Time, Seawalls, and Money

Anthropologies of Rising Seas and Eroding Coasts

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ABSTRACT: This article explores the anthropological and social scientific literature on sea level rise and coastal erosion, examining questions of time, the human dimensions of seawalls, tensions over relocation and retreat, and the politics of finance. This includes insights from the author's research in Baja California Sur, Mexico, and along the California coast in the United States, where locally based experiences illustrate not only the challenges of rising seas and erosion, but also the importance of addressing these issues, sooner rather than later, through the critical lenses of anthropology. Overall, this article explores how anthropologists and other social scientists have critically examined the issues, processes, and tensions that shape global coastal responses, and points to directions for future research and engagement with sea level rise, eroding coasts, and humanity's future along the edge of the sea.

KEYWORDS: climate change, finance, home, ideology, sea level rise, seawalls, time

As we reach the end of the first quarter of the twenty-first century, the threats of sea level rise (SLR) and coastal erosion present a serious, seemingly intractable human dilemma. The problem is not so much a matter of disputes about the data or science behind sea level rise and erosion (with some exceptions), but rather when they are going to happen (time), how they should be addressed (seawalls?), and who will ultimately pay the price (money). Sea level rise and coastal erosion are often approached, at various scales, as largely technical problems to be addressed through science, good data, and effective engineering measures. Rising seas are certainly a technical problem. But they are also deeply human problems, interlinked with competing ideologies of nature (Gesing 2017; Marino 2015), conflicting interests (Gesing 2017; Malm 2013; Marino 2015), uneven risks, and entrenched inequalities (Gray 2014, 2023; Rush 2019). This article explores the anthropological and social scientific literature on sea level rise and coastal erosion, with an emphasis on rethinking the temporality of the coast, competing imaginaries of what the coast should look like, questions of home, and the financialization of the coast.

Anthropology, Climate Change and Sea Level Rise

Anthropological approaches to sea level rise fit within broader work on climate change (e.g., Barnes et al. 2013; Crate 2011; Crate and Nuttall 2016; Dove 2013; Fiske et al. 2014; Roncoli et al. 2009; Sayre 2012). Susan Crate outlined two key points that are particularly useful for

approaching the issue of sea level rise, especially in relation to questions of adaptation and technical responses. The first is the importance of documenting how "place-based peoples observe, perceive, and respond to the local effects of global climate change" (2011: 179). The second, which stems from a critique of resilience frameworks, argues for the importance of understanding: "how communities' adaptation to climate variation and change is not a simple function of technical solutions. On the contrary, human adaptation more oft en is determined by sociocultural relationships manifest in a web of reciprocities, obligations, and assets, including social capital—an asset important for access to resources in times of stress" (Crate 2011: 180).

Sea level rise is a case in point for how responses to climate change are about far more than just questions of proper management techniques or technical solutions. There is a considerable amount of literature that covers the science, debates, and potential human impacts of sea level rise, including academic literature (e.g., Frederikse et al. 2020; Griggs and Reguero 2021; Hauer et al. 2020; Nerem et al. 2018) and a number of books that have been published for specialists and general readers (e.g., Englander 2021; Gaul 2019; Goddell 2017; Griggs 2017; Pilkey et al. 2018; Pilkey and Pilkey 2019; Pilkey and Young 2009; Rush 2019). This includes a growing academic literature in anthropology as well (Anderson 2019a, 2022; Fagan 2013; Finan and Rahman 2016; Fiske 2016; Gray 2014; Koslov 2016; Lazrus 2016; Marino 2015; Oliver-Smith 2009; Paolisso et al. 2019; Vaughn 2017; Yoshida 2019).

Global sea levels rose rapidly from about 20,000 years ago until around 7,000–8,000 years ago. From that point on, global sea levels rose about one millimeter per year (or 4 inches/century) up through the mid-1800s (see Anderson et al. 2020). For most of the twentieth century, global sea levels rose between 1.2 and 1.7 mm/year (about 4.7 to 6.8 inches per century). The average rate of sea level rise has since accelerated. Between 1991 and 2019, the average rate of rise was 3.4 mm/year (13.3 inches per century). However, from about 2011 to 2020, the rate of rise was higher, at about 4.4 mm/year (or 17.3 inches per century; see Anderson et al. 2020). The IPCC (2019) predicted that global mean sea level (GMSL) will rise between .43 and .84 meters (1.4–2.8 feet) by the year 2100. A NOAA-led interagency task force report (2022) predicts sea levels in the United States to rise between .3 meters (1 foot) and about 2 meters (6.6 feet) by 2100.

The problem with SLR is not just rising sea levels but how they interact with storm surges, hurricanes, and other factors to produce greater risk and vulnerability. Such complications include the differences between global eustatic sea level rise and local, relative sea level rise (Griggs 2017; Griggs and Reguero 2021; Pilkey and Young 2009). As Gary Griggs (2017) explains, there are places in the world where post-Ice Age landscapes are rebounding and relative sea level rise is actually dropping (this is what is sometimes referred to as "uplift "). In Yakutat, Alaska, for example, sea levels are dropping at a rate of about 17.6mm per year (Griggs 2017: 106). Yet there are other places where sea levels are rising at far higher rates than the global average due to subsidence, which is caused by either extraction (of water or petroleum) or the "consolidation of organic-rich sediments" (Griggs 2017: 106). Because of subsidence, islands off of coastal Louisiana are experiencing rates of sea level rise that are more than five times the global average, while rising seas in the iconic coastal city of Venice, Italy, double the global average. Coupled with the global extractivism, the issue of subsidence presents an array of challenges and complications for addressing rising seas (see, for example, Goh 2019 on the socio-environmental dynamics of extraction-induced subsidence in Jakarta). Considering the millions of people who live on the coast today, sea level rise is one of the biggest—and most intractable—threats that humanity will face in the coming decades.

What can anthropology contribute to this conversation? As Crate (2011) mentions above, we can begin by understanding how people perceive and respond to climate change (in this case SLR) at the local level. We can also help better understand how community adaptation is shaped

by sociocultural relationships and power dynamics. Shirley Fiske (2016) implores us to meet people "where they are" in order to understand their reactions and responses to climate change. This approach is evident in the work of Elizabeth Marino (2015), Heather Lazrus (2016), Liz Koslov (2016), and Mariko Yoshida (2019), among others.

