

Building Material 24

Topography

Shifting coasts: Developing New Coastal Concepts

Coastal environments are closely under the radar of the impact of climate change. Approximately 680 million people live in low-lying coastal zones according to the most recent Intergovernmental Panel on Climate Change (IPCC) report from 2019.¹ The report presents key threats to coastal environments that include permanent submergence, more frequent and intense flooding, loss and change of ecosystems and the salinization of the ground. In arctic and sub-arctic regions, thawing permafrost has weakened coastlines resulting in accelerated coastal erosion. In addition, the reduction of sea ice has left coasts in these regions without a buffer to protect them against severe wave erosion. The report concludes with certainty that coastal environments, especially in low lying regions, have challenging futures ahead. Designers and artists are reacting to these changes. Many competitions, exhibitions and art installations relating to threatened coastal environments expose this contemporary trend. *Some* notable examples include the *Rising Currents: Projects for New York's Waterfront* exhibition at MOMA in 2010; *Boston: Living with Water* competition from 2015 and in 2019 a light installation highlighting future sea levels called *Lines* on the island of

Uist in the Outer Hebrides.² A recent architectural design competition called *Warming: Architecture for a Warming Climate* dared competitors to 'Imagine Miami Beach permanently underwater... and heat waves that render Barcelona unlivable. A future like this currently occupies our imagination but inches closer to reality each day'.³

These realities concerning the effects of climate change are unfolding rapidly across the globe. This paper seeks to examine how architects and landscape architects can respond to such change when environments that are conventionally regarded as stable and secure have become more fluid and uncertain. I begin in the first section of this paper by taking a critical reading of terrestrial words that are commonly used in architecture and landscape studies and highlight the problems that arise when they are applied to coastal environments. To counter the persistence of projecting such words onto coastal descriptions I suggest that it is time to look outward towards the sea in order to develop new modes of thinking and theorizing about our coasts. After all, as the early twentieth-century American biologist Rachel Carson wrote 'the shore has a dual nature, changing with the swing of the tides, belonging now to the land, now to the sea'.⁴ Attention towards the sea is emerging as a renewed field of interest in geographical enquiry. Many scholars, such as geographers Kimberley Peters and Peter Steinberg, argue that 'the sea provides a unique space for developing an understanding of fluidity'.⁵ This involves new practical and theoretical perspectives that consider spatial, temporal and material dimensions of more fluid future environments.

It is through an enquiry of these words that I propose two overarching coastal concepts in the second section of this paper. These concepts are a way of developing potentially

new modes of thinking and theorizing about coasts. These sea-orientated concepts have the aim of re-orientating and reimagining our dialogue with coastal environments in order to design and adapt for unpredictable futures. The first concept refers to the materiality of coasts as porous and elastic intermediary spaces where human and non-human participants engage. The second concept serves to articulate the dynamic and multi-temporal complexities of coastal environments with particular emphasis on unpredictable futures.

The final section incorporates the two suggested concepts through textual and illustrative means. The complexity and site-specificities of coastal environments will be explored through the coasts of three Norwegian Arctic islands - Jan Mayen, Bjørnøya and Hopen. Of particular interest is the rich and varying materiality of these coasts and the local conditions that influence their compositions and forms. These examples demonstrate the influence of the sea upon the materiality of these coasts. Through a descriptive analysis of these photographs, a glossary of words implicitly emerges to assert the specificities inherent to these coasts.

Terrestrial concepts and the coast

'I stood looking out over the undulating plain with its endless lines of wild white horses with tossing manes, and watched the interminable rollers surging up from the west...'.⁶ This is an excerpt from the account of Norwegian explorer Fridtjof Nansen when he journeyed along Greenland's eastern coast in 1925. What is of particular interest is his comparison of the sea to the land. The sea is transformed into an 'undulating plain' while the waves become 'wild white horses'. Later on, he compares glaciers to 'snow-clad islands'.⁷ In his efforts to communicate what

the open seas and the Arctic looked like he resorted to using comparable descriptions to which his audience could more easily relate.

