VII

It's All Fun and Games Until Someone Loses an Island

". . . You're not helping. Why is that?"

In a walnutshell:

Modern Convenience v Modern Conservation >
Biogenesis v Abiogenesis >
Do v Die >
Swim v Sink >
Now v Never >
Sinking the Stage v Raising the Stage

Three Blind Mice/Three Crooked Dice

> A bit of wisdom is indeed possible; but I found this blessed certainty in all things: that on the feet of accident they would rather – dance. Oh sky above me, you pure, you exalted one! This your purity is to me now, that there is no eternal spider and spider web of reason: – that you are my dance floor for divine accident, that you are my gods' table for divine dice throws and dice players.
> – Friedrich Nietzsche, *Thus Spoke Zarathustra* (2006 [1884])[325]

Fig. 14: "Mertle," green turtle (*Chelonia mydas*), Raine Island Recovery Project, Raine Island, Australia, 24 December 2016.

Mertle, Tokolou, and Turturi are three female green sea turtles of the species *Chelonia mydas*. So named in 2016, following their capture by park rangers and conservation biologists, who glue satellite tags to their shell tops, and spray-paint

325 Friedrich Nietzsche, *Thus Spoke Zarathustra*, ed. Robert Pippin (Cambridge: Cambridge University Press, 2006 [1884]), 178.

large 'X's across their shell centres. Satellites then monitor their behaviour for the next 12-odd months, until shell growth dispels the tag, causing it to fall to the sea floor. Now anonymised, once more. But this is not their first capture, track, and tag: more detailed data shows that for Mertle this goes back to 1992, for Tokolou, 2006, and for Turturi, 1984.[326]

In the more recent taggings and trackings, however, the gameplay and its stakes are altogether different. These turtles three are the only ones named in a publicity campaign for an experimental conservation project in 2016. The relevance of the traditional, familiar forms of conservation – 'yesteryear' conservation – is disappearing at an exponential rate. Conservation ideas and concepts, say of 2006, 1992, or 1984, are rendered completely nonsensical, because for these turtles, as well as life-at-large, the world a few decades ago may as well be another geological and climatological epoch. There is no way to compare conservation from the halcyon yesteryears of the twentieth century with the experimental approaches coming to the fore today, let alone with ever more interventionist proposals for the future.

These turtles three have borne, and still bear witness to this transition from recent conservation ideas to current conservation ideas. The former refers to those mainstays of post-World War Two environmentalism: David Attenborough docudramas, Greenpeace, proximal campaigns for singular bioregions and/or singular species. Save the Whale. Save the Panda. Save the Bee. The latter is really just a shorthand for ModCon – Modern Conveniences, or rather, Modern Conservation – because such emerging approaches pivot on technofixes that share their lineage with anthropocentric conveniences that manipulate the environment, such as air conditioning. If your house is uninhabitable at its ambient temperature, can the ModCon of air con instead control your domestic microclimate?

Applied to the plight of the more-than-human world, such Modern Conservation takes Frankensteinian forms of intervention that appear more like science fiction than environmentalism: intervention ecology, assisted evolution, synthetic biology, climate engineering and the like.[327] Despite seismic differences in scale, method, and medium, all seek a timely answer to the burning question: if the base causes of climate change (capitalism, consumerism, human exceptionalism and individualism,

326 Andrew Dunstan and Katharine Robertson, *Raine Island Recovery Project: 2016–17 Season Technical Report to the Raine Island Scientific Advisory Committee and Raine Island Reference Group* (Brisbane: Department of National Parks, Sport and Racing, Queensland Government, 2017), 13.

327 Oliver Morton, *The Planet Remade: How Geoengineering Could Change the World* (Princeton: Princeton University Press, 2017).

not to mention utter political and social inertia) cannot be curtailed, can ModCon instead ameliorate some of the consequences?[328]

The answer to the former is self-evident: domestic climates can be controlled in the short term here-and-now with air con. But so doing collectively induces long-term chaos in the planetary climate there-and-then, which will then encompass all here-and-nows too. Shut off the air con of equatorial cities, as well as cities that have been transformed into urban heat islands, and they become instantly uninhabitable. Keep them habitable in the here-and-now through air con, but when exacerbated climate change consequences – partly exacerbated by air conditioning itself – arrive on our doorsteps, all homes will be uninhabitable, air con or no air con.[329] All technofixes actually do is disguise the true cost of ModCon, which is the undermining of the future for the same civilisation it now comforts and upholds. More sinister, technofixes fundamentally undermine the biosphere to which this so-called civilisation is hitched.

The answer to the latter is the subject of Act III, because this seemingly innocuous proposition in fact encapsulates the most pernicious game of dice ever played. The outstanding question is whether desperate Modern Conservation measures will not only fail, but exacerbate planetary biophysical chaos through thwarted casts of the die. After all, these conservational dice are thrown in a way that reverses the logic of the universal sigh, tasking our comprehension of the world with fulfilment of a desire to intentionally influence the planet's changeability, and control the consequences of experiments undertaken with that intention.

Recognising the abject failure of the Dire to placate the demon with soothing nursery rhymes of sheltered worldviews and human-scaled ideas of rupture and refuge, the Dice sings instead of outright biophysical manipulation to coax it back into its bottle of containment. For even though a dire demeanour is premised on comprehension of cosmic changeability and its consequences, only a dice demeanour seeks to wager with this premise, assuming one can "become smart enough to control"[330] the demons. A feat that depends on the kind of macro-comprehension that we think we have, even as Stegosaurus stands before us and laments how "we all have a brain about the size of a [rockmelon née] walnut."

As if the prospects were not already dire enough, in a universe that was not already dour enough, the walnutshell-sized comprehension now seeks to control

328 Holly Jean Buck, *After Geoengineering: Climate Tragedy, Repair, and Restoration* (London: Verso, 2019).

329 David Wallace-Wells, *The Uninhabitable Earth: Life after Warming* (New York: Tim Duggan Books, 2019).

330 Berry, *Standing by Words*, 65.

the demons by wager at "gods' table for divine dice throws and dice players," who, as Nietzsche reminds us, "on the feet of accident they would rather – dance."[331] This is where Nigel Clark's earlier ideas about "my gamble, with the usual provisos about decision-making under conditions of unknowability"[332] comes into play. This is a gamble on increasingly radical proposals for conservation (so-called, for it is a tautology to propose to conserve an organism by manipulating biophysical environments ranging all the way from cell to sky), and the idea that they can remain in step with massive and brutal biophysical changes already occurring across every sphere of the planet.

