

RESEARCH ARTICLES

Speculative Islands: Black Sand, White Dolphins, and a New 'Ecological Island' in the South China Sea

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The proposal for an 'ecological island' to be built off the coast of Coloane, Macao has led to speculation about its potential impact on the marine environment. The material for this new reclamation project is construction waste left over by the development of Macao's large-scale casino resorts, most of which are themselves built on reclaimed land. This new *speculative island* is an opportunity to consider the affects associated with infrastructure that is seen at a distance removed either temporarily or spatially.

This article draws on scholarship about infrastructures (Larkin, 2013; Berlant, 2016; Bosworth 2023), as well as archipelagic theories from island studies (Hayward, 2012) and postcolonial literature (Glissant, 1987). It takes particular inspiration from Édouard Glissant's essay *The Black Beach* which uses a multiscalar approach to a black sand beach in Martinique to express a creole experience of the Caribbean. Utilizing a similarly situated vantage point, this article uses the local white dolphin population as well as the black sands of the nearby Hac Sa beach as a non-human lens through which to view Macao's extensive history of land reclamation and envision its future development.

Hac Sa Beach

When you stand on Hac Sa, the largest beach in Macao, and look out to the sea you can see a chain of islands on the horizon that make up part of the Wanshan Archipelago. These islands appear close by but are not easily accessible as they are part of mainland China. There are no boats or ferries that run from the beach to these nearby shores as immigration channels funnel tourists and residents through specific border crossings. On a clear day, you can see a few windmills offshore too, slowly generating power. If you could see further still you would see the Philippines, Hawaii and eventually the Americas.

This vantage point on the South China Sea has been the site of a lot of coming and going. Starting from the mid 19th century thousands of Chinese prospectors headed to the Pacific northwest coasts of Canada and the U.S. in search of gold and fortunes to send back home. Macao was also the

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main port of exit through which thousands of Chinese immigrated to South America and the Caribbean, many of them sent against their will, taking on indentured servitude to pay off debts. This so-called *culie* or *coolie* system saw thousands of people brought to Macao, housed in barracoons, warehouse spaces or *pig sties* as they are colloquially known in Cantonese. They were then shipped off to work in brutal industries like sugar plantations in Cuba and guano mines in the Chincha Islands of Peru, work so arduous that these islands became widely known as a kind of living hell (Clark & Foster, 2012). These Chinese workers provided labor for industries that had been dependent on the only recently abolished transatlantic slave trade.

Now millions of mainland tourists flow into Macao annually to enjoy its sightseeing and gambling. This has created a uniquely successful economy that is primarily dependent on these two paired industries: tourism and gaming. The Cotai Strip, a stretch of resort casino complexes modeled originally on the Las Vegas strip, now far exceeds the revenues of its namesake. Writing about the world historical significance of this entrepôt turned global capital of gaming, Simpson has called Macao a “model city for Chinese consumerism” and “a sort of experimental laboratory of consumption” (Simpson, 2023, p. 20). This special administrative region of China provides the PRC with a regulated and carefully confined way to experiment with how much to expose its population to the vices and pleasures of consumerism and the gaming industry.

I moved to Macao in 2008, roughly a decade after its handover from Portugal to China in 1999 and several years after the internationalization of its gaming licenses. Over the years I have been able to witness this tiny territory transformed by any number of large-scale infrastructure and land reclamation projects. Some of these reclamation projects were extensions of existing land while others were newly built islands. Even with this consistently changing shoreline and all the infrastructural investment in Macao and visible across the border on the neighboring islands of mainland China, it is remarkable how normalized it has become. In other words, what is remarkable about the land reclamation of Macao is how unremarkable it is. Given this ubiquity of infrastructural changes it is all the more interesting to consider how and when prevailing narratives about development are disturbed by environmental concerns and speculation.

Land reclamation has historically been a necessary means for Macao to support its growing gaming industries and population. Since the handover, the population of Macao has nearly doubled from 438,100 in 1999 to 683,700 in 2024 (Government of Macao Special Administrative Region Statistics and Census Service, 1999, 2024). This population growth has put pressure on the local government to try and meet new housing needs by building new reclamation projects. Both the Portuguese government prior to the 1999 handover and the current Macao SAR government historically used land reclamation to address the need for more space for housing and industry in this densely populated 33.3 square kilometer region. These reclamation



Figure 1. Sketch of the Typa and Macao. (Engraved by) W. Harrison after a missing survey by William Bligh. London, G. Nicol and T. Cadell, 1785. David Rumsey Map Collection, David Rumsey Map Center, Stanford Libraries.

projects largely took place through landfill between existing islands forming new continuous landmasses (Hodges, 2020; Kvan & Karakiewicz, 1998). The Cotai Strip itself is built on reclaimed land between the islands of Taipa and Coloane. The scale of this transformation can be seen clearly in the side by side comparison of [Figure 1](#), a map from 1835 - 1836 and [Figure 2](#), a contemporary map of Macao.