Nansen's use of terrestrial words to describe the sea is not uncommon. The glossary of words, definitions and descriptions that we place on land is broad and, in Nansen's case, adapt easily to the sea. These words evolve and adapt as users challenge them for different reasons over different periods of time. *Topography* is one such word. The dictionaries state it is a noun describing the physical features or relief of an area. Professor of architecture, David Leatherbarrow extends topography's physical association by returning to its ancient Greek origins that may be translated as 'writing the site'. He explains that 'topographical inscriptions do, indeed, give evidence of previous enactments but they also indicate those that are still occurring and that may unfold in future'.⁸ Leatherbarrow re-introduces the temporal aspects of topography back into its original meaning. In doing so, topography inherits a performative and active role and accommodates its constantly changing formations.

The metaphor of palimpsest is another word commonly referred to in landscape discourse. Geographer Richard Muir describes the original meaning of palimpsest 'as a parchment from which earlier inscriptions have been erased to make space for new writing, but on which the older writing is still faintly visible'.⁹ This has been translated to describe the organisation of landscape as a chronological accumulation of material layers that mark different events and traces of present and past users.¹⁰ Although this is a very simplified way to describe the earth as neatly and chronologically layered it reduces the landscape to an order that does not necessarily exist. Archaeologist Oscar

Aldred points out that 'the way in which accumulation takes place is not in terms of layers but a complex mix of use and reuse, making and building'.¹¹ In this sense, the historical aspects of the landscape are not regarded as passive layers but agencies that shape and influence present and future landscapes.

A third conceptualisation of landscape that I wish to draw attention to is *topology*, developed by landscape architect Christophe Girot.¹² Topology's Greek origins *topos* (place) and *logos* (language) have been adopted in mathematics to describe a connected or continuous surface. However, Girot's meaning is about 'developing a new set of disciplinary tools capable of responding fully to a continual terrestrial situation'.¹³ Girot's topology incorporates the physical, technical, ethical, aesthetic, cultural and temporal dimensions of the land.¹⁴ Like Leatherbarrow, Girot also pays attention to past traces and marks on the land. Geographer John Wylie provides further insights into the meanings of topology when he develops the idea of connections being woven through space and time where 'relations come before positions'.¹⁵ Wylie's reflections help to break down the conventional definition of topology to one that serves today's needs and concerns and that considers the complexities of connections and relations.

While Leatherbarrow, Aldred and Girot's contemporary interpretations of ancient concepts and words develop our understanding and theorizing of the land, the application of their readings becomes slightly problematic in a coastal setting. *Topography, topology and palimpsest* are terrestrial words and metaphors that refer to stable physical environments. This is not to say that the land is fixed but as geographer Jon Anderson states, it is 'stationary in terms of their grid reference and location'.¹⁶ In coastal

environments and particularly those that are under severe threat of erosion, submergence or flooding, traces from the past disappear from view, dislodge or transfer to another place and perhaps in a different form. These environments are constantly in motion and are increasingly regarded as fluid rather than fixed. Architect and cultural geographer Anna Ryan describes how the ‘coast has long struggled with an illusion of it as being fixed and permanent in nature, a concept alien to its essential mobility’.¹⁷ This compels us to reconsider how we define coasts and the meanings attached to such spaces.

Developing new coastal concepts

What would happen if we instead viewed the land from the perspective of water? What would happen if we wanted to see similarities and overlaps between land and water, rather than distinctions and boundaries?¹⁸

Philip Vannini and Johnathan Taggart pose two very interesting questions to their readers. Their questions require a shift in perspective and one that places the reader in a more unfamiliar, aqueous environment. The distinction and boundary between the land and water varies enormously depending on the type of coastline one finds oneself in. On many contemporary cartographic representations of the coast, however, the distinction is very apparent. Often, a coastline is represented as one line that neatly separates the green and brown hues of the land from the blue water. It is a matter of concern and frustration for those working with or studying the coast because this line does not exist in reality. As architect and landscape architect Dilip da Cunha and Anuradha Mathur explain ‘...not only are these lines everywhere, their presence is taken for granted as natural’.¹⁹