Marino's work contextualizes climate change responses and challenges in Shishmaref through a holistic approach that incorporates a strong historical analysis, in-depth fieldwork, and attention to power dynamics. Her work illustrates how vulnerability for the community of Shishmaref has been produced, over time, by historical and colonial relations. The situation in Shishmaref, in which seawalls are failing and homes are sliding into the sea, was not simply a matter of sea level rise or climate change alone. One of the big factors was the loss of mobility and flexibility that once characterized Iñupiaq responses to ecological change. Marino also discusses how and why these communities are reluctant to relocate despite the risks they face. This reluctance stems from mistrust of the intentions and willingness of the US government to actually address the problem, combined with a strong attachment to home (Marino 2015). This attachment to home, which will be discussed in more detail below, resonates in the work of several anthropologists whose research addresses how people respond to climate change and sea level—and why so many are resistant to relocation, retreat, or being labeled as "climate refugees" (Kirsch 2020; Koslov 2016; Lazrus 2016; Simms 2017).

Responses to climate change and sea level rise vary, in part because of particular attachments to home, place-based identities, and livelihoods. But such responses can also vary for other political and economic reasons as well. Decisions about sea level rise planning can, for example, be dominated by the interests of governments and corporations that are more concerned with making profits—or protecting capital—than providing support for citizens and communities that are vulnerable (Gray 2014; Malm 2013; Yarina 2018). Local concerns and conflicts about climate responses, then, have to be understood within broader contexts, machinations, and processes. This is yet another point where anthropology can bring in powerful, critical perspectives that ground local and place-based experiences within a broader global and historical framework. This includes bringing in a much deeper perspective about the issue of time, which I will discuss in the next section.

Humans and the Coast: It's about Time

One of the challenges, and shortcomings, of many contemporary debates about coastal adaptation and planning—including what I have seen in my own work in California and Baja California Sur—is a tendency to frame problems in quite limited time horizons. Richard Irvine (2014: 5) refers to this tendency as "temporal lock-in," or what he defines as "an increasing fixation with the landscape as it presents itself at a particular point in time, such that uncertainty about the form of that landscape in the future becomes, literally, unthinkable." Irvine illustrates his argument through a discussion of the environmental histories of the Norfolk coast, in England, drawing connections between the Happisburgh footprints, which date roughly 780,000 to 1 million years ago, and contemporary coastal disasters. He highlights a case in which local residents in Happisburgh see strategies such as "managed realignment" as a threat to community survival and therefore push to "fight" for seawalls and other measures that, as they see it, would protect their coast. What we are seeing in this case, Irvine explains, are "tremendous political and economic pressures" to preserve the coastline according to limited, fixed data points—despite the dynamic reality of coastal change that has shaped such coasts. Irvine (2014: 6) argues: "What we are dealing with are phenomenal encounters with long-term history that force us to think

on temporal scales vastly beyond those of the short term political and economic cycles within which much of contemporary life operates and upon which public policy is so often dependent."

Irvine's solution is to "see the coast in time" and "expand our time horizons" to think through and about coastal change and adaptation, particularly within the context of global climate change. Humans have traversed the coast for some 80,000 years, leaving Africa along the hypothesized Southern Dispersal Route (Erlandson and Braje 2015). They reached Sunda and Sahul (Southeast Asia and Australia today) by around 50–60,000 years ago, and the Americas by about 20,000 years ago, via coastal dispersal routes and maritime adaptations (Erlandson et al. 2007). Much of humanity's experience with the coast, for thousands of years, likely consisted of the kind of flexible, mobile adaptive patterns that were characteristic of the broader hunter-gatherer lifestyle for thousands of years (Fagan 2013).

Sea levels began to stabilize around 7,000–8,000 years ago. That stabilization likely contributed to greater population densities along the coast. Increased sedentarization, along with more people, resulted in attempts to overtly modify and defend the coast. This was a particular type of adaptation that occurred in various parts of the world about 7,000 years ago. The earliest potential evidence of a coastal defense structure has been found at Tell Hreiz off the Carmel coast of Israel (Galili et al. 2019). The construction of harbors and proto-harbors were another early form of coastal modification and protection. The earliest evidence of such structures date to about 4000–4500 years ago in the Levant and sites such as Wadi al-Jarf in the Egyptian Red Sea (Galili et al. 2019). Outside of the Mediterranean, some of the oldest harbors were in Lothal, India, which dates to about 4,300 BP (Before Present), and the Hepu Seaport in China, which dates to about 2,000 BP (Ruan et al. 2010).

As Brian Fagan (2013: 93) notes, "The Romans were industrious builders of harbors of all kinds. There were at least 240 major Roman ports in the eastern Mediterranean and around 1,870 in the west." This included the port city of Alexandria, known for extensive harbor constructions, including the causeway-aqueduct known as the Heptastadion, which was built around 2,200 BP (McKenzie 2003). These early harbor and seawall complexes presaged a response that would become more and more common over the course of the next 2,000 years. Other attempts to modify and/or control the sea began to proliferate around the globe, ranging from seawalls in China from about 713 to 900 CE in the Quintang estuary and Hangzhou Bay respectively (Pranzini 2018; Wang et al. 2012) to the monumental architecture of the artificial islets and seawall at Nan Madol in Pohnpei, which was constructed around 1000 CE (Ayres et al. 2008; Seikel 2011). It was only a few centuries later, in the 1300s, that some of the earliest seawalls and shoreline works began in Venice, a coastal city that has come to be one of the most well-known symbols of coastal engineering in the twentieth and twenty-first centuries.

Looking to the past is useful for seeing and thinking through the variety of responses to coastal adaptation. But it is also useful for assessing the implications and impacts of particular responses. It is useful to know, for example, that the terpen site of Ezinge, near Groningen, which dates back to 2,400 BP, had to be continually modified over the course of centuries, growing from around one meter tall in 400 BCE to 18m by 1000 CE (Fagan 2013). Similarly, the harbor structure at Dor had to be modified and rebuilt over the course of 200 years due to damage from rising seas (Raban 1987). Such adaptations can last for quite a long time. And yet, even when certain responses work for a time, things can go wrong, particularly when new threats or challenges arise. The terpen-strewn landscape of the Netherlands, which were successful adaptations to sea level rise in 800–950 CE, were unable to withstand the inundations that came with the Medieval Warm Period in 1000 CE, in which tens of thousands lost their lives (Fagan 2013).

What this tells us is that coastal adaptation has long been an ongoing process and set of decisions, rather than a one-time choice. Seeing the coast through time, particularly through the lens

of anthropology, is helpful for understanding the bigger picture for coastal change, adaptation, and policy. Such insights are useful for contemporary policy debates, which at times seem to be looking for some kind of panacea (Bigger seawalls! Relocation! Living and green shorelines!) for our current coastal woes. A broader understanding of the temporal dimensions of human-coastal interactions may also be valuable for confronting contemporary issues that are wrapped up in difficult cycles of decision-making and subsequent impacts, including the vexing problem of extraction-induced subsidence (Goh 2019). We have deep histories and archaeologies that tell us quite a bit about what happens when certain courses of action have been staked out. As Fagan points out, the histories of human-coastal adaptation (and disaster) laid the foundations for the primary challenges that contemporary nations face today with rising sea levels: "Do you yield to the attacking ocean, staying where you are and adapt, or wall yourself off from rising sea levels and violent storm surges?" Seawalls, in particular, symbolize this ongoing tension between retreating and holding the line.

Seawall Ethnographies

Anthropological approaches to seawalls fit within wider literature on infrastructure (e.g., Anand 2017; Anand et al. 2018; Chahim 2022; Di Nunzio 2018; Ficek 2018; Jensen 2017; Larkin 2013). In this section, I discuss the work of three scholars (Gesing 2017; Gray 2014; Malm 2013) whose research focuses specifically on the social, economic, and political dimensions of seawalls.

In a very basic sense, there are only so many options for dealing with coastal change, rising seas, and erosion: soft protection, hard protection, or some form of retreat (Pilkey and Cooper 2014). Soft protection entails measures such as beach sand replenishment (also known as "beach nourishment"), which generally consists of importing sand onto beaches that are losing sand. Hard protection means building seawalls, groins, and other structures that are meant to help stabilize the coast. Retreat, finally, refers to the idea of pulling homes and infrastructure away from the coast, whether "managed" (see Anderson et al. 2020; Mach and Siders 2021) or not (Griggs 2015). But as Liz Koslov argues, retreat should be understood as something that is about much more than just moving buildings or roads away from the sea. Rather, she explains, our discussions of retreat should help contextualize what it means for various communities and maintain a space for grassroots responses that include considerations of peoples' rights to relocate, stay put, or return after a disaster (2016: 380). In making a case for retreat, Koslov's work pushes the conversation beyond programmatic attempts to make retreat sound—or appear—like a comfortable, neutral option. "Leaving home in the context of climate change," she writes, "is not a neutral act" (2016: 380). None of this will be easy, she writes, echoing Fagan's (2013) sentiment mentioned above: "The complexity and ambivalence of retreat serves as a reminder that there are no easy solutions and that it is not possible to rebuild forever or to wall ourselves off from the problems we face" (2016: 380).

Humanity cannot wall itself off indefinitely, even if many hope or wish that were the case. In the world of coastal management and policy, hopes, or perhaps expectations, of rebuilding and walling ourselves off from the sea tend to dominate. This kind of thinking was readily apparent during the winter 2022–23 storms that hit the California coast, when the Biden administration trotted out the "build back better" line after the coastal communities in Santa Cruz, Capitola, and Aptos had been ravaged by floods, massive waves, storm surge, and extensive infrastructural damage. Many communities—and those who shape their coastal responses—are a long way from anything remotely close to "amphibious acceptance" (Boyer and Vardy 2022). For many coastal communities around the world, especially in places where valuable real estate

finds itself in a precarious position, some combination of soft and hard protection measures tend to be the go-to options. Both are an attempt to try to maintain the coast in a relatively fixed position or state. Seawalls, in particular, remain a common—if not controversial—tool for trying to hold coastlines, properties, and values in place.

Friederike Gesing's (2017) article is a case study of the politics and conflicts over a seawall that was built in Waihi Beach, Aotearoa (New Zealand). Despite protests from local community groups, coastal scientists, and the Maori community, the seawall was approved and built in 2011. Gesing argues that this seawall, which was built to protect about 80 private beachfront properties, symbolizes a "failure thus far to move beyond hard protection" (2017: 129). The seawall may become "the last monument of what its critics view as a failed approach that protects private assets to the detriment of the public space of the beach" (2017: 129).

Gesing discusses the emotional dimension of people's attachment to the coast and how those attachments (and interests) shape decision-making processes. She provides a rich, ethnographic examination of the histories and politics of the Waihi Beach seawall, discussing the deeper histories of the site where it was created. Before Europeans arrived, the land and coast belonged to Maori iwi peoples. The first Euro land titles were obtained in the 1870s, and homes were built soon after. By 1959, most of the beachfront properties had been built, and "[t]he authorities at the time seem to have acted as if they could rely on the terrain to remain fixed and permanent during development" (Gesing 2017: 132). For Gesing, private property is one of the central points of contention, particularly in relation to beliefs and expectations about "eternally fixed boundaries" on the coast (Gesing 129). These expectations of fixity, also mentioned by Irvine (2014), are common in such conflicts over coastal protection and management (see Anderson 2022; Gray 2014). At Waihi Beach, various structures were put in place to protect oceanfront homes and, over time, more development followed. As home values skyrocket, real estate value becomes a dominant force that drives policies (see also Anderson 2022 on this point).

However, despite the approval and construction of the seawall, and the dominance of oceanfront property owners in pushing their vision/interest at Waihi Beach, Friederike Gesing argues that the seawall, for many, has become a symbol of their lost cause. But it has also become a visual and material symbol of change and resistance. Gesing (2017: 141) quotes Linda Pierce, a member of the Bay of Plenty Regional Council, who talks about how the seawall, over time, may actually help change minds: "And I think the Waihi Beach scenario will be a good way of getting the public perception changed, because people would look at it and think, 'Actually, we don't want that here,' and actually people start thinking more long term about these things."

Gesing frames this in relation to Actor Network Theory (ANT) and Michael Callon's (1986) concept of a "sociology of translation," in which objects, such as seawalls, are enrolled in changing outcomes and effects in the world (Gesing 2017: 141). The seawall, as it erodes, breaks down, and contributes to beach loss (as seawalls are known to do; see Griggs 2005), serves as a constant material and visual reminder of a "dystopia of misguided coastal protection" (Gesing 2017: 141). The seawall becomes a "bridge to the future, making the predicted effects of climate change more tangible and concrete" (2017: 143). This point opens up opportunities for anthropologists and other social scientists to track, assess, and document how people live with, think about, and are impacted by coastal protection structures throughout their lifecycle, particularly as they weather, break down, and eventually fail. This resonates with some of my work in Pleasure Point, near Santa Cruz California, where a new seawall was built in 2012 to address coastal erosion and public safety issues (Anderson et al. 2022). In the ensuing decade, however, the wall has slowly begun to deteriorate and show early signs of failure: rust, cracks, and exposed rebar. While the Pleasure Point seawall may have been the best option at the time it was constructed,

it may end up, similar to the Waihi Beach seawall, illustrating, through its failures, the need for alternative coastal protection and adaptation practices.

Gesing details how local community organizations, in conjunction with coastal scientists, led efforts against the seawall. But her analysis also includes deeper questions—and histories—of rights, ownership, attachment. While local Maori were supportive of the community groups that opposed the seawall, they were not involved with the decision-making process. But this is changing, Gesing writes, in part because of the adoption of new sustainability policies that include the "cultural" as key components (alongside the social, environmental, and economic components). As Gesing points out, putting local Maori into the "cultural" slot is problematic, but it is a framing that members of the Maori community use, strategically, to assert their interests and values—particularly in a new political climate with renewed hopes for land restitution. The cultural, in this sense, "provides opportunities for Māori participation and engagement" and an "inroad into political decision-making" (Gesing 2017: 145). Local Maori critiques of the seawall are based in visual and material concerns, in addition to questions of relations and time. As Tūhua Brown, local marae chairperson, explains:

> We see this heavy infrastructure, this rock wall, these sand bags coming out of the Waiorooro Stream and it just takes away our visual relationship to that area. By that [visual relationship], we are sort of connected to our ancestors, carrying on a customary practice that our ancestors did for over a thousand years in that one particular spot. (Gesing 2017: 145–146)

Framing his argument in terms of Maori values, Tūhua expresses support for "soft" approaches (such as dune restoration), in addition to managed retreat. He expresses empathy for coastal home owners, but explains that erosion is a natural process: "We feel sorry for those people in those houses, but we feel that the Council should have paid them out, relocated those houses and let nature take its course, naturally, naturally. Our belief is, you know, Tangaroa [the god of the seas] will eat away at, well—because erosion, that's what Tangaroa does" (Gesing 2017: 147).

Overall, Gesing argues that the Waihi Beach seawall conflict is not just about one technical solution versus another. It is also about "which nature(s) people want" (2017: 147), and "a struggle over whose imaginaries and practices of nature-making gain legitimacy" (2017: 147). This brings up bigger questions about what kind of beach will be created, who has a say in that process, and what 'nature' means. The seawall at Waihi Beach symbolizes "a struggle about the right state of the coastal environment" (2017: 148). For now, alternative visions have been closed off. The "hegemonic version of coastal nature culture as a private space in need of protection from the sea" has won out. But small changes are afoot. And the seawall itself, as it degrades, fails, and becomes a visible reminder of climate change, may help change more minds.

Andreas Malm (2013) writes about seawall politics along the Nile delta in a piece that focuses on what he calls the "injunction to build seawalls to respond to climate change." Management of this coast, Malm argues, is skewed toward sunk capital and the investments, rather than the poor, marginalized people who live and work in precarious conditions. This is due to uneven and combined development and the politics of the former Mubarak regime. One of the focal points of this piece is the massive storm that hit the Mediterranean shore in December 2010, which hit the coastal city of Alexandria (mentioned above) especially hard. That storm, which took place just before the political upheaval that erupted across Egypt in early 2011, was a harbinger of the future (Malm 2013: 803).

Egypt is, as Malm explains, extremely vulnerable to sea level rise. How does the government respond? They build seawalls. But such structures protect some while leaving others exposed, vulnerable, and marginalized. Like Gesing, Malm brings an explicit ethnographic analysis in this work. Malm explains that such an approach matters because "all studies to date have been

geophysical and technical in character" and therefore ethnographic methods are an "entry point" into understanding climate change and the production of vulnerability (2013: 812). Malm does not dismiss geophysical and technical research, but argues that "a deeper understanding of the parameters for adaptation to climate change also requires studies of the *social relations* within which all adaptive responses, by dint of being human, are formed" (2013: 812). This piece includes ethnographic details and narratives from people who are dealing with the risks, impacts, and losses that have come with storms, coastal flooding, and salinization.

These narratives push back against official government narratives about the state of the coast and the efficacy of coastal protection measures. Some residents speak to the inequalities of coastal protection, arguing that coastal resort towns such as Ras El-Bar and Baltim receive extensive shoreline protection, while they are left to deal with floods and rising seas. The famed port city of Alexandria is a case in point.

Malm notes the "extraordinary concentration of capital" in Alexandria, a city with a population of about 4 million people when this article was written (it is now at about 5.4 million). Malm points out, "Alexandria has been singled out as having the largest urban population of all cities in the developing world exposed to sea level rise and storm surge" (2013: 817). But this exposure is not equal: Many factories in the low-lying industrial district are as much as three meters below sea level, but they are protected by the Muhammed Ali Seawall, which was built in the 1830s (Malm 2013: 817). It is the oldest seawall in the country, and it requires extensive resources to maintain; it was reinforced in 1980 and raised 2.5 meters above sea level. However, Malm argues: "While luxurious venues along Alexandria's corniche were also hit by the waves and suffered economic losses, the vast majority of the victims belonged to the poor working population of Egypt, accustomed to life and work under rickety roofs" (2012: 818).

Government officials, including researchers at CoRI (Coastal Research Institute), one of Egypt's national research institutes, embrace what Malm describes as an ideology of *adaptationism* (Malm 2013: 820). There is a strong belief in the power of adaptation and protection technologies—such as seawalls. This ideology of adaptationism is reflected, Malm notes, when people compare Egypt with what is perhaps one of the most common global symbols of humanity's capacity to resist the sea: the Netherlands. Why is Holland better able to defend its coast? The answer, Malm explains, can be found in looking at Egypt's "centuries of integration into the world system" (2013: 822). On this point, Malm also brings up the catastrophic flooding that hit Bangkok, Thailand in 2011, a case in which the wealthy areas were well-protected and marginalized people were stuck wading through knee-deep water. Coastal protection, whether in Thailand or the Nile delta, protects "sunk capital" rather than farmers, fishers, workers, and other marginalized peoples who live along the coast: "In today's world of uneven and combined development, sea wall politics are accumulated capital facing the pressures of the future" (Malm 2013: 823).

But, Malm asks, can there be a revolutionary sea wall? Something that offers real protection to vulnerable people? Can things be different? Seeking to answer such questions, Malm argues that despite their problems, coastal protection structures should not be rejected outright. For many people living on the edge of the sea, they are needed. The challenge, Malm argues, "seems to be to make these technologies available to all, through non-capitalist modes of resource allocation" (2013: 826). But the reality, he says, is that there are limits to any seawall—at some point the sea will win. The end point, then, is that creating a "revolutionary seawall" is actually more about mobilizing people and fostering social change than building a concrete wall that will only last for so long.

Summer Gray's (2014) research, which has been published as a book (Gray 2023), takes a different approach to seawalls and coastal defense, engaging in a multisited project that starts in the Netherlands and ends in the Maldives. Gray's is a "study of human-altered landscapes,

climate change, and the stories of men and women who live behind walls at the edge of the sea" (2014: 2). She writes: "As melting ice and shifting coastlines intersect with human borders, lived experiences, and embedded histories, those who dwell behind seawalls can perhaps provide a glimpse into the precarious world of life in the anthropocene. Here, manufactured walls enable people to resist sea change by gambling with the dangers and unknown costs of human-altered landscapes" (Gray 2014: 53).

Gray's work looks at both the high-tech and big money seawalls of the wealthy, and the often dated, crumbling, and inadequate seawalls of the poor and marginalized. The Dutch landscape, where she begins her analysis, serves as "an ideal form that other coastal cities can achieve" (Gray 2014: 115). Dutch sea defenses, she explains, can be seen as an example of the "technological sublime" (drawing from David Nye's [1996] use of the concept), which refers to the awe, wonder, and terror that people have when they experience natural, architectural, and technical achievements (Gray 2014: 80). In the world of coastal management and policy, Dutch practices are often looked to as a model that can be emulated, seemingly endlessly, all around the world. One key aspect of this, particularly in relation to shorelines, is the conflation of preservation with the idea of stability (Wallace Kaufman and Orrin Pilkey, cited in Gray 2014: 81).

However, as Gray argues, the question moves rather quickly from the issue of avoiding catastrophe to the politics of who will actually be saved by such measures (Gray 2014: 115). The MOSE project in Venice (Modulo Sperimentale Elettromeccanico), for example, cost an astounding $9.5 billion dollars—an amount that is far out of reach for many nations around the world. MOSE, Gray argues, is "a testament to the political will of Venetians to save their treasured home" (2014: 118) It is also a testament to economic power, the kind of adaptationism that Malm discusses, and a poster child for the technological sublime.

Massive coastal infrastructure projects like MOSE take on a life and power of their own, often resulting in unintended consequences and catastrophes. This includes the "levee effect," in which the construction of large-scale flood defense infrastructure encourages or allows more development and leads to greater damage when it eventually fails (Kates et al. 2006; see also Colten 2006). Andrew Littlejohn (2021) details a related case, in which trust in seawalls specifically led to extensive loss and devastation in the aftermath of the 2011 tsunami in Minamisanriku, Japan. Due to a similar ideological and political ecological trap, Venice is "backed against a technological wall over which they have no say," in which survival "requires endless supplies of concrete and money" (Gray 2014: 123).

After her ethnographic investigation into the lives of seawalls in the Netherlands and Venice, Gray shifts her lens toward the marginalized peoples in Guyana and the Maldives whose lives have been shaped and constrained by the politics of seawalls as well. But in these coastal communities, which lack the economic and political power that runs through the Dutch and Venetian coasts, the situation is very different.

In Guyana, the modern coast is about a half meter below sea level and is a high flood risk. This coastline is "protected by a combination of naturally occurring mangroves and human-engineered seawalls, dikes, sluices, and dams" (Gray 2014: 129). Much of the country's coastal defenses, which were built within the last 200 years in a fraught colonial context, have fallen into disrepair and neglect. Maintenance of those structures requires extensive government action and spending. It does not come cheap, and often it does not come at all. About 90 percent of Guyana's population lives in vulnerable coastal areas (2014: 129). Gray argues that human settlement in those coastal zones would not be possible without these defenses, which protect "the vast majority of Guyanese livelihoods, homes, and cultural traditions" (2014: 130).

The seawall "symbolizes the future of the country in its most fundamental form, as land above water" (2014: 148). People are doing what they can to "hold the line." This includes every-

thing from a young woman who seeks to push back against the sea with a low-cost sea defense made from geotubes to makeshift seawalls and efforts to protect the coast by restoring mangroves (see Vaughn 2017 on Guyana and mangrove restoration). Women, Gray explains, are at the forefront of many of these efforts. For many, the idea of retreat—of leaving their home—is something they cannot imagine.

This theme of attachment to place, and particularly the idea of *home*, continues in Gray's next stop: the Maldives. It is a theme that also resonates in other work about climate change, sea level rise, and migration (Marino 2015; Simms 2017). The Republic of the Maldives is the lowest-lying nation in the world, with a population (as of 2022) of about 540,000 people. When people think of the Maldives, Gray explains, they are generally thinking of Malé, the capital city, which has one of the highest population densities in the world (2014: 177). A giant seawall surrounds the island, a testament to what Professor Paul Kench, one of Gray's interviewees, calls an "unquestioned affinity for concrete structures when dealing with complex problems" (2014: 179).

The situation in the Maldives is the result of modernization via autocracy that was built on high-end tourism and uneven development, as the massive economic growth and overpopulation of Malé coincided with the underdevelopment of the other 200 islands in the nation (Gray 2014: 186). There is a widening inequality gap in the Maldives, and this includes those who are and who are not protected by seawalls (2014: 203). As one interviewee explained, "it's quite sad that we have to be the people who are to be first impacted by this when we contributed least to the problem" (2014: 234). This is a perfect encapsulation of Nathan Sayre's (2012) "politics of the anthropogenic," in which marginalized people pay the price for the decisions, consumption patterns, and overdevelopment of more powerful nations.

One solution for Malé, perhaps, would be to relocate people somewhere else. But there is nowhere else to go . . . at least not on overcrowded Malé itself. So the government came up with a plan to relocate people to other "safe islands" through a program of Population Consolidation (Gray 2014: 204). The only problem? People did not want to leave. Here, building on the work of Carol Farbotko and Heather Lazrus (2012), Gray complicates and critiques notions of "climate refugees," relocation, and retreat. Despite the risks, the inequality, and the uncertainty, many people in Guyana and the Maldives do not want to leave. "In the Maldives and Guyana, where destructive development has locked people behind a seawall," Gray explains, "home is complicated" (2014: 250). This, she says, is why ideas about relocation and retreat are far more complex than they might seem–and why people might resist what seems like their only option. As Mohamed Aslam, the former Minister of the Environment in the Maldives explained to Gray, "people are not like trees": "You can't pluck them and replant them. It's not that simple. We've lived on these islands for so many centuries. We have a sense of belonging to these islands. There's a history, your memories are attached to that. You feel home on these islands" (2014: 250).

Seawalls are complicated things. They reflect ideological understandings and philosophies about human-nature relationships, particularly the belief that humans can dominate nature. But they also represent a kind of hope, or persistence, to stave off the sea and fight for home. All too often, when it comes to sea level rise planning, proposed solutions focus on technical fixes while considerations of the people who live there are left out or forgotten (see Yarina 2018). Anthropology's strength lies in bringing those human perspectives into the picture to show the complexity of issues such as sea level rise, and to help seek out alternative pathways and responses. The three primary seawall ethnographies I have discussed above clearly illustrate the complexities, tensions, and politics that come with this form of coastal protection.

Gesing (2017) highlights contestations over place and identity, but also how seawalls, as material objects, may actually end up working, over time, to change minds. All three authors

highlight how issues of power and inequality shape conflicts over seawalls and coasts. As Malm (2013) and Gray (2014) both point out, seawalls often provide uneven protection, leaving many coastal communities in vulnerable positions. This might seem to indicate that seawalls should be abandoned, not only because of these uneven politics, but also because, as some of the deeper histories show, such structures can last only so long. Not only that, but they can also contribute to overdevelopment of the coast and greater catastrophes when they do eventually fail. Some, such as Patrick Nunn and collegues (2021), argue that seawalls in and of themselves should be considered maladaptations (specifically for island communities). One of their points is that island communities, in this case, do not always understand the long-term impacts of seawalls. Nunn and colleages (2021: 9) conclude that the ties that islander communities have with their homelands "need to be severed and replaced with more realistic future scenarios, maybe informed by precedent . . . that require relocation."

Yet this is precisely the kind of outside, expert knowledge that many coastal peoples resist. This resistance to relocation has been well-documented by anthropologists and other social scientists (e.g., Gray 2014; Kirsch 2020; Lazrus 2016; Marino 2015). Often, these communities have few choices, and this is where anthropology can be powerful for challenging dominant discourses about the inevitability of retreat. As Gray points out, some coastal communities are doing anything and everything they can—often because of marginalization or neglect—to save their homes. Some communities look to seawalls as sources of hope and resilience in the face of rising seas. They look to those walls, for better or worse, as a means through which they can protect their homes, communities, and livelihoods. And while such perspectives may appear to be trapped within overly presentist thinking, they are often informed by deeper environmental histories and connections to place (e.g., Kirsch 2020; Marino 2015). For some communities, it seems, almost any option remains on the table—except for retreat—because of their desire to protect and maintain their homelands.

Home, Retreat, and Buying Time

Marino (2015) discusses what she calls the "tenacity of home," in which residents of the coastal Iñupiaq community in Shishmaref, Alaska, are also ambivalent—and sometimes completely resistant—to the idea of relocation (or retreat). Jessica Simms (2017) finds a similar sentiment in coastal Louisiana where, despite risks of loss and dispossession, residents express a strong desire to stay in place. Stuart Kirsch details the reactions of Pacific Islander communities, from the Marshall Islands to Fiji and the Solomon Islands, who, tired of being cast as climate refugees who must leave their island homelands, have "stopped worrying about the apocalypse and started fighting climate change" (2020: 834). In Guyana and the Maldives, Gray (2014: 251) explains, "The effort to keep home where it is entails many actions, from women safeguarding mangrove forests to democratic uprisings and youth movements to save the beaches. To survive, people must utilize whatever means are within reach to construct breakwaters, mangroves, coral, and rip rap, buying time one painstaking day at a time."

As Gray makes clear, many people around the world do not and will not have access to the protection from expensive, technologically sublime seawalls and protection devices that can be found on Dutch, Venetian, American, and other shorelines. Even so, Gray reminds us, those expensive Dutch and Venetian walls, which are often built for the sake of profit (or capital) over people, "do not necessarily translate into better lives" (2014: 251). In the absence of clear and equitable pathways forward, and as the seas keep rising, people are buying time, doing anything they can to hold back the water.

During my research in Cabo Pulmo, Mexico, I saw similar efforts to buy time and hold back the sea. In one example, one family-owned restaurant that was located on the edge of the sea was eventually destroyed by erosion. A new version of the same restaurant was built just landward, and continues to be used to this day. But the battle with the sea did not end there, as the family who owned and ran the restaurant were continually worried about the encroaching sea. Because they were on the edge of a national park, their options were extremely limited. But they did what they could, sometimes bringing in rocks to create a temporary wall to hold off the waves. It was a continual battle, leaving the community itself in a constantly precarious state somewhere between "resilience" (see Anderson 2023) and disaster.

In another example from Cabo Pulmo, the community was able to build a *palapa* on the beach with the help of government funding. This structure was important for local families who ran ecotourism operations (diving and snorkeling). It was located right on the short bluffs just above the sea. Over time, as the bluffs eroded, community members were continually trying to stabilize and shore up the structure. They even moved it back at a certain point. I witnessed these struggles from about 2005 until 2017, when the structure was still standing, but about half of its original size.

But the situation in Cabo Pulmo was complicated. The local Mexican community was outnumbered by American and Canadian settlers who created an enclave starting in the 1980s and 1990s (Anderson 2017). Most of the beachfront homes and properties were owned and controlled by these settlers, and the histories of how that played out were fraught with tensions, conflicts, and disputes (Anderson 2017). When the storms hit the shoreline, many of these settler residents just kept building back their seawalls, even though it was technically illegal to do so because of the national park. Some Mexican residents, who also wanted to protect their interests, were explicitly told they could not build any walls. This unevenness between settlers and the local Mexican community played out in many such ways.

Regardless, I saw seawalls come and go. Big, seemingly invincible walls would crack and collapse with repeated storms. Large chunks of property would be lost from one winter to the next. The shoreline itself was eventually littered with the wreckage of this whole process, with rebar and old concrete scattered along the beach. The shoreline was not quite what one might expect for a well-known marine protected area. It was an illustration of the conflicted interests of individual property owners, who wanted to protect their homes and investments, and those of the broader Mexican community, which sought to protect its interests while also supporting the long-term mission of the national park. One of the biggest challenges for Cabo Pulmo, overall, is that there is not a broader, regional plan for coastal adaptation. This translates into an "everyone for themselves" situation in which individuals and families do whatever they can to hold up their homes, properties, and businesses while also trying to maintain some semblance of hope for longer-term solutions and options.

Along the California coast, the situation is different. In this case, there is a broader plan for coastal development and adaptation—but not everyone agrees on what that plan should be or how it should be implemented. The California Coastal Commission plays an important role in regulating coastal development in this context. This includes extensive review of any coastal development projects and the ability to grant or deny permits depending on how they fit with established coastal requirements and policies. The Commission has been trying to move away from using hard armoring to protect the coastline. But there are tensions with many local communities, which often see seawalls (and continuous sand replenishment) as the best options for protecting their homes, interests, and values. Retreat, for many communities along the California coast, is completely off the table (see Anderson et al. 2020; Anderson 2022). Many, like residents of the coastal city of Oceanside (in San Diego County, California), want to do anything they

can to either maintain or bring back the beaches they knew in years past. This includes growing optimism about the possibilities of "living shorelines" and other "green" solutions, ranging from artificial reefs to dune restoration. These green solutions, which are presented as alternatives to seawalls and other engineered responses, are often framed as largely benign options that harness natural resources with little-to-no impact. But as Stephanie Wakefield (2020) points out in another context, such nature-based solutions are, in fact, complicated, tenuous, and labor-intensive projects. Green solutions are infrastructural projects in which nature is meant to replace or augment the protective work of seawalls and other structures, yet as Wakefield explains, dunes, reefs, and (in her case) oysters do not always obey the commands of the planners and managers. Still, despite the known shortcomings of seawalls, and very limited examples of successful living shorelines, California residents seem to gladly support either option over the idea of retreat.

In Oceanside, extensive beach loss has been the result of decades of development, including dams, harbors, and other coastal structures that have impeded the flow of sand (Anderson 2019b). One local community-based organization has led efforts to build a new groin, which would help retain some of the lost sand. Nearby cities, however, have joined forces in opposition of this project because they are worried about the downcoast impacts of a new structure (even though these cities have highly armored shorelines themselves). The residents in support of building the groin want to see "their" beaches come back. They see the groin as an attempt to adapt, or fight to save their beaches, instead of giving in to the idea of retreat (see Koslov 2016 for similar responses). They also see the groin (in addition to sand replenishment) as options that can help restore the "natural" state of the beach, even though their coastline is the result of extensive human intervention and engineering that started as early as the nineteenth century (Anderson 2019b).

Coastlines all around the world are maintained, or shored up, in various ways. The work of Gesing (2017), Malm (2013), and Gray (2014, 2023) point our field toward critical and powerful approaches for documenting, assessing, and understanding the human dimensions and politics of how such coasts are constructed, maintained, and defended over time. In some cases, as these scholars have shown in their work, these coastlines are held up by literal seawalls and other material structures. But coastlines are also held up, defended, and protected through various ideological dimensions as well, which Gesing, Malm, and Gray (and others) also highlight. These "ideological seawalls" (Anderson 2022) include the beliefs, attachments to place, and livelihood needs that compel coastal communities around the world to defend their homes at all costs. Yet there are also financial dimensions of these ideological seawalls, as the work of Malm (2012), Gesing (2017), and Anderson (2022) all illustrate.

Financial Seawalls

In my work along the California coast, resistance to anything remotely resembling retreat is one of the most fascinating themes (Anderson 2022). This resistance, in some cases, resembles the place-based attachments that are common all around the world. People want to keep, protect, and save the places they know, grew up with, and depend on. Here, as elsewhere around the world, resistance to relocation or retreat is about livelihoods, money, and wealth. What differs, in the case of California, is a matter of economic status and class: some of the fiercest resistance to retreat are coming from comparatively wealthy coastal property owners. These class positions are, of course, grounded in the violent, uneven, and racialized histories of displacement and dispossession that have shaped the California coast (Anderson 2022; Gilio-Whitaker 2017; Lindsay

2012). In recent years, the affluent, and mostly white, communities of Del Mar and Pacifica have been some of the state's most vocal opponents to the idea of managed retreat (Anderson et al. 2020). Arguments against retreat include attachments to place, community, and livelihoods. But they also contain another, perhaps surprising element: the argument that coastal properties are too valuable to simply abandon them to the sea (Anderson 2022). Beliefs in, attachments to, and defenses of that value serve as one form of financial seawall that maintains particular coastal imaginaries over others. There are material, concrete impacts as well: these ideologies translate to practices—such as building and maintaining seawalls—that shore up all that value and produce certain kinds of coasts.

So far, coastal real estate values in California have not yet felt the impacts of sea level rise. Rising sea levels are already impacting homes on the East Coast (see Bernstein et al. 2019; Griggs and Patsch 2019; Pilkey and Pilkey 2019; Union of Concerned Scientists 2018). East Coast states such as Florida, North Carolina, and Virginia have seen some of the largest losses. This is primarily due to their low relief shorelines. Since 2005, Florida has lost about $5.42 billion in property values (Pilkey and Pilkey 2019). In California, which has a very different geography than much of the East Coast, this threat seems distant. This is a key temporal dimension of these financial seawalls: values hold strong and communities resist change (or even longer-term planning), because the threat appears to be a problem for the future.

In the United States, there are deeper foundations that support such ideological and financial seawalls as well. This includes patterns of insurance and reinsurance via the National Flood Insurance Program (NFIP) or the Stafford Act (see Elliot 2019, 2021; Pilkey and Pilkey 2019; Taylor and Weinkle 2020). All properties within Federal Emergency Management Agency (FEMA)-designated Special Flood Hazard Areas (SGAHs) that have federally backed loans require flood insurance (Pilkey and Pilkey 2019). One of the biggest problems is that FEMA flood maps often rely on outdated data, resulting in insurance premiums that do not accurately reflect risks (Pilkey and Pilkey 2019). This has resulted in the subsidization of development in high flood risk areas and billions of dollars of debt for the NFIP. Orrin Pilkey and Keith Pilkey (2019) argue that the NFIP encourages people to buy and build in increasingly risky coastal areas, because they know they can be bailed out. This is the financial corollary to the "levee effect" mentioned above. As development density has increased on the coast and property values have exploded, the problem has only grown worse.

As Pilkey and Pilkey (2019) note, in order to work, insurance needs to distribute risk. The NFIP, which only requires insurance in high-risk zones, does the exact opposite: it concentrates risk. In addition, many people either do not have insurance, or they let it lapse. When Hurricane Sandy hit the Northeast in 2012, only about 15–25 percent of at-risk properties were insured (Pilkey and Pilkey 2019). There are various issues and complications with flood insurance that anthropologists could and should explore further. Anthropologists have, for example, covered the social dimensions of flood insurance post-Katrina, highlighting patterns of racialized inequity that constrain participation (Wright 2011); the challenges of navigating the claims process (Carter 2019); the pressures of dealing with requirements, rate changes, and growing deductibles (Adams et al. 2009); and the impacts of tens of thousands of homeowners who have no coverage (Petterson et al. 2006). Insurance was not the primary focus for these Katrina-related articles, but it certainly could be, and this points us toward critical avenues for exploration going forward. There are many questions to ask about what insurance means, how people think about it, what it is like to use it, and what it ultimately accomplishes. Following the insurance, from an anthropological and ethnographic perspective, could be a powerful way, going forward, to understand the impacts and politics of sea level rise and climate change. Rebecca Elliot (2019), for example, has shown how NFIP maps, which are supposed to "empower individual and collective actors to act

with greater confidence" actually create more alarm among coastal residents, who sometimes see such maps—and what they imply for the future—as "scarier than another storm."

In some ways, as discussed above, the financial dimensions of sea level rise and coastal adaptation create and perpetuate additional problems. But there are efforts to use financial tools to help alleviate the tensions, challenges, and risks that humans face on the coast. That was the intended goal of the NFIP, for example. But additional measures are on the table, including the use of voluntary buyouts (see Keeler et al. 2022; Kraan et al. 2021; Mach et al. 2019). In essence, buyouts are meant to help compel people to move away from hazardous coasts through the purchase of their homes/properties before they slide into the sea. This is one attempt to not only reshape the coastal zone, but also help property owners recuperate some of their economic value before it is too late. There is also a temporal dimension here, as such programs seek to encourage people to act now instead of waiting until it is too late. However, just like insurance, buyouts are far from problematic and can, as Marino (2018) argues, end up exacerbating existing inequalities. Voluntary buyouts have, in recent years, become more common and popular, but the social and political impacts of such policies remain to be seen:

> What happens to renters in Houston, millionaires in Miami, or tribal communities along the Gulf Coast and in Alaska over the next twenty years will be the real test of who retreat and relocation policies actually protect. (Marino 2018: 12)

All around the world, coastlines are shored up by various protection devices. Such devices range from relatively simple tools such as seawalls all the way to the massive, technological beast that is the MOSE in Venice. Often, people find ways to maintain their shorelines through sheer force and technological power. But coastlines are also held together, imagined, and valued in other ways as well. This includes the abstractions of money and finance. The financial dimensions of the coast reveal many of the deeper conflicts and tensions that shape debates about retreat, adaptation, investment, and ownership along the world's coasts, and present a critical opportunity for engagement—and intervention—by anthropologists.

Conclusion

As Gesing (2017) argues, conflicts over the coast often come down to ideological disputes about whose beach and which form of nature will be maintained or created. These conflicts range from very localized disputes about specific beaches (e.g., Waihi Beach) all the way to larger global conflicts about coastlines, protection, and relocation that affect the lives and livelihoods of millions of people. In the coming years, these issues will only become more common—and complicated. Humans have been living with and adapting to the world's coasts for thousands of years. Some of the earliest tensions—between staying in place and adapting or relocating—have been part of humanity's coastal experience for generations. While there are lessons and similarities that can be learned from the past, there are also distinctions that must be made. Today, millions of people live along the coast, and for many, retreat is not an option. Regardless, the seas are rising and coasts are eroding. The challenges, going forward, are a complex mix of social, political, and economic factors that shape how people, from Shishmaref to Los Angeles, live with, adapt to, and remake the coast. For many, the coast is a home that simply cannot be abandoned. For others, it is a financial investment that needs to be shored up no matter the economic, technological, or human cost. As the twenty-first century progresses, and we get ever closer to the realities of climate models and predictions that seem so far off (for some), anthropologists can play a crucial role in highlighting the broader historical, economic, and political processes that

shape how local, place-bound communities around the world experience and respond to the slow, relentless grind of rising seas.

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