreover, the zone stretches further out into the deeper, colder and saltier waters where the kelp (brown seaweed) forests reside. While kelp forests inhabit the "invisible" underwater, they act as a first line of defence against storm surge via wave attenuation. In contrast, other seaweeds near the urban shorelines in the intertidal areas serve as a marine resident to the new blue urban commons in the waterfront. It is a new urban typology where marine life forms have a space and strong thriving presence as a key part of a coastal city.

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