Writer and map maker Tim Robinson gives practical insights into the challenges of map-making and cartography. In the creation of his maps of the Aran Islands, he resists drawing a line to represent the coast. Instead, he recalls his experience of these places – ‘I relived with my pen the hourly give-and-take of land and sea’.²⁰ The practice of map-making was, for Robinson, ‘tentative and instinctual’ that led him to have an intimate understanding and knowledge of the islands’ coasts.²¹ Time is richly enfolded in his maps where the delicate hand-drawn textures effuse a sense of impermanence. It is a reminder of the traces on the landscape that Leatherbarrow refers to whereby the dense materiality of the coast leaves its physical inscriptions. However, Robinson was very aware that the materials captured in his cartographic representations were constantly shifting, disappearing and reappearing under the powerful forces of the Atlantic Ocean.

With the increasing trend for architects and landscape architects to work with coastal environments, there appears to be an inclination to adopt ecological terminology such as adaptation, succession, resilience, ecosystem, conservation, etc. This is clearly demonstrated in the work of SCAPE landscape architects,²² the writings of Chris Reed and Nina-Marie Lister,²³ and the research of Bradley Cantrell and Justine Holzman.²⁴ This ecological approach benefits process-orientated design and indeed favours the more-than-human actors and agencies in a place. However, I would argue that emphasis is placed more on the resiliency and robustness of the land rather than its fluid connections with the sea.

I propose a shift in perspective from the terrestrial-centric thinking towards the sea through two concepts. These concepts are situated in both a theoretical and

applied approach to re-thinking and re-knowing coasts as designers. The first sea-orientated concept that I refer to is *re-materialising our relationship with the coast*. This concept draws attention to our relational and material engagement with coasts and calls for consideration of the non-human agencies shaping our coasts. The second concept, *re-conditioning our approach to coastal change*, confronts the chaos of coastal spaces and turns towards an anticipatory approach to coastal futures. The concepts may be regarded as generative principles to work from rather than a conclusive framework.

1 Re-materialising our relationship with the coast

Unlike the flat, two-dimensional blue plane that we are familiar with on maps, the sea stretches horizontally and vertically. The seabed is as diverse as the physical undulations on land. Unlike the surface on land, however, the seas and oceans are constantly in motion, steadily moving with the currents and tides. There is a constant interaction and flow with the conditions in the air and the land. This gives the ocean a dynamically shifting character, shape and form. David Lambert et al. encourage ‘...consideration of the relationships between different elements and materials - water, wind, wood, salt, cloth, metal, coal, rope, plastics - and the cultures of nature that combine them within different practices and technologies’.²⁵ These connections and relationships are constantly in processes of assembling and disassembling.

In the seas and oceans, the metaphor of palimpsest is defied. Along a coast, the tides deposit materials that spur the imagination as to their origins. Lighter materials such as shells, dry seaweed and plastics often gather in striated accumulations parallel to the sea. One can observe the

different local seaweeds and organisms intermingled with plastic debris. The gentle and powerful forces of the sea leave behind traces along a coast creating an interface between the human and non-human. Historian Michael Pearson maintains that the coast presents a material world that is porous, elastic and unbounded.²⁶ The materials that we encounter along a coast acquire new values and meanings when we consider how they relate to the coast they inhabit. As designers, we can interpret new roles that these materials bring to a coastal site and find ways to negotiate between the human and non-human. Conceiving the coast from a sea perspective positions non-human objects or organisms into a more active role rather than assigning them to a passive backdrop of an anthropocentric world. Through this concept attention to local specificities are prioritized through engagement with both the sea surface and the depths below. By re-considering and accepting the chaos of materiality and the inevitable changes to our coasts designers may open up to new ways of knowing coasts, as illustrated in the proceeding section *Coastal specificities*.