Since 2013 there has also been a plan in place, known as the *Macao New Urban Zone*, which proposed six new separate islands each with its own intended purpose, ranging from housing to industry and government services. As of 2024, five of these new reclaimed islands in this urban



Figure 2. Map of Macao. Created on Inkatlas. © OpenStreetMap contributors (openstreetmap.org). Map data Mar 31, 2024. 1:75000

archipelago have been completed with the sixth canceled. Further development of these sites is taking place with some well underway while other islands lay fallow waiting for the land to settle before construction begins.

In the winter of 2024, the Macao government announced a new plan to build an 'ecological island' off the coast of Coloane just southwest of the black sand Hac Sa beach. This beach is the largest and most popular recreational area in Macao. In contrast to earlier largely positive reactions to its reclamation projects, the government received push back from some locals, including environmental protection advocate Joe Chan. Lawmaker Lo Choi also raised concerns about the necessity and impact of this new 'ecological island' (Marques, 2024). These concerns were expressed largely in terms of the possible impact the reclamation project might have on the welfare of the Indo-Pacific humpback dolphin (*Sousa chinensis*) also known as Chinese white dolphins which are indigenous to the Pearl River Estuary.

Anxiety over new island construction and its influence on the well-being of this native species was similarly manifest in the earlier construction of the Chek Lap Kok Airport in neighboring Hong Kong, a city that has also developed from its earliest colonial incarnations through land reclamation (Xue & Sun, 2022). That project also involved land reclamation that prompted public concern for white dolphins and their aquatic habitat. The local community was galvanized by this issue which ultimately led to the creation of a marine park adjacent to the airport to better accommodate this dolphin population (Verrall, 1995, p. 98). In both these cases dolphins have given a face to ecological concerns around land reclamation in the region.

Material out of place, like the bodies of dolphins washed ashore can prompt reflection about the environmental impacts of such marine development. This article looks to add to these environmental anxieties a consideration of other affects engendered by infrastructure. Witnessing the development of large infrastructure projects can trigger a wide variety of responses from pride to indifference. Marine infrastructure and reclaimed islands in particular are routinely seen at a distance removed either spatially or temporally. In calling such projects *speculative islands*, I am emphasizing the need to account for this aspect of removed observation. Witnessing unfinished and incomplete projects on the horizon invites speculation. After reviewing literature on infrastructure, island studies and postcolonial perspectives, I will use the black sands of Hac Sa beach to better understand different modes of speculation manifest in response to this new island project.

Speculation and Infrastructure

To make sense of reactions to this new island reclamation project it is helpful to first consider other speculative islands and marine infrastructure projects. There are a whole host of these to be found in other cities as well as in folklore, contemporary science fiction and urban planning. Writers, filmmakers and cultural critics have historically made use of imagined islands as ways to speculate about and comment on the future. From Urusla

LeGuin's archipelago world of Earthsea to the floating "L'Île à hélice" or 'propeller island' of Jules Verne (1895), authors have regularly made use of islands and archipelagos as settings for their stories and as means of satire and critique.

Toland (2017) evokes Verne's floating island in his writing about land reclamation in Hong Kong and refers to the convergence of different ideas and competing interests involved in such reclamation projects as a kind of 'infrastructural imaginary.' He traces a particularly Chinese infrastructural imaginary back to the Emperor's attempts to recreate Penglai, the mythical island of the immortals, in palace architecture. Toland emphasizes that the interests behind land reclamation in Hong Kong involve "intricate geopolitical maneuverings" and attempts to render spaces "as more economically and, especially, politically conducive" (Toland, 2017, p. 88). New reclamation projects fit into established political and economic contexts. Thinking critically about reclaimed land and other such large scale marine infrastructure, whether it be an entirely new island or a new bridge, involves situating them in terms of their immediate surroundings, including adjacent waters and nearby islands, as well as Toland's infrastructural imaginary.

Infrastructure also can trigger a wide variety of responses in people who witness it. Large urban transportation projects, like the Hong Kong–Zhuhai–Macau Bridge (HZMB), can be associated with national pride and positive feelings of future mobility; but such projects can also provoke ecological concerns and feelings of endangerment and precarity as people try to make sense of the potential impact of such large scale construction projects on the marine environment.

A growing body of scholarship across anthropology and cultural geography has focused on infrastructures and the affects, expectations and desires they can generate (Berlant, 2016; Larkin, 2013; Star, 1999). This includes consideration of the built landscape as well as projects under construction and those merely imagined. While writing on infrastructure can come from a confusing variety of different disciplines and approaches (Bosworth, 2023), a throughline in much writing on infrastructures is consideration of their visibility, how they can go both unnoticed as commonplace features of the landscape and function as spectacular forms of state and corporate interests. Star (1999) theorized that infrastructure is "normally invisible" but "Becomes visible upon breakdown" (p. 382). For Star, their very ubiquity makes them easily ignored and taken for granted. As the metaphor goes, they are like hidden plumbing that only gets attention when it is not working. Berlant takes up Star's theory of infrastructure but considers the breakdown more the rule than the exception. Extending Star's argument with a different emphasis Berlant continues, "when infrastructural things stop converging...we can see the glitch of the present as a revelation of what had been the infrastructure of the lived ordinary" (Berlant, 2016, p. 95). For Berlant these glitches form a kind of *glitchfrastructure* in which life can feel less like a smooth seamless flow of hidden machinations and more like a series of ruptures and breaks.