Against always out-of-reach "conditions of unknowability," we now want to stake it all on a wager at the "table of the Gods." But this is no game of chess, immortal or otherwise: this will manifest chaos not just in the order of ecosystems, but in evolution. Not just in a species here, a genus there, a family or two. At the table of the Gods, we play for impact at the level of order, class, and phylum, from here into the inconceivably distant future.

If ModCon are desperate measures for desperate times, they face down prospects rendered deceptively simple by the sheer enormity, speed, and scale of the rupture as it now unfolds around us: as simple as the old adages of Do-or-Die, Swim-or-Sink, Now-or-Never . . . It would appear to be a no brainer that we should *do* and *swim* right *now* to the absolute limit of our capacity, given the alternative is to *die* and *sink* into the *never* of mass extinction. Like Frankenstein, the loss involved in doing nothing is so great that those pursuant to the Dice will hedge no bets in this gamble, meaning the only end results can be victory, or forfeited hands and defeat.

If all spoils go to the victor, then what would such spoilage entail? In such a desperate pursuit, *doing* and *swimming* right *now* does not allow for the luxury for Bataille's humility toward cosmic vicissitudes, because steering clear of *dying* and *sinking* (or indeed, capturing *now* before it disappears into *never*) requires the hubris of Fuller's *Spaceship Earth*, the end game envisioned as a managed Noah's Ark of as much of the more-than-human world as is necessary to ensure human survival. The original *Blade Runner* film took place in a 2019 devoid of non-human life, while its sequel is set in 2049, following full scale ecological collapse in the 2020s.[333] As it turns out, both films may only have been off by a year or so.

Part of learning to sing a new song is learning new words, especially as so many words inherited from old worlds, like 'conservation', no longer apply for

331 Nietzsche, *Thus Spoke Zarathustra*, 178.

332 Clark, "Volatile Worlds, Vulnerable Bodies," 33.

333 Denis Villeneuve, director, *Blade Runner 2049* (Warner Bros. Pictures, 2017), 35 mm.

what now lies on the table. In 2002, Tim Low sang the emerging lyrics for ModCon in his book *The New Nature*:

> That's what conservation management will be like in the future – laced with irony. Old mines will be saved for bats, and pine plantations kept for endangered cockatoos. Experts will argue about the ecological value of weeds. There will be less clarity of purpose (do we recreate the past, preserve the present, or usher in the future?) and more potential for misguided actions. Intervention, after all, is more difficult than a hands-off approach . . . Conservation is intervention, and intervention isn't easy.[334]

The term Intervention Ecology has since become the accepted surrogate for dead-in-the-rising-seawater 'conservation.' Plant biologist Richard Hobbs, from the Ecosystem Restoration and Intervention Ecology Research Group at the University of Western Australia, confesses how difficult it is to sing this new song:

> The term intervention is itself loaded and has militaristic overtones as a result of recent popular usage. It is certainly not the nurturing term that restoration is, and it is hardly likely to engage communities in ecosystem management in the way restoration does. It seems unlikely that a community group would label a site being manipulated with 'Intervention in Progress' (although this would transmit a more realistic message).[335]

As technoscientific intervention, ModCons bypass the impasse of societally-structured causes of climate change. Technofixes do not fix societal causes, nor do they seek to. They are what remain on the table when what should have been done – a dramatic and sustained decrease in greenhouse gas emissions, alongside all other human-induced biophysical change – faces the stark reality of what was done – a dramatic increase in all forms of human-induced biophysical change. They are what remain when the table at the United Nationals General Assembly in Manhattan is going underwater. Its banner that should have hung behind Margaret Thatcher's address in 1989, now hangs in tatters, still surmising that *It's All Fun and Games Until Someone Loses an Island*. Nowadays, any such address from the twentieth-and-second-to-last century merely denotes what was needed way back when, before the two-degree guardrail became a game of two-too-little, two-too-late.

Nowadays, what could or should be done bears little relationship to what could have been done, should it have been done when there was still time. Add to this the temporal gap that is rapidly closing between what could be done – in the form of radical ModCon – and what should be done if seeking to thwart extinction by throwing the biosphere a lifeline through technoscience. Given the manifest

334 Tim Low, *The New Nature* (Sydney: Penguin, 2002), 301.

335 Richard Hobbs et al., "Intervention Ecology: Applying Ecological Science in the Twenty-first Century," *BioScience* 61 (2011): 447–448.

failure of policy instruments to curb any such social excesses, biophysical interventions are proffered as workaround.

Now our Desert Tortoise dilemma, having already opened up a portal to the World Turtle, comes crashing back to earth, through the turtles three. Mertle, Tokolou, and Turturi are not conscripted into ModCon due to the existential plight of their sole species, or even existential plight at the scale of Tu'i Malila and her *Geochelone radiata* species, let alone that of Lonesome George, as the endling of the *Chelonoidis abingdonii* species. Rather, what is at stake is the fate of their entire superfamily *Chelonioidea*, encompassing all of these turtles and our problematic desert tortoise as well. As a team of conservation biologists remarked in their 2018 article "Where Have All the Turtles Gone, and Why Does It Matter?":

> The fate of turtles is especially tragic in light of their distinction as paragons of evolutionary success. They survived everything nature could throw at them from both earth and outer space (for example, the asteroid that wiped out the dinosaurs), but will they survive modern humans?[336]

Looking at the present tense through a deep-time lens, these turtles three are synecdoche for the plight of life-at-large. Their "fate" entwines their superfamily's 120-million-year record of enduring not only the two Mass Extinction events prior to this one, but also all the many varied unnamed ruptures that are part and parcel of long-term survival. Here again, an echo of the universal sigh: turtles lived through Chicxulub, as well all the other "whenever[s]," only for the 'whenever' unfolding now to render them highly precarious and endangered. To opt to roll the dice against such prospects is not in keeping with fidelity to cosmic vicissitudes, but rather to claim fidelity toward the guilt of causing the rupture, or the ethics of triaging lifeforms that it imperils.