2 Re-conditioning our approach to coastal change

Unprecedented changes being experienced along coastal environments around the world, and predictions of worsening conditions, are generating feelings of anxiety. Some notable examples are from Arctic environments such as the re-location of the Alaskan village of Newtok due to coastal erosion and thawing permafrost.²⁷ Climate-related anxiety relates strongly to unpredictable events. The concept of unpredictability, according to philosopher Elizabeth Grosz, generates words like uncontrollable, unsettled, upheaval and disorder.²⁸ To counter the negativity surrounding unpredictable futures she suggests

engaging more openly with time and duration, with the acknowledgement and acceptance of undetermined futures. Grosz highlights the natural sciences, and biology in particular, with regard to approaches that work with open-ended, random and transformative processes such as mutation and metamorphosis. A study undertaken by anthropologist Mark Nuttall examined the effects of a warming climate on Greenlandic indigenous people living along vulnerable coasts. To confront unprecedented change he proposes an ontology of anticipation claiming that ‘while adaptation is largely about responses to climate change, anticipation is about intentionality, action, agency, imagination, possibility, and choice; but it is also about being doubtful, unsure, uncertain, fearful, and apprehensive’.²⁹ Nuttall also asserts that anticipation is relational ‘in the sense of connecting several points in time’ echoing Wylie’s position on topology.³⁰

Moving more specifically to the more-than-human actors of the coast, archaeologist Þóra Pétursdóttir discusses material futures and the role of drift matter or seaborne debris along coastal environments of Iceland and northern Norway. The random materials washing up along the shores ‘are seen as out of place, control, and context – as mistakes, intruders and pollutants overriding the trajectories and destinations defined and anticipated for them’.³¹ Similar to Grosz, she confronts notions of randomness and chaos. She challenges coastal heritage approaches of preservation and curation which are modes of ‘tidying up’ and ‘making sense’. The accumulation of drift matter along coasts is approached through a sense of open-ended futures. Rather than invite a new way of *thinking* she proposes a new way of *knowing*. This is done by engaging with time and coastal processes that condition the future of these materials. Grosz, Nuttall and Pétursdóttir offer theoretical modes on how to break down

the apparent resistance that exists in accepting unpredictable futures. This is particularly useful in the context of coastal environments that are already enduring such futures. The images illustrated in Figure 2 in the preceding section illustrate the diversity and vulnerabilities of Arctic coasts. The changes to these coasts are happening under an accelerated warming climate which forces a re-assessment on how we think about time and manage its material consequences. This applies to coastal environments all over the world especially those in low lying areas.

Coastal specificities

To illustrate the diversity of Arctic coasts I will apply photographic and descriptive methods. While photography is regularly employed in architectural enquiry and practice, written accounts documenting what is seen and experienced is less common. However, there are interesting examples of how to engage with words and texts as tools to elevate the spatial, material and temporal specificities of a site. The office of landscape architect Günther Vogt, for example, employs a glossary of terminology to ‘enrich our design vocabulary’.³² As a designer, Vogt has extensive knowledge of the diverse materials he works with as well as the agencies that condition them. On a broader scale, landscape architect Jane Wolff pays close attention to words and language in her study of San Francisco Bay. Here the bay ‘demonstrates a problem ubiquitous in contemporary landscapes: it defies the vocabulary we’ve inherited for describing the world around us’.³³ Wolff brings to the fore the inadequacies of terrestrial vocabulary being applied to coastal environments. Concerns relating to environmental change and local perceptions of San Francisco Bay prompted a reassessment of the language that is used to describe the bay. She suggests the use of a lexicon to incorporate words

used to specifically describe the bay and the perception of its users. Wolff explores how these meanings and perceptions differ from various user groups – from casual users to politicians. The lexicon she proposes offers a means to communicate more fully the meanings that the bay holds today as well as developing language for the future. Wolff's work provides a useful approach on how to reassess our connection with coasts and the potential to change the language we use to describe them.