Larkin (2013) also argues against the invisibility of infrastructure, highlighting how states draw attention to their infrastructural projects to sell a vision of the future and unify citizens around this vision. He defines infrastructures as “built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space;” and later he even more succinctly defines them as “matter that enable the movement of matter” (2013, p. 328-329). These networks, “form us as subjects not just on a technopolitical level but also through this mobilization of affect and these senses of desire, pride and frustration, feelings which can be deeply political” (2013, p. 333). Bridges, roadways and factories can be a source of patriotism just as during their construction they can be a source of frustration and debate. Importantly, the affects they generate can shift too as infrastructures age and people’s experience with them changes too.

Carse & Kneas (2019) introduce into this literature on infrastructure an attention to the unbuilt and unfinished. They stress the need to study infrastructural “projects that were proposed but shelved or pursued but abandoned” (p. 23). Such projects present a different temporality than “project timelines presented by funders, builders, and boosters” (p. 10). Land reclamation projects exemplify this different temporality as there is a long list of proposed and unfinished land reclamation projects. Given that the timelines for completing such projects can also be quite long, there is clearly a need for a theory of infrastructure that accounts for projects that are incomplete, abandoned or otherwise in process. Speculation is a key method wherein publics and academics alike try to understand these unbuilt, unfinished and still in process projects.

Land reclamation routinely passes as an unremarkable component of urban infrastructure and yet can also stand out as a spectacular form, especially when it takes the shape of an entirely new island project. Writing about the extensive use of land reclamation in island cities around the globe, Grydehøj notes that infill is the most common type of land reclamation. He also argues that land reclamation “is in a sense singularly inappropriate” as a name for this practice as it “does not typically seek to ‘reclaim’ lost ground at all but instead extend solid ground out into new frontiers” (2015, p. 99). Grydehøj goes on to argue that it is this incremental process of land extension over time that has rendered much land reclamation largely invisible. After a couple of generations it may be hard for communities to even remember where the edge of the city used to be. This has also led to such land reclamation being largely understudied.

Along these same lines, one could argue that the prominent visibility of the proposed ‘ecological island’ project in Macao is due to its very distance from shore. Unlike earlier reclamation projects situated closer to shore or those that extended islands incrementally, this proposed new island roughly 1 kilometer from shore is clearly visible as a distinct offshore island. It may be that it is exactly because it is more removed and thus visible as a separate island that

it has garnered so much public attention; while the infill projects between islands so common to the region receive less attention. Whatever the reason, there is a clear difference in the community's response to this specific case.

Such island reclamation projects, due to their very distance from shore, can prompt a particular kind of speculation about their potential economic, environmental and societal impacts that speaks to older folklore and fantasies about distant islands. Whether inspired by Chinese folklore about Penglai and the land of the immortals or Western fantasies about an edenic desert island, islands clearly have a long history of embodying fantasies and fears.

Speculation can also take all kinds of forms. Speculation about islands certainly comes in many different literary and mythic forms. Speculation is also done at different scales from that of state and corporate interests to that of individual fantasies and anxieties. Speculation in architecture and urban planning often takes the form of 3d renders. Whether in stills or animations, these visualizations are replete with stock figures, anonymous joggers and other such staffage, used to attract investors and sell communities on the safety and necessity of a proposed new infrastructure project. Speculation does not, however, have to involve elaborate computer graphics. In its simplest form it can involve just looking at the materials at hand and making conjectures about what might happen or what might be found nearby.

People routinely engage in this kind of speculation through the materials and other living things they encounter. Anyone who has taken a walk along a beach and contemplated the origins of seashells, driftwood and other debris washed ashore has engaged in such speculation through things. This kind of chance and even idle speculation can have a critical component too. In writing of the "temporality of infrastructure" Appel & Gupta suggest the importance of decentering humans "to think about other time spans, the lifetimes of other things that shape life on the planet" (Appel et al., 2018, p. 20). Such material and multispecies attunement to different temporalities can shift one's focus away from everyday practical and financial concerns to consideration of the lasting ecological impact of new infrastructure and one's own relationship to such developments.

Witnessing from the Shore

In Édouard Glissant's essay *The Black Beach* he explores the affects of witnessing, what it feels like to be a removed observer contemplating the waters, sands and people that come together at the beach. In this essay Glissant does not directly address infrastructure but he does provide an example of a kind of situated speculation. In the essay, he reflects on the "subterranean, cyclical life" of Le Diamant, a black sand beach located on the southern coast of his island home Martinique in the Caribbean (E. Glissant, 1997, p. 121). In its black sands he observes an alternation between order and chaos embodied in the material ecology of the beach. As he poetically recounts, "The sand is the color of confusion, neither dull nor bright, and

yet it suits the quality of the atmosphere and wind" (1997, p. 125). Glissant attunes his readers to the very materiality of the beach and uses it as a means to consider the postcolonial context of the Caribbean.