The turtles' "fate" also raises the ominous question of whether the rupture unfolding will be their final undoing. With 120 million years of continuous existence, now is not the first time *Chelonia mydas* have found themselves caught on the chessboard between the Court Jester and the Red Queen. But it is the first time they have shared that chessboard with modern human society.

This society currently proposes various Modern Conservation efforts directed at the superfamily *Chelonioidea*, and these ModCon proposals for turtles are a microcosm of attempts to respond to the rupture. In this way, the microcosm also provides a portal into the biophysical limits to life. Part VII explores dice thrown at the

336 Jeffrey Lovich et al., "Where Have All the Turtles Gone, and Why Does It Matter?" *BioScience* 68, no. 10 (2018): 772.

scale of one island and one superfamily of species, with the relative scale of knock-on effects to interconnected species and ecosystems. Part VIII explores dice thrown at the level of an entire class of species, distributed all around the planet along the tropics, with correspondingly greatly increased stakes for many more species and ecosystems. Finally, Part IX explores dice thrown at planetary scale inhuman forces, in a one-shot operation to cool the climate. Those stakes could not be higher, as that cast of the die will foreshadow what comes between earth and the sun, and thus all life which depends directly or indirectly on photosynthesis.

Together, the three crooked throws of the dice run the gamut of what *on earth* Modern Conservation means at all scales, from atom to atmosphere, and cell to sky, and raise global dilemmas over what conservation could, or should, become. Running counter to the throw of the dice is the cold comfort of the perennial universal sigh, and the Dour's acquiescence to how, even if desperate times call for desperate measures, the response can only be measured against its one true correlate – the cosmos. And beside the cosmos, the dice and the rupture they attempt to ameliorate are drops in a temporal and spatial ocean. In response to the "future likelihood of crossing climate thresholds"[337] the Dice offers a reflexive response to Detective Holden's vexing question: "*You're not helping. Why is that?*", while the Dour maintains that any available help amounts to nothing more than an empty gesture.

The reflexive human response to the plight of Mertle, Tokolou, and Turturi sought to understand the question of "Where Have All the Turtles Gone, and Why Does It Matter?" by tracking where turtles are going at present. Peering down on them from satellites over 2016 to 2017 confirmed some staggering feats of green sea turtle migration, including that they swim up to 2,500 kilometres to reach their nesting site, from as far as Vanuatu, Indonesia, and Papua New Guinea. Each nesting migration is an unvaried return to the exact beach of birth, navigating via earth's magnetic field. A field which has aperiodically flipped polarity many a time, at random intervals without rhyme or rhythm, while their homing beacon fixates on points in space and time as fluid as the rise and fall of entire continents, when one's habitation extends over 120 million years.

For these turtles three, their sole destination is a drop in the ocean: Raine Island.

337 Clark, "Volatile Worlds, Vulnerable Bodies," 33.

Game On

> I'll stand on the ocean until I start sinkin'
> But I'll know my song well before I start singin'
> And it's a hard, it's a hard, it's a hard, it's a hard
> It's a hard rain's a-gonna fall.
> – Bob Dylan, "A Hard Rain's a-Gonna Fall" (1963)[338]

Raine is a microcosm for how life did not happen on, but rather to, earth. After all, the island is biogenic. Like all coral cays, its origins lie not only in a lifeform (coral), but also in the death of this same lifeform, composed, as it were, of skeletal coral remains. In the beginning there was a disruption to ocean currents, as living coral entangled passing waters through their reef structures simmering just beneath the sea surface. By slowing down water directly above the reef, sediment carried by currents became deposited on top.

Meanwhile, petrified dead coral became broken into smaller and smaller pieces by the grinding and reductive vicissitudes of oceanic motion. Those pieces also get entangled in the slowed ocean currents, creating further deposits atop the reef. Add skeletal remains from other animals and plants as well as abiotic sediment and the makings of a new landmass are born.

Bit by bit, year by year, century by century, coagulating sediment forms protosand that becomes a lagoon, then a beach, and finally an island. From little things, big things grow. From little things, big things growl. Recall the World Turtle: while turtles do not make the world the way coral makes islands, an earth built on infinite layers of petrified organisms is not mere metaphor. In the case of Raine, sediment started congregating immediately downwind of sea surface coral around five millennia ago. Over the following millennium or two an island formed out of the open ocean.

The biogenic formation and ongoing reformation of Raine Island itself demonstrate the dour forces at play when a species whose tenure on earth extends a mere 200 millennia threatens a species whose tenure extends 120,000 millennia, on a planet that has flipped of its own accord many-times-more than one would dare imagine. While current game play is about human attempts to configure a *New World Coming* for Raine, the biogenesis of this island's microcosm reveals how this is neither the first or last time a world has come into, or out of, being. Via biogenesis, life itself has been part and parcel of configuring many-a-world many-a-time before.

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338 Bob Dylan, "A Hard Rain's a-Gonna Fall," track 6 on *The Freewheelin' Bob Dylan* (Colombia, 1963), LP.

For this microcosm, life had thus far happened from the bottom-up: built upon ocean, sediment, and coral corpses. Once Raine became an established land mass not only year-round, but year-in-year-out, life then happened to this earth on a whole other level. For coral is not the only way life (or at least life's excrement) is literally woven into the island's fabric itself. Next came an earth suffused with life from the top-down: shit happens. And it happens from the sky.

Biogenic contributions to creating Raine came from guano, when dried birdshit accumulates on a semi-solid foundation, say rocks or sand above sea level. Guano reacts with existing sand, sediment, and water to make top-down bedrock, a mirror process to how coral aggregate sediment to make bottom-up bedrock. The guano bedrock then lays the foundation for soil and grass to form, which add to existing attractions for birds to nest. This creates more guano, which amplifies the cycle of shit-fuelled land ho!

To the naked eye it appears obvious how coral change cay geomorphology: no coral = no island. But the way guano can change cay geomorphology is hidden from plain sight. Chemical reactions started by the birdshit catalyse "a unique form of reef island in which a phosphatic cap formed from the downward leaching of guano plays an important part."[339] While this process is endemic to all phosphatic cap islands, "unique" refers only to Raine, for reasons borne out by this island's creation and features, which make for a microcosm of earth.

The sentence comes from *Raine Island: Its Past and Present Status and Future Implications of Climate Change*, a 2008 report by geomorphologist David Hopley. The sentence's abrupt ending begs a cascading series of questions: "an important part" in what? Important in catalysing Raine? Important for Raine's resistance to oceanic erosion? Important for marine and terrestrial life which depend on Raine for breeding and nesting?

The possible answer – a definitive answer is absent from the 101 pages of the report – encapsulates how the Dour, Dire, and Dice trio are interwoven within this microcosm. Because what the report does state is that the guano-phosphate cap has life and death consequences for turtle nesting. Given turtles' drive to nest only where they are born, nesting sites are the existential thread connecting successive generations. And given Raine is the largest remaining *Chelonia mydas* nesting site in the world, and thus the most important green sea turtle rookery, the stage makes for a telling tale of the Dour, Dire, and Dice trio.

339 David Hopley, *Raine Island: Its Past and Present Status and Future Implications of Climate Change: Project Report* (Townsville: School of Earth and Environmental Sciences, James Cook University, 2008), 1.

Since geographically distinct populations of *Chelonia mydas* do not interbreed, each is effectively contained to its respective nesting site. The only other population in Australia, some 2,000 kilometres south in the Southern Great Barrier Reef, makes Raine the primary preserve of the entire Northern Great Barrier Reef population. In addition, Raine's rookery has the longest known use in the world, having nurtured turtles for at least the last millennium.

Thus the story of Raine Island takes us from Mertle, Tokolou, and Turturi to *Chelonia mydas*, then to turtles-at-large, and beyond to life-at-large, because turtles are but one of many lifeforms dependent on this drop in the ocean. 130 years of European observations have identified 84 bird species nesting on Raine, making it "one of, if not the most important tropical seabird nesting site on the Great Barrier Reef."[340]

And, like green sea turtles' mammoth migrations, the birds connect Raine to distant corners of the globe. This island, a mere three-square kilometres, 100 kilometres off the mainland, is globally interconnected to distant corners of the planet by the migratory feats of those nesting there. If Raine is a drop in the ocean, it shows how all drops are connected far and wide.

Mertle, Tokolou, and Turturi were born before 1981, when the global importance of the refugia was first recognised by establishing the Raine Island Corporation. These turtles three herald from the last generation before the geomorphology of the phosphatic cap began to play "an important part" in the survival of their species. By the time Hopley published his 2008 report, the stakes around the refugia's protective status had been raised, and the island's management had been transferred from the Corporation to the Queensland state government just one year prior. The stakes were raised again when it was subsequently reclassified as a "Nature Refuge" and then as a "National Park (Scientific)." The latter holds the most stringent status and highest level of protection in Australian law, including limiting all access to "scientific research and essential management only."[341]

Talk, though, is cheap. While it is already dubious whether such strictures hold up at the scale of Raine, at a planetary scale all legal protections are revealed to be null and void for the present tense. Arbitrary boundaries that demarcate a "Nature Refuge" are empty gestures against underwater heatwaves-cum-heatfloods, when warming waters never subside and rising waters never recede. The same goes for arbitrary boundaries that demarcate a *Spaceship Earth*, which sails at the behest of

340 Hopley, *Raine Island*, 13.

341 Peter Beattie and Lindy Nelson-Carr, "World's largest green turtle rookery given highest protection status," ministerial statement, Record of Proceedings, First Session of the Fifty-Second Parliament of Queensland, 22 August 2007, 2727.

forces that will never respect its boundaries. The stakes extrapolated from this microcosm of earthly biogenesis and now subjected to human geological agency are neither a superfamily of reptiles or a seemingly isolated drop in the ocean. At stake is whether "a hard rain's a-gonna fall," drowning Raine, its turtles, the World Turtle with it, and with that, the world.

Ramping Up

> One of the most profound (if initially counter-intuitive) effects of Anthropocene discourse is to disclose the radical asymmetry of human and non-human forces . . . It prompts us to consider the extent to which all human life remains utterly dependent on geologic and biological conditions bequeathed to us by Earth and cosmic systems. And reminds us that our existence is reliant on certain states or regimes of Earth systems that in many cases represent only a narrow range of their potential operating spaces.
> – Nigel Clark, "Geo-politics and the Disaster of the Anthropocene" (2014)[342]

Life happening *to* earth has vastly different repercussions for those who *act upon*, rather than *intervene with*, the earth. Raine's biogenesis, through coral catalysing bottom-up deadrock and guano catalysing top-down shitrock, is without intention or design. Yet bottom-up/top-down biogenesis was only the beginning of life happening to this microcosmic earth. While Raine is composed of coral and birdshit that randomly happen *to* the island, it is continually recomposed laterally by turtles, whose intervention is intentional.

For a turtle, intervening with an environment is far more likely to yield negative consequences for the actant than for the environment, even when directed at immediate ends. Coral-caused island bottoms or birdshit-caused island tops are incidental for the ongoing life of coral and bird respectively. Both are largely after the fact creations, where 'the fact' equals deposited exoskeleton and tissue upon coral death, and deposited excrement upon migratory bird passage. The turtle's contribution, however, happens during the fact, bringing adult and hatchling alike into chance-based games of life and death.

Just as "we build our houses on the earth," turtles too build their houses, or nesting burrows, on the World Turtle. Wherein, their existence becomes entangled with earthly vicissitudes. For fledgling turtles, earth is incubator and protector. Burrows keep eggs warm enough, cool enough, and dry enough, and hold them deep enough and long enough to hatch without respectively being cooked, drowned, eaten, or prematurely unearthed. Each existential challenge is just a

342 Clark, "Geo-politics and the Disaster of the Anthropocene," 27.

smattering from biophysical limits to life. Too hot = die inside the egg. Too cold = insufficient growth inside the egg. Too much water = drown inside the egg. Too little water = dehydrate inside the egg. Yet the turtles' unwavering instinct to only burrow into the soft sand of their birth beach brings their plight into infinitely regressing layers of chance, layers resting on layers resting on layers, until it is turtles, born and unborn, all the way down . . .

Such is life (and death) for green sea turtles. But on Raine the "unique form" of solid phosphatic rock poses distinct existential challenges. During nesting season upwards of 20,000 individuals may burrow at the same time, redistributing so much sand over the island that they unintentionally construct ramps from the beach to the raised phosphate centre. In search of better sand for burrowing, or due to overcrowding of other turtles on the beach, some climb these ramps to nest on the raised central platform.

These ramps are the only means up or down, because the edge of the phosphate platform has eroded, creating a cliff with a metre or so drop to the beach below. Platform hatchlings then need the accidental ramps created by adults to still be there so they can get down onto the beach and into the sea. The first existential challenge for those platform birthing or hatching is to be able to ramp down, with all the entailed vicissitudes. Because a ramp constructed today is as ephemeral as tomorrow, given the winds, hurricanes, surf swell, or burrowing by subsequent turtles over the 60 days of incubation.

For adults though there is an additional predicament, both cognitive and proprioceptive. *Chelonia mydas* live their whole lives in water, other than when on Raine. Being on land is the exception to their rule: following birth, the first 40 years are spent at sea. Having reached maturity, the females then return to the beach of their own birth once every two to four years for a nesting season, nesting four to six times per season. Having swum up to 2,500 kilometres to return to Raine, they haul a 130-kilogramme torso across tropical sands in 35 to 40°C heat, negotiate their way through the thousands of their kind doing likewise, locate a site, then burrow for hours on end to create a nest. By the time they finish laying their eggs their energy levels have plummeted, making for a dehydrated and delirious return to sea.

With energy repositories barely sufficient to provide motion toward the sea, the wherewithal to search for a ramp is wanting. Unable to negotiate the cliff edge, many exhausted turtles fall over, landing on their back on the hot beach sand. Enter a human, confronted with a turtle: "*The tortoise lays on its back, its belly baking in the hot sun, beating its legs trying to turn itself over, but it can't . . .*" intones Detective Holden.

Back-to-front turtle flipping has subsequently become an endeavour whenever scientists and park rangers visit Raine during nesting season. They walk the

cliff base perimeter, stepping around those nesting on the beach, to manually flip hundreds of turtles back onto their front. At first, staff drag them on surfboard like platforms across the beach to get them back in the sea. As demand increases, they introduce little diesel-powered tractors to wheel them back into the sea. So far one would be hard pressed not to follow suit: why *on earth* would one not flip a turtle onto its front? But then how *on Earth* can this microcosm be scaled up to the incomprehensively larger and more complex macrocosm of earth?

Manual turtle flipping is a reactive intervention, meaning the reaction follows after an event has occurred. Reactive interventions suffer from bleedingly oblivious intrinsic limits, especially when applied to human-caused environmental damage. First we create catastrophes, and then reactively attempt clean-ups that are often completely insufficient and haphazard. A reactive mentality is already problematic for discrete incidents with proximal cause-and-effect chains, such as oil spills. But it is absolutely delusional when confronted with distal nonlinear phenomena that are discrete in neither space nor time, such as climate change. Coaxing oil demons back into barrels is self-evidently hazardous. Coaxing greenhouse gas demons back into the magic lantern of earthly sequestration is self-evidently preposterous.

The logical alternative to reactive interventions is also fairly self-evident. Proactive interventions attempt to anticipate, rather than react. First: extrapolate from the present to an anticipated future consequence of present phenomena. Then: intervene to thwart the undesirable future from eventuating. Or so the logic goes, where the proof in the pudding is that the originally anticipated future does not eventuate. The premise is that pre-intervention is better than cure. On Raine, the first such proactive intervention can be seen in the low fences constructed around the cliff edge to stop turtles going over. Now a turtle is prevented from flipping onto its back, provided the fence exerts sufficient resistance.

So far the factors, predicaments, and interventions are the most visible and self-evident cause-and-effect chains. A turtle has a significant chance of flipping as it falls from the cliff, unless a human intervenes and builds a fence strong enough to prevent the fall. A flipped turtle only gets back on its feet if a human manually exerts sufficient force to turn it over. For each individual it is Do-or-Die, determined solely by the amount of time that passes before human aid arrives or hydration limits are breached.

The most visual, obvious, and isolated incidents are easiest to rectify, say by flipping turtles one by one. Consequently, they are the least consequential. The most intractable, invisible, and omnipresent phenomena are the most consequential, say by dissipating earth's energy imbalance due to existing greenhouse gas concentrations. Air that Tu'i Malila breathed shortly before her 1966 death had 40% more carbon dioxide than that breathed in her 1677 youth. And yet, she, like most lifeforms,

would find the difference imperceptible. Up to a point, oxygen-breathing life is less immediately sensitive to such changes in atmospheric chemistry. But the same lifeforms have no such shelter from the climatic changes induced by such changes in atmospheric chemistry.

Say one chooses to not flip upturned turtles, or to not stop them flipping in the first place. This does not represent a higher level of existential threat *per se* to the species. They would still successfully return to their sole refuge and nest *en masse*, though some would then die on the attempted return to the sea. From an evolutionary standpoint, these are ordinary vicissitudes. Especially since death occurs after conditions have been met for the next generation to hatch. Let us then object to intervening by flipping fallen turtles back onto their fronts on the basis that it is only a Do-or-Die predicament for each individual turtle. We object not because of indifference to their suffering, fully aware that *"you're not helping. Why is that?"*

We look at the fact that a certain number of turtles never make it back to sea after nesting and declare this to be natural selection, a realm of suffering that resides on the yonder side of the fence, within nature as distinct from humanity. This distinction is however problematic. It means that no level of existential threat to the more-than-human-world is actually a human concern, whether a threat made against an individual lifeform (like Raine Island's overturned turtles), a species (like Raine Island's turtles *en masse*), a family, superfamily, or indeed an entire regional or planetary ecosystem.

The distinction, and the objections to intervening that arise from it, rest on two premises. Firstly, that there exists a natural order of things (whether inclusive or exclusive of humanity). Secondly, that to speak of upturned turtles as insufferable injustice is to conflate the world's biophysical workings with a misconstrued worldview of the world itself. Recall the long arc of justice wherein Chicxulub set upon its trajectory of extinguishing The Age of Dinosaurs, right at the advent of the dinosaurs' ascendancy. Turtles have died upturned since time immemorial, just as all lifeforms eventually do, whether peacefully or violently. Of all species that ever lived on this planet, 99.9% have already gone extinct. One should let sleeping dogs lie, as well as upturned turtles, so to speak. Shift happens, so to speak.

But what happens to these premises when breadcrumb trails lead from upturned turtles back to interventions by WE* ancestors? Now the upturned turtle bears a distinctly human twist, even if the flipping was done indirectly by those who came long before. The turtle no longer appears to be on the yonder side of nature, but has now been ensnared on the human side, at least as far as culpability goes. How then can one still maintain this objection to intervening in its

plight? An objection that rests on absolving humankind from more-than-human worldly affairs.

However, tracing these breadcrumb trails does not dissolve any arbitrary distinctions between humans and nature. At the very least, the trails show how the more-than-human world's current plight bears thumbprints, however faint, of WE* ancestors. And what we encounter beyond simple flipping of turtles sets us on a journey into Modern Conservation.

With Raine as earthly microcosm and flesh-and-blood individual turtles as synecdoche for the World Turtle, this dilemma can be extrapolated to all uses of ModCon to intervene in ecosystems and evolution. Recall the image of an infinite progression of turtles underpinning the earth. No matter how many successive turtle layers are upturned in the search for incontrovertible anthropogenic signals, we are, as always, working from the remaining fragments. The details have been lost to time.

The fragments, however coarse, still paint a picture connecting the present flipped turtle to past WE* interventions. The island's microcosmic rupture now reveals both biogenic origins – coral and birdshit – and anthropogenic origins, mingled through and through with myriad abiotic forces of cosmic progeny. Raine going under the rising seas now stands for Hamilton's emerging "joint human-Earth story":

> Beyond its scientific importance, the appearance of this new object, the Earth System, has ontological meaning. It invites us to think about the Earth in a new way, an Earth in which it is possible for humankind to participate directly in its evolution by influencing the constantly changing processes that constitute it. It therefore brings out the conception of a joint human–Earth story.[343]

While thinking about the earth in such a "new way" does not scale up from an individual mind to the entirety of the planet's past, rupturing present, and inconceivable futures, Raine-as-microcosm is a proxy vision. A species-level humanity folded into the ethics of intervening *on Earth*. This is where earth's biogenesis becomes the product not just of intentional intervention, but of rolling the dice of Modern Conservation to boot.

343 Hamilton, *Defiant Earth*, 25.

Staging an Intervention

> The Miller and his merry olde Wife,
> She scrapte her tripe licke thou the knife.
> – Thomas Ravenscroft, *Three Blind Mice* (1609)

The breadcrumb trail starts in 1842, the year the sheltered version of *Three Blind Mice* was published in the *Nursery Rhymes of England*. In that same year a barque, also hailing from England, was wrecked on a reef 40 kilometres from Raine.[344] Many such ships ran aground on the Great Barrier Reef, which led the British colonial authorities to build a beacon on Raine, in the form of a non-light-emitting lighthouse. The island was selected not so much for its position, but rather for its phosphate cap, which guaranteed its relative year-to-year landmass stability and also provided on-site building resources. In 1844, an expedition began building the beacon with rocks mined from the phosphate cap and timber salvaged from the 1842 wreck.

So followed a settlement of convicts consigned to build the beacon, and their captors, who enforced their labour. The island peak was now the tower, neighboured by an inverse indention from the quarried central phosphate platform. In effect, Raine-as-microcosm experienced a biological intake akin to when the Isthmus of Panama first connected North and South America. Goats and vegetable gardens visited upon existing plants, replacing native species with lifeforms from the far reaches of the world. Following the coral and birdshit biogenesis, Raine's first non-indigenous incursion constituted a distinctly modern form of anthrogenesis.

The legacy of this anthro-genesis ran amok for the following few decades, once the beacon was built and Raine was once again uninhabited and unvisited. When intensive guano mining began in 1890, Raine experienced an export equivalent to the first land exchange between North and South America. Tens of thousands of tonnes of guano were mined from the island's central platform, used to manufacture phosphorous that was shipped all around the globe. Raine's shit-catalysed topography was distributed onto farming fields far and wide, as phosphorous was foundational to developing industrial agriculture. Unlike the explicitly coerced beacon builders, coercion now was implicit between Chinese labourers and their European overlords. The breadcrumb trail reveals how innumerable tales of vastly differentiated agency, will, and responsibility entwine with the question of how the anthropos acquired the Anthropocene's geological agency.

344 Hopley, *Raine Island*, 68.

The legacy of this second stage of anthro-genesis on Raine ran amok for the following few decades, as Raine became uninhabited once more, after all mining had been exhausted. In combination, both stages of anthro-genesis constituted a biogeochemical upheaval of Raine. With the upper guano removed, rainwater could now penetrate the raised central platform substrate. Chemically reacting with the phosphate, seeping rainwater then eroded the substrate away, in turn eroding the cliff edges of the central platform. Picture a limestone cave – the principle is the same, except the erosion manifested over decades rather than over millions of years. Picture the Isthmus of Panama closing over decades rather than millions of years – the skewed temporal ratios are alike.

However, the anthro-genesis does not paint a neat breadcrumb trail from nineteenth-century phosphate mining to flipped turtles today. Any such trail depends on whether Raine's nesting topography is considered human-induced, or within 'natural' vicissitudes intrinsic to earth (based on a worldview where humans sit outside of 'nature'). To compound an already heady confusion, the opposing worldview situates humans as always already part-and-parcel of nature. Wherein. human-induced phenomena can only ever lie within the natural order of things.

This worldview lies at the heart of a dour demeanour, as it places humanity within rather than without the natural order of things. Given our shared progeny with all other earthly lifeforms, how could our labour, including its disastrous fruits, be anything but natural? The Dour decries how we are but the latest rupture in a long line of ruptures, and consoles us that while we may be the most destructive experiment of this planet's evolutionary chaos, its experiment we most certainly are.

Hence it is a sleight of hand and a betrayal of our aquatic origins to set humanity outside of 'nature', where nature refers to life-at-large on earth. Following the breadcrumb trail from this line of thinking to its watery grave, why should the plight of an upturned turtle concern us, whether WE* flipped it, we flipped it, or it was flipped by forces not of our making or influence?

But the breadcrumb trail remains opaque against such searches for certainty by either opposing worldview, because WE* intervention into Raine's substrate is still only a drop in the ocean relative to the extant history of coral-birdshit-water-sand interminglings which have produced and reproduced the island since its conception. Steadfast sediment such as rock can provide reliable portals for winding back the clock over millions-cum-billions of years, with high fidelity to what happened when, and how. But, with coral cays being too volatile to yield such precise insights, Raine presents an enigma for dissolving, or absolving, human concern for the more-than-human world.

To convert the confusion into a full-blown contusion, Raine is unique and therefore does not have a host of comparable islands for cross-referencing. Current cliff erosion could have an intrinsically nonhuman origin that predates nineteenth-century mining, although the incontrovertible fact that this mining caused significant geomorphological changes does argue strongly for a human hand amongst the breadcrumb trail to the current plight of cliff-flipped turtles. And, given Raine is "probably the most studied turtle nesting site in the world with more than 130 years of observations,"[345] hypotheses about precipitating the phosphate cap erosion are not without some solid ground.

With Raine as earthly-microcosm, this minutia becomes a synecdoche for modelling cause-and-effect on earth-at-large. Namely, given the distinction between humans and nature is mere delusion, are we morally obliged to reactively or proactively intervene in turtle flipping? The distinction is academic – in the worst sense of the term – unless one argues against intervening on the rationale that responsibility to the more-than-human world is restricted to when WE* or we caused a flip.

And the distinction remains academic, because the opaque breadcrumb trail of human interventions on Raine have become peripheral to what is actually at stake. *Chelonia mydas* now face an existential predicament that is orders of magnitude more acute than the Do-or-Die predicament of the individual fallen turtles on Raine Island's nesting site. When turtles "build [their] houses on the earth," they do so at the behest of not just their metre-deep burrows, but the successive layers upon which sand rest, going down to "an elephant, the elephant on a tortoise, the tortoise again . . . and so on *ad infinitum*."

Intramural debates about human culpability and responsibility are finally laid to rest in the brine bedrock that lies directly under the beach sands where turtles nest. The bedrock has progressively shifted under their burrowing area, by way of phosphate transported by water that has leached through the eroded cap, making, in effect, a solid platform under the beach sands. That shift may or may not have been catalysed when seeping rainwater first began modifying the stratal chemistry and eroding the phosphate rock. Meaning guano mining may have catalysed the shifting bedrock by exposing the phosphate rock, or maybe, in Clark's sense, Raine's cataclysm lies further 'upstream', before any humans came on the scene. At this late hour of the nightmare, it seems sensible to ask *why on earth* does it matter? When an existential predicament escalates from threatening individuals to an entire species, does the gravity not supersede any debates about culpability, as well as any hesitation about whether or not to intervene?

345 Hopley, *Raine Island*, 10.

The shifting bedrock appears to be the terminus for David Hopley's 2008 statement that "the downward leaching of guano plays an important part."[346] Conservation biologists were initially baffled as to plummeting hatchling numbers, hence Hopley's ambiguity about what on earth was the "important part." Subsequent research revealed that since the bedrock is not porous, the water table is increasingly rising up the beach area, where turtles build their nests. The bedrock thus retains falling rain under the beach and exacerbates sea water rising through the beach sand. Thus, from coral-birdshit-water-sand-human-industrial intermingling, a rising sea water level was drowning the vast majority of incubating eggs. The Do-or-Die of individual fallen turtles had graduated to become a Sink-or-Swim predicament for the species as a whole.

By 2014, the sink:swim ratio had become critical. Whereas 370,000 hatchlings represented an average nesting season, all other things being equal, conservation biologists estimated 2,500 hatchlings that season.[347] Government agencies reactively intervened by experimentally increasing egg distance from the water table. Transporting massive engineering vehicles onto Raine, they raised a 100 x 100 metre beach section one metre, redistributing the equivalent of six Olympic swimming pools of sand from the front beach area to the rear. With the experiment indicating a less dire sink:swim ratio, the state government proposed a larger scale beach re-profiling.

But, instead of fronting up the eight million Australian dollars required to do so, the government advertised for private sponsorship. As per the technofix ethos of ModCons, so with their societal ethos. David Attenborough lent his voice to their fundraising video, inviting the viewer to "be part of the largest green turtle recovery project in history."[348] Attenborough has a long association with Raine – having first filmed there in 1957, back when it was still possible to claim innocence about flipping the world by flipping turtles. Like all innocence though, it was born of ignorance and died in disgrace – three months after the BBC broadcast his Raine episode, in November 1957,[349] US television broadcast Capra's *Meteora* episode.

346 Hopley, *Raine Island*, 1.

347 Andrew Dunstan, quoted in Neil Mattocks, "Natural History and Research and Management of Raine Island's Green Turtle Rookery," *eAtlas*, 12 August 2014, accessed 6 May 2019, https://eatlas.org.au/ts/raine-turtles.

348 David Attenborough, quoted in *Be Part of the Largest Green Turtle Recovery Project in History* poster (Department of Environment and Heritage Workshops, Queensland Government, 2016).

349 David Attenborough, director, *Zoo Quest*, episode 2, "Zoo Quest for the Paradise Birds," aired British Broadcasting Corporation, 17 November 1957.

Like a turtle returning to its birth site for its first nesting season, Attenborough returned to Raine a half century later, filming the 2014 fence building and beach raising interventions. Featuring the experiments in his major three-part BBC series *Great Barrier Reef*, the projects suddenly received international attention. A consortium of companies, NGOs, state agencies, universities, and Traditional Owners responded to the call for desperate measures, and with funds secured, the Raine Island Recovery Project launched in 2016.

The title is unwittingly ironic: recovering Raine by literally re-covering the beach in its own sand. A larger re-covering intervention in 2017 bore a title befitting the neoliberal conservation: "Operation Sand Dune."[350] After all, ModCon is *Nature Inc: Environmental Conservation in the Neoliberal Age,* as the authors Bram Büscher, Wolfram Dressler, and Robert Fletcher lament.[351]

Mertle, Turturi, and Tokolou were tagged and tracked as part of analysing the comings and goings of adult turtles during the Raine Island Recovery Project. Indigenous schoolchildren named Mertle and Tokolou, from their respective local indigenous languages. But it was multinational fossil fuel company BHP that named Turturi, a fringe privilege gained from their principal funding of the whole five-year project. Conservation through ecosystem engineering, outsourced by a state government, funded by a fossil fuel company. The more-than-human world now beholden to the tyranny of the court. A price put on everything under the sun, while those burning it to the ground fund empty gestures toward conserving what remains. A deal with the devil it may be, but conservationists who have wagered this game for decades are putting all options on the table, because the floor is already soaked through with the rising seas.

One could take the moral high ground and protest the bitter irony of the funding source. But the moral high ground is not as obvious as refusing to stand on the re-profiled beach area. Without that sponsorship, the second beach level raising and ancillary experiment support would not have occurred in time. When populations plummet, so does the luxury of time in which to respond: "*The tortoise lays on its back, its belly baking in the hot sun, beating its legs trying to turn itself over, but it can't . . .*"

Raising the beach, combined with fences to prevent turtles falling onto their backs, combats the existential threat on both the individual and species levels. It is the *do* in Do-or-Die for individual turtles, and the *swim* in Sink-or-Swim for the

350 Great Barrier Reef Foundation, "Mission Accomplished to Re-Shape Raine Island," media release, 19 September 2017, accessed 30 July 2024, https://www.barrierreef.org/news/media-release/mission-accomplished-to-re-shape-raine-island.

351 Bram Büscher, Wolfram Dressler, and Robert Fletcher, eds., *Nature Inc.: Environmental Conservation in the Neoliberal Age* (Tucson: University of Arizona Press, 2014).

species: raising the height of the beaches stops the eggs from drowning, meaning a certain number of hatchlings will at least attempt the journey from nest to sea. Technically, any material intervention into an ecosystem will indirectly influence evolution. Flipping a turtle – Do-or-Die – is an obvious intervention. Raising the beach sand height – Swim-or-Sink – is another obvious intervention.

As such interventions change sea turtle populations, they influence all species in their food web, alongside a host of ancillary influences up and down the infinite regression of World Turtles. In this vein, Clark remarks, that

> All interventions in Earth systems are matters of trial and error. At whatever scale they are attempted, experiments with flows of matter and energy have a fair chance of failing, falling short, or having unintended consequences. Efforts to deflect or modulate disaster, in this sense, can be expected to precipitate new disasters.[352]

At the scale of the Raine Island turtles, the evolutionary repercussions of such "interventions in Earth systems" are largely restricted to populations of affected species, such as more seagrass being around if there are less sea turtles to eat it. Only over evolutionary time scales will turtle or sea grass generations manifest any phenotypic or genotypic modification.

Such is the relatively limited remit of individual Do-or-Die or species Swim-or-Sink predicaments. While the latter affects far greater proportions of a species than the former, both are limited in their repercussions. Neither can be included in the acutest level of existential threat, perhaps best understood as Now-or-Never. Thus far this is not a Now-or-Never predicament, because the unreconstructed beach was still (barely) above water levels for hatchling rates to precipitously dwindle. 2,500 hatchlings out of an expected average of 370,000 is precipitous if restricting the view to this individual sample, but it is not yet an existential threat so acute that any means whatsoever can be justified in combatting it. Recent nesting years fared better in relative terms, producing increased numbers of hatchlings that are nonetheless still precarious in absolute terms. Yet the substantial effects on hatchling rates in unconstructed beach areas were still insufficient to constitute a Now-or-Never dilemma.

The point being that these levels of existential predicaments negate each other as the threat levels scale up: just as slower-moving insidious threats at the level of Swim-or-Sink make individual Do-or-Die threats pale into insignificance, so do more acute Now-or-Never threats make any threat restricted to a single species or happening along an extended time-frame pale into oblivion.

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352 Clark, "Geo-politics and the Disaster of the Anthropocene," 34.

What then, when the gap between now and never is simply the distance between us and the powerful entity we run from, having enraged it? And how should we even judge that gap, given the entity may or may not have already blinded us to our comeuppance? This distance is an interval that pushes irresistibly at the limits to both social and biophysical life, holding now, but never forever.

Did you ever see such a sight in your life/As three blind mice?

Exclamation.Point.Extreme.

> It's funny how people, just won't
> Accept change
> As if nature itself – they'd prefer
> Re-arranged.
> – George Harrison, "The Light That Has Lighted The World" (1973)[353]

While the biophysical limits of ModCon are decidedly mechanical and technical, they are presaged first and foremost by social limits. Nowhere is this more the case then when facing down acute existential predicaments: the kind of predicaments that present Now-or-Never dilemmas, where *now* is the last chance for a last-ditch attempt to avert extinction, and once the window of *now* closes, there will *never* be another chance. This level of existential threat can apply to a species, or to an entire ecosystem, or, indeed to life-at-large, but the Now-or-Never mindset is heavily flavoured by social and cultural domains.

When Attenborough returned to Raine in 2014, he drew a perplexing and distinctly socio-cultural line in the sand, whose demarcation made a mockery of any protests against intervention, while also revealing that any such interventions can only ever be empty gestures when viewed on any meaningful scale.

In his 2014 documentary, Attenborough unintentionally shows up human hubris as a hollow conceit when profiling the work of conservation biologists who count hatchlings from the re-profiled beach area that they have steered into a shallow trench. The team from the Great Barrier Reef Marine Park Authority lift each hatchling from the trench, putting them onto the beach to continue their shell to sea journey. Attenborough concludes the segment about Raine by interviewing the project leader, Andrew Dunstan, on the beach raising experiment:

> It's confirmation that Andy [Andrew] and his team have found the right way to restore this vital breeding area. But for the young hatchlings, the trials of life have only just begun. Each

353 George Harrison, "The Light That Has Lighted The World," track 3 on *Living in the Material World* (Apple, 1973), LP.

> new arrival will have to make a perilous dash to reach the ocean. Now they're on their own. Andy and his team must not interfere at this stage. Inevitably, the tiny, defenceless hatchlings attract scores of predators.[354]

This statement draws a line in the sand, by separating humans from nature. Once the hatchlings leave the trench, "Andy and his team must not interfere" any further in the turtles' journey to the ocean. It appears as if the tiny hatchlings have crossed some invisible line, leaving the protection of human hands. Human hands that have raised their nesting beach so that they did not drown as eggs, flipped their parents onto their backs so that they did not die of dehydration, built fences and even trenches to aid adults and hatchlings respectively. But now the hatchlings return back to the yonder side of nature, the one that is "red in tooth and claw,"[355] with all human aid withdrawn.

For every 1,000 hatchlings, only 70 make it to the sea. On the journey from shell to sea crabs or birds eat those whose "trials of life" end after they "have only just begun." For every 1,000 that make it to the sea, only one makes it to adulthood. On the journey into the sea, tiger sharks wait so close to the shoreline that their entire backs are exposed above water. Granting safe passage from shell to sea would thus go a long way to greater numbers reaching adulthood. If aiming to help