The experiential connection to landscape, linking photography and text, are highlighted in an essay by Johan Ottosson. The rehabilitative dimension of the landscape is experienced first-hand by the author. He identifies how the seasonal fluctuations in a Swedish landscape conditions the materials he encounters and the feelings that are evoked as a consequence of these changes. Ottosson draws attention to the importance of a multi-sensory engagement with the landscape:

Out in Nature – to which people have been attuned since time immemorial – we experience more basic sensations and we perceive more basic signals that penetrate more directly our psyche.³⁴

Also of interest is artist Richard Long who utilises words to reinforce the material and experiential facets to his walking artworks. His walks are often transformed into what he calls *textworks*. Creating specific vocabulary for a project and/or experience both enriches the engagement with a site and gives attention to site-specific materials and processes that may be otherwise overlooked. Horst Ruthrof adds that there is also non-verbal engagement with landscape that cannot be fully articulated through textual representation but is crucial to recognise as a way of knowing the world.³⁵

To convey how photography and text articulate coasts in different yet connected ways, I present a study undertaken on the Arctic islands of Jan Mayen, Bjørnøya and Hopen in 2018 (Figure 1). The photographs in figure 2 are part of a larger study that investigates multi-sensory engagement with the material and temporal aspects of these Arctic coasts which are experiencing physical transformations that are linked to climate change.³⁶ This exercise is a means to activate the concepts that I proposed in the previous section where there is an emphasis on the materiality of the coasts and consideration for their future.

The short descriptions of the photographs use words that are specific to coasts and resist comparisons to land or sea features. It challenges the reader to re-orientate the approach of the coast from the sea rather than the land as a new way to enrich our understanding of coasts.

The top three images in figure 2 were taken from the *volcanic island* of Jan Mayen which lies in the North Atlantic. The *coast* is predominantly rocky, however, along the middle section of the island lie two large *lagoons* – one to the east and one to the west of the island. These *lagoons* contain extensive areas of *black volcanic sand*. When the *waves* crash on these *shores* they appear a brilliant white against the dark volumes of the *sand*. Large circular shapes with different gradients of *sand* and *foam* define these patterns as is evident in image 2c resulting in a temporary *beach* feature called *swash marks*. Historically, *ice floes* frequented the *coast* of Jan Mayen and offered some protection from *wave* erosion but that is no longer the case. As a result, the island has become increasingly vulnerable to *coastal erosion* where many of its heritage sites are severely threatened. In addition, and like many *coasts* around the world, there has been a massive increase in the

amount of *plastic debris* reaching these *shores*, requiring regular and extensive clean-up operations.

The three photographs in the middle section of figure 2 are from the island of Bjørnøya which is located in the Barents Sea. Photograph 2d shows the small concrete *harbour* adjoining the existing rocky *shoreline*. Cement, reinforcement bars and wood were imported onto the *island* for its construction. The *harbour*, like the adjacent rocky formation, is slowly eroding with every severe storm passing by the *island*. The centre photograph, 2e, illustrates the dark sediments from *seaweed* being pushed and pulled along the strand by the workings of the *tide*. And finally, photograph 2f shows a mix of materials that are found on most small *sandy beaches* to the north of the island. As the *tides* retreat it leaves behind bleached wooden logs scattered on the *shores* interspersed with *plastic debris*. Like the island of Jan Mayen, the residents on the *island* undertake regular beach cleaning exercises to reduce plastic debris which is detrimental to the rich birdlife on the island.

The bottom row of photographs is from the island of Hopen. The isolated *island* also lies in the Barents Sea and to the south-east of the Svalbard *archipelago*. Small and narrow *pebble beaches* are to be found along the periphery of this narrow island. From the air, the simple meeting of *sea* and pebbles create very diverse patterns and textures along this *littoral edge*. Large intrusions created by the *sea*, as illustrated in photograph 2g, contrast with the light feathery trails created by the *tidal backwash* as is illustrated in 2h. *Seaweed* is not an abundant material on this *island* but it makes a stark appearance on the lightly coloured gravel when it aligns with the *coast* depending on the mood of the *tide* as illustrated in 2i.

Collectively the nine photographs and descriptions illustrate how the sea encounters the shores of these islands in very different ways. Each image elicits different forms and textures that provide clues on how the sea meets the land and what materials predominate. There is a sense of porosity between land and sea where exchanges take place. Although these materials vary in shape, form and composition they are all governed by the forces of the wind, waves, currents, tides and anthropogenic agencies. From these descriptions, words associated with coasts start to emerge. The words, highlighted in bold text, identify the materials from which the different coasts are composed and the site-specific processes and agencies at play. In consideration of the two concepts that were proposed earlier, the photographs and description demonstrate the messiness along these littoral edges. However, each material captured in the photographs plays a performative role in how the coast is conditioned. Closely observing these materials and understanding the sea, air and land processes that shift and shape them is, I believe, a step closer in a new way of *knowing* our coasts and accepting change.

In this article, I set out to challenge the terrestrial leanings of words and descriptions that tend to be assigned to coastal environments. The reasons to highlight this misfit of words and descriptions relate to a sense of urgency that is being experienced in many coastal environments around the world due to climate crises. Coasts which were once considered robust and stable are being re-conditioned to be more fluid and unpredictable environments. To confront such change I argue that a re-orientation of how designers approach coasts is needed and one that shifts our perspective towards the sea in order to develop new terminology, knowledge and understanding of coasts. This

way of thinking embraces the materiality and temporalities specific to a site which led to the proposal of two concepts.

The first concept which I term *re-materialising our relationship with the coast* refers to the materiality of coasts as porous and elastic intermediary spaces where human and non-human participants engage. It allows for a dialogue to be established and disrupts the notion that the land must retain its solid edge to the sea. Connected to this term I have coined a second concept called *Re-conditioning our approach to coastal change*. This serves to articulate the dynamic and multi-temporal complexities of coastal environments with particular emphasis on unpredictable futures. Collectively these two concepts may be seen as part of a potential wider-emerging discourse on coastal studies where architects and landscape architects need to confront the increasingly transitory and multi-temporal consequences of climate change.

To articulate these concepts further I used photographic and descriptive modes of enquiry and applied them to three Arctic coastal sites. This demonstrated the material richness of each site that is constantly undergoing multi-temporal processes. This applied knowledge is necessary for design disciplines to test theoretical propositions. I offered one such method to explore these concepts whilst exploring coast-specific words. However, I suggest that further interrogation of these concepts has the potential to expand new meanings that we can attach to other coastal sites.



Figure 1
Island Locations

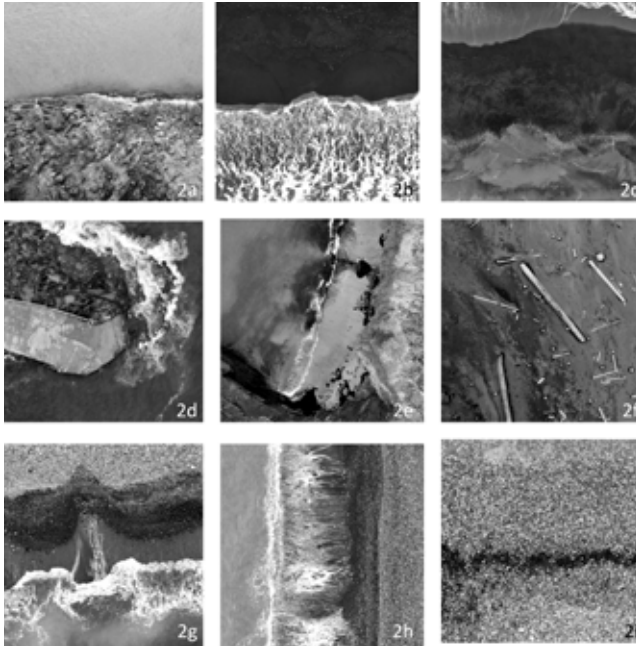


Figure 2
Nine Coasts

Notes

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