In Glissant's writing on the creole experience of the Caribbean, the beach is more than mere metaphor. He sees in the confusion of the shore a way of expressing the experience of an African diaspora forcibly brought across the Middle Passage as part of the Atlantic slave trade. The mixture of different granules of sand parallels the different cultures and peoples brought together and so violently disconnected from their past. Subsequent writing on the Black Atlantic has also looked to unexpected materials to articulate this history. Pinnix (2019) highlights how the floating islands of sargassum endemic to the Sargasso Sea have provided a means for artists and writers to depict the entanglements of material and colonial history. This "new oceanic imaginary for the twenty-first century" connects with a history of "Caribbean writers and artists who have long theorized the ocean in terms of the violent convergence of environment and history" (Deloughrey, 2017, p. 33).

In his essay, Glissant also recounts the figure of a 'ghostly young man' wandering back and forth along the beach. The intentions and identity of this man are a mystery to Glissant. Faced with this lone silent figure and turbulent confusion of materials on the beach, Glissant accepts the enigmatic scene. Elsewhere he expands on this relationship to the other, arguing for a fundamental right to obscurity. As he puts it there is a "right to opacity for everyone" (1997, p. 194). This is the right to be not fully understood, the right to have differences that are not reduced to a universal understanding. This theory of obscurity is part of his 'archipelagic thought' which looks to articulate "a form of worldwide exchange that recognizes and preserves diversity and creolization" (É. Glissant & Obrist, 2011, p. 4). Glissant extends this to the material and nonhuman stating that "With archipelagic thought, we know the rivers' rocks, without a doubt even the smallest ones;" Wiedorn reiterates for emphasis and clarity that "the smallest, the most minuscule, must be considered and not overlooked or subjugated to grand ideas or abstractions" (2021, p. 3).

If we return to Hac Sa Beach with this archipelagic thinking in mind and crane our necks to the right we can just about see the section of sea where the new ecological island is proposed to sit. Unlike Glissant's near empty beach with its lone figure, Hac Sa Beach is a popular destination, regularly visited by tourists, families and workers seeking a break from the city's intense heat and crowds. On any given day you can see kids walking hand in hand with parents engaged in important beach activities like collecting seashells and building sand castles. Intrepid teenagers occasionally swim out into the silted waters accompanied close behind by middle-aged paddle boarders. But most visitors are content to stay dry and enjoy the beach with a barbecue chicken wing, selfie stick or beer in hand.

Glissant was writing from a different island, a different black sand beach but we can learn from his observations and situated poetic approach a way of engaging with Macao's own unique island infrastructure and set of colonial histories by focusing on the materials that have washed up on its shores.

White Dolphins and Environmental Attunement

Environmental concerns about the health of the marine environment in the Pearl River have taken place while the orientation to the sea in the cities of Hong Kong and Macao has changed. The majority of these urban populations are no longer involved in maritime industries like fishing and oyster farming. So even though it was in the waters of Macao that Peter Mundy writing in July of 1637 first described seeing what he called porpoises "as white as Milk" (1907, p. 171); now visitors and residents of Macao are less likely to be on a boat and thus less likely to be gazing out at its surrounding sea further reducing their chances of catching a glimpse of a dolphin or any other marine life for that matter. These days much of Macao's architecture is inward facing with its largely windowless mega-resort casinos aiming to keep tourists' attention focused on their gaming tables and shops rather than out at the sea (Grydehøj, 2015; Simpson, 2023). As such, Hac Sa beach and the smaller neighboring Cheoc Wan beach are two of the only places that have direct public access to the water.

In my time spent living in Macao and visiting its beaches for recreation, I have never seen a dolphin. I have, however, seen all sorts of things wash up on shore from the usual assorted plastic trash to driftwood, jellyfish and even once a propane tank that bobbed up and down in the tide seemingly with its own agenda. In addition to this flotsam and jetsam, there have been numerous reported cases of dolphin carcasses washing ashore. These have circulated online in the news and social media as confirmation of the negative impact of large marine infrastructure projects on the local dolphin population.

J.G. Ballard's short story, *The Drowned Giant*, recounts the discovery of another kind of body on a beach, namely the body of a giant. Roughly the size of a whale, the body washes ashore and gets the attention of the local residents. Ballard's narrator never explains the origin of this giant nor why it washed ashore. Instead he chooses to focus on the reaction of the local crowds to the body itself. These crowds become ever more intrepid and eventually start carving up the body to use as fertilizer ultimately leaving nothing of it behind on the beach but a memory. In analyzing the story Knowles (2018) seeks to provide some historical context by suggesting that Ballard may have been inspired by the real life case of whale carcasses being toured around England in the 1950s. In these reports audiences marveled at their size and remarked on their putrid smell, just as they do in Ballard's fictional account.

There are many such stories in fiction and folklore about sea creatures either sighted out at sea or washed ashore. In the current context of the Anthropocene marine fears have more commonly to do with rising sea levels and catastrophic weather events than sea monsters. In Macao, a city beset

in recent years by strong typhoons, these fears are based on very real events. Macao's population was, nonetheless, historically dependent on fishing and has well established folklore and traditions regarding the sea and marine life. This precarious industry meant that folklore and stories also developed around the risks and travails of being out at sea.

The story of A-Ma or Mazu is a key such story in Macao. In it A-Ma rescues a member of her family, alternately her brother or father, who is washed overboard during a storm. The A-Ma temple sits near the entrance of the Inner Harbour and attests to the significance of this mythology for the local community. There is also a modern statue to A-Ma in the A-Ma Cultural Center in Coloane. The 19.99 meter tall statue of A-Ma symbolically commemorates the year Portugal handed Macao back to China.

For the traditional fishermen and women of Macao dolphins are associated with A-Ma but also considered fishing rivals. In Cantonese dolphins are referred to colloquially as 烏忌白忌, or "black taboo white taboo" referring to the different colors of the calves and adults. This phrase also evokes the bad luck dolphins are thought to bring as they interfere with fishermen's nets and catch. Local attitudes towards dolphins also include positive associations with the 盧亭 'Lo Ting' or Fish People, a kind of hybrid fish and human merfolk who were believed to be the original inhabitants of the Pearl River Delta. This mythology was taken up by a group of artists curated by Oscar Ho in the 1998 exhibition "Hong Kong Reincarnated: New Lo Ting Archaeological Find" in order to explore ideas around Hong Kong's past and identity around the time of the handover (Chui-fun, 2022). In more recent years, dolphins have been used in Mainland China as a symbol of post handover reunification with the special administrative regions of Hong Kong and Macao (Du et al., 2024). Attitudes about the dolphin population in the region are clearly multiple but now consistently stand in as a marker for the ecological health of the marine environment. Attunement to the potential impacts of large scale land reclamation projects on the marine environment happens not just at the register of ecological concern but also takes place at the scale of individual dolphins and dolphin sightings.

Anthropogenic Archipelagos

Deleuze (2004) famously wrote of islands appearing in two ways, one continental and the other oceanic, the former breaking off from neighboring shores and the later rising up from beneath. He focused specifically on desert islands, considering their mythological origins and imaginary potential. One thing he doesn't include in his philosophical musings on island geography are anthropogenic islands, islands made from and for human interests.

Such artificial islands have become a popular model of urban development, what Jackson and Dora call "a speculative icon and emergent material form" (2009, p. 2088). Island real estate developments like The Palm and The World Islands in Dubai were designed to elevate its status as a luxury tourist destination, an aim beneficial to both state and corporate interests (Gupta, 2015). These islands mimic their namesakes when seen from above, a

distanced aerial perspective aimed at a global audience of potential investors and visitors. This fits with Goldman's theory of Speculative urbanism which he describes as "the logic of building "world-class" urban infrastructure, emerging in the late 20th century, deploying a spectacular imaginary on what could be in this new urban form" (Goldman, 2023, p. 372). Island smart city projects also make use of islands to appeal to sustainability. This use of island spatiality is more of a marketing approach than confirmation of any real ecological benefit to new island construction (Grydehøj & Kelman, 2016). New islands and whole new archipelagos offer a spectacular means of touting a city's arrival on a global stage.

Scholars working in Island Studies have sought to problematize visions of isolated or otherwise self contained islands by thinking about them in context. This includes thinking critically about the colonial histories and emergent financial interests that might inform them. It also involves understanding islands in relation to other islands as archipelagos. Thinking of islands in relation to their surroundings also extends to the waters around them. Hayward calls these *aquapelagos* and *aquapelagic assemblages*, proposing the terms "in order to provide an expanded concept of the territory and human experience of an intermeshed and interactive marine/land environment" (2012). The reclaimed islands of Macao are also best understood in relation to its surrounding waters and other nearby islands.

Other reclaimed island projects like Miami's Venetian Islands, Pearl island in Qatar and the Kau Yi Chao artificial islands in Hong Kong were also designed to appeal to a variety of different potential buyers and interests. They too were first seen from a distance. For the Venetian Islands developed in the 1920s this meant postcards and illustrations advertising a leisurely Florida lifestyle. For the contemporary Kau Yi Chao artificial island project this has meant computer rendered architectural flythroughs highlighting shopping centers and the conveniences of a new urban archipelago.

Such architectural plans and renders offer a future anterior vision of a world that could be completed in the future. To borrow from Wolf's writing on the use of computer graphics and simulations in documentary, island developments and their associated architectural plans and renders are "subjunctive" in the sense that they are concerned with "what could be, would be, or might have been" (Wolf, 1999, p. 274). Like many examples of futuristic cities and islands from speculative fiction, they give form to near futures that could soon be realized.

Architects routinely work in this temporal gap between the present and an imagined future. Projects like *Marine City* proposed in 1960 by Japanese architect Kiyonori Kikutake envisioned a floating city of the future. Kikutake's contemporary Kenzo Tange's 1960 Master Plan for Tokyo also envisioned extending the city out into the bay. Buckminster Fuller was similarly commissioned to design a floating city for Tokyo Bay, a project he called *Triton City*. None of these projects were ultimately realized as proposed but Kikutake's floating city concept was executed in part as a centerpiece

of the Okinawa Expo in 1975 called the *Aquapolis*. Whether realized or not, these floating city projects speak to persistent desires for solutions to expanding populations and fantasies of extending cities out into nearby bays through artificial islands.

In addition to artificial islands and archipelagos constructed for real estate, Pugh has drawn attention to the wide variety of “manufactured archipelagos such as wind turbine arrays, island military bases, and moving islands that create dynamic archipelagos, like fleets of military vessels or oil tankers” (2013, p. 12). Along the gulf coast of Texas and Louisiana, residents know that oil rigs blink and glow at night as if whole cities were lit up just off shore. An endless stream of tankers and container ships also occupy coastlines from the Gulf of Mexico to Singapore. This seemingly endless stream of ships creates its own kind of ‘manufactured archipelago.’ The near constant presence of these mobile floating islands can paradoxically render them invisible, just another routine part of the scenery. Habit and familiarity turn them into normal fixtures on the horizon.

We might extend Pugh’s ‘manufactured archipelagos’ to include clusters of islands formed intentionally and unintentionally by human intervention. These come in the form of ancient middens amassed by discarded oyster shells or alluvial islands formed by upstream disturbances of the natural flow of rivers and streams. The accumulation of waste material in Macao and its proposed formation into an offshore island is another kind of anthropogenic or manufactured archipelago. Whether planned or not, human interventions into the marine environment are clearly creating new environments.

A New Ecological Island or How Do You Name an Island?

The name of a new island is one of the first things a public might know about a proposed reclamation project. While Macao was still under Portuguese colonial rule, before the development of its more recent land reclamation projects, there had been a proposal to build ‘Ilha da Rada’ or ‘Island of the Harbor’ in the sea between the Macao peninsula and Taipa. This reclamation project was part of a proposal from Adolpho Loureiro, a Portuguese engineer sent to Macao in 1883 to address the silting problem that had begun to hinder the flow of ships and cargo into and out of the once busy inner harbor (Haberzetti & Ptak, 1991). Loureiro surveyed the hydraulic flow of the associated waters and proposed dredging canals and constructing a large mole to redirect currents to protect against further silting. Loureiro’s proposal was never realized due to its expense and trade further migrated to the deepwater ports of Hong Kong.

Now this area between the Macao peninsula and Taipa is populated in part by the Macao New Urban Zone. These reclaimed islands were named with just a letter, A, B, C, D, E1 and E2. If the newly proposed island off the coast of Coloane had just continued this alphabetical logic it would have been “F” and perhaps could have avoided any confusion surrounding the use of the term ‘ecological.’

One might think that the other names of islands in Macao would give some kind of precedent for how to go about naming such a new island. Taipa, a name confused by some foreigners as Taipei, has a very practical origin. It means rammed earth in Portuguese and derives from the walls that gave support to the city's early defenses. The Portuguese name of 'Macao' from which the English 'Macao' is derived was also more the result of a misunderstanding than anything else. It is rumored to be derived from a simple case of miscommunication as Chinese thought that the Portuguese were asking the name of the temple "Ma Kok" dedicated to the sea goddess, A-Ma or Mazu, when they first arrived in the region. The actual name "Ou Mun," meaning "Inlet Gates," has more to do with its strategic positioning at the mouth of the bay.

So neither Taipa, Macao nor its foundational mythology really provide a clear model about how to name this new island. Since this latest proposal has ecological ambitions it might seem appropriate to give it a name with a natural or more organic origin. It could be called 'Egret Island' or 'Oyster Island' given what one imagines would be its first inhabitants. There is precedence for this too; with the nearby Lapa Island translating to Limpet Island. Macao was also called Oyster Mirror referring to the glassy waters of the bay which helped make it a favored port. But none of these approaches seems to have stuck.

Macao sits at the southern mouth of the Pearl River, a region that contains numerous islands and placemaking traditions (Su & Grydehøj, 2022). The once popular regional name Pearl River Delta has been actively supplanted in recent years with the term Greater Bay Area, part of a concerted effort to reframe colonial area boundaries and stress regional collaboration. Writing about the neighboring cross board city of Zhuhai, Gang has shown how the narratives informing public perception of islands can be rewritten (Hong, 2017). This city of 'a hundred islands' has seen some of its islands variously rebranded as sites of leisure for a mainland tourism market and as enclave spaces for local residents (Hong, 2018). The island of Hengqin in Zhuhai has also been developed and rebranded with the hopes of serving as a financial and technology hub to rival Hong Kong. Its numerous high-rise office towers now crowd the coastline opposite Taipa. Hengqin also includes the University of Macau, a sprawling campus built on an area of reclaimed oyster farms which the PRC authorized Macao to govern in 2009.

This island on an island is where I live and work. Seeing the growth of the nearby Cotai Strip and the development of Hengqin led me to this article's central concern with the affects associated with witnessing large scale island development. From my apartment I can see the lights of the Chimelong Ocean Kingdom aquatic park at night. It's regular light shows illuminate the evening sky as do the occasional fireworks it deploys on special holidays. On my walk to work I can see both the new office towers being constructed on

Hengqin and the expanding concert venues and hotels of the Cotai Strip. This position in between different spectacular forms of urban development inspired this article.

Given this context of urban growth in Macao the naming of this latest proposed island as an *ecological island* seems all the more significant. The name suggests it will have some ecological benefit, a function different from the other reclamation projects in the region. As of September 2024, there has, however, been no statement on the exact ecological aims of this proposed island other than to state that it could be 'educational' in nature. While the Macao government has to date not yet laid out the ecological or preservation goals of this new island, it has commissioned studies on the potential environmental impacts of the new island. The result of these studies, as relayed by the government itself, is that the island would not impact the local dolphin population given the availability of other neighboring marine habitats.

What has received a lot of further explanation from the Macao government is the immediate need to deal with the construction waste that has accumulated with the large scale casino resort developments in Cotai and other such construction projects in the region (DSPA, 2024). The sole landfill to accommodate this waste is located in Cotai next to the airport. It is already nearing capacity with its 25 meter tall mass now clearly visible to arriving visitors. Given its land constraints, Macao incinerates some 80% of its waste (Jin et al., 2006). This still produces fly ash and other byproducts which must also be disposed of in landfills. Some of this waste produced in Macao can be sent to China where space is more readily available but most must be handled locally. It is for this reason that the proposed ecological island is the Macao government's preferred solution to this problem.

This approach of using unwanted construction waste to build new land is not unique to Macao nor is it new. It has been used in the past in Macao and in Hong Kong as well as other coastal cities from New York to Tokyo. The Environmental Protection Bureau (DSPA) of Macao has stated that the Semakau Landfill island project in Singapore is a direct reference for their own proposed 'ecological island' (DSPA, 2024). The Semakau landfill was first proposed in 1989 and began operation in 1999 with an estimated lifespan of 47 years. The Semakau site involved the relocation of communities on two neighboring islands which formed its initial footprint while the Macao proposal is for an entirely new island.

The term ecological island has its origins in preservation projects developed in New Zealand (Saunders & Norton, 2001). Given its unique geography and relative isolation, the biota of New Zealand developed without the influence of small mammals (2001). This meant that birds arose as dominant species with some evolving without the need for flight given they had no real competitors on land (2001). The later introduction of rats and other alien species had a dramatically negative impact on these endemic populations. In response to this the New Zealand government began to set aside certain

'ecological islands' or zones to preserve indigenous biodiversity and species (Russell & Broome, 2016). This concept has since been extended to geographic regions that feature certain species while being surrounded by terrain inhospitable to said species. In this way, such ecological islands do not need to be surrounded by water. They are instead clusters of endangered or otherwise threatened species and the microclimates and biomes that support them.

In contrast to the interwoven interests of manufactured archipelagos, part of a global supply chain, ecological islands point to the benefits of creating isolated islands. The island proposed off the coast of Coloane is a convergence of both, it is an isolated ecological island but it is composed of waste from a long chain of anthropogenic interests.

Sand and Accumulation

In speculative fiction, planets are often treated like islands, fodder for resource extraction. In writing about the fictional planets featured in Frank Herbert's *Dune*, Callaway (2020) shows how speculative fiction draws "heavily on the trope of the island paradise" continuing "the great tradition of colonial writing on islands" that treats them as "exotic and idyllic (or potentially idyllic) places" (p. 123). Fictional planets, like fictional islands, provide a place for fantasizing about the riches and resources that are contained within them.

Fantasies of resource extraction historically have centered around minerals like gold and diamonds, as well as fossil fuels and other materials vital for industry. Sand is less commonly thought of in these terms even though it is also a nonrenewable resource and part of a large extraction industry. It is a critical material used in a wide variety of industries; and like infrastructure, it can also hide in plain sight. It is a common component in building materials from roads to sidewalks and bridges, not to mention buildings themselves. William Jamieson has written extensively on what has been called the "global sand crisis" and the industries that ship sand from remote riverbeds and beaches to building sites and urban centers (Jamieson, 2023, 2024). Land reclamation projects in cities from Singapore to Macao rely on such imported sand for their expanding urban development.

Sand is also ancient, made of minerals and materials ground down slowly over time. As particulate it has a way of getting around. It is alluvial, carried by streams and rivers, deposited on riverbanks and coastlines. It can also be airborne. Zee (2022) writes about how particulate from the Gobi desert circulates throughout China affecting its weather. Timothy Choy's (2011) ethnography *Ecologies of Comparison* similarly explores how particulate in the air is quantified by various stakeholders in Hong Kong, from environmentalists and community groups to government agencies. Zee and Choy's ethnographic work shows that even the smallest particulate can provide a non-human or more-than-human lens through which people make sense of the developments around them. So too in Macao, the accumulated

construction waste amassed by Macao's rapidly expanding gaming and tourism industries and the eroding black sands of its largest beach can provide different ways of thinking about the ecology of Macao.

Hac Sa Beach is noted and promoted for the black color of its sand which gives it its name. The black sand of Hac Sa is, however, not composed of the same material as Glissant's Diamant and other more famous black sand beaches. Many of these more well-known black sand beaches are composed of basalt deposited by volcanic activity that has been slowly ground down into sand as is the case in the black sand beaches of Hawaii. There are still other black sand beaches formed by placer deposits of magnetite and iron rich minerals. These black sands are commonly found alongside alluvial deposits of gold as both are relatively heavy metals that collect and pool in fixed points in rivers and shorelines. Such placer deposits on beaches are in part what led thousands of Chinese to travel through Canton and Macao to the Pacific coast of North America. The scale and impact of beach mining can be seen in [Figure 3](#) where in 1899 such gold deposits were found on beaches in Nome, Alaska. This brought a rush of prospectors that transformed the once quiet region into a host of competing mining operations. These beach mining operations continue to this day and now extend into the waters just off shore as global climate change and the warming of sea temperatures in the Bering Sea have made such offshore operations increasingly viable (Rosen, 2021).

The particles that give Hac Sa Beach its color, however, have not attracted much attention as a resource. Its sands are of "fluvial-marine origin" and contain "a wide range of mineralogical components, mostly derived from local lithologies, where the high percentage of chlorite, biotite, clay and oxides often confers them a dark color" (Quelhas et al., 2021, p. 265). The color of its sand is also said to be due to the presence of glauconite, a mineral commonly known as greensand or greensand marl, a marine sediment formed during the Cretaceous period composed of decaying algae and other biomatter (Neuendorf et al., 2005, p. 283). In Europe it has been used since the Renaissance as an underpainting pigment for skin tones called verdaccio, Terre Verte, or Green Earth. It has also been used as a fertilizer and later as a substitute for limestone in the production of cement. The intensity of the black sand color of Hac Sa has been diluted by the effects of erosion and the subsequent addition of new yellow sand to hedge against further loss. Concerns about the integrity of Hac Sa beach and its unique black sands first manifested with the construction of the Westin Resort which opened as a golf course and resort hotel on the eastern edge of the beach in 1993. The beach was impacted by the disposal of sediment off its shores and the reclamation of land along its sides (Oliveira, 2006). This created conditions for erosion and later the necessity to import sand to shore up the beach.



Figure 3. Nome, Alaska, 1900. (1900). [Print, Electronic resource]. Library of Congress: Prints and Photographs Division. Retrieved from <https://www.loc.gov/pictures/item/2017760251/>.

Sensitivity to the eroding sands of Hac Sa beach and the health of the local dolphin population are two ways in which people have speculated about the potential environmental impacts of the newly proposed island off the coast of Coloane. Standing on the mixture of new and old sand at Hac Sa Beach one can only imagine this new offshore island and the influence it might have.

Further Speculation

Reclaimed islands are commonly part of archipelagos; they exist in relationship to other islands not in isolation. They are also part of infrastructural imaginaries that inform how they are seen and understood. Glissant's writings remind us that islands and the marine environment are also informed by colonial histories and personal experience. Turbulent winds and waves have carried peoples and cultures across the Atlantic and across the Pacific. It can be difficult to encompass all of these different histories but new infrastructural changes to the sea present an opportunity to reflect on them. Large scale marine infrastructure projects on the horizon raise questions about why they are being built and for whom. The pervasiveness of such developments in Macao means that they can also go unnoticed as unspectacular forms. Small changes or matter out of place, however, can

be one way to register these changes. In this way large developments are registered in minutiae, in the smaller matter like grains of sand that find their way to shore.

White dolphins, black sand and other materials washed ashore on the beaches of Macao have led to speculation about the impacts of regional development on marine life. Such speculation can be a means of visualizing future ecological devastation; but it is not only this. It is also a means of imaging alternatives. As sea levels rise and climate futures become increasingly part of public discussion and government policy decisions, the sea looks less like an endless resource and more like a shifting set of concerns. Speculation is a tool of statecraft, real estate developers and extractive industries. In fiction and in imagination it can also be a tool for individuals, communities and publics to envision alternative futures. Whether seen from the shores of Le Diamant in Glissant's Martinique or Hac Sa Beach in Macao a speculative island could appear off the shore of any seaside community. What it does and what impacts it has remain to be seen.

Indulging in a bit of closing speculation, we can imagine what would have happened if gold had been found on the shores of Macao instead of all the way across the Pacific. How many lives and family histories would have been changed? The lack of gold or other rare minerals along Macao's shores has meant that it has avoided the environmental impacts associated with industrial resource extraction but it is ironically the remnants of its large scale gaming industry that have created this surplus of construction waste and the need for a site to dispose of it. Financial accumulation has transformed into material accumulation, presenting its own opportunities and problems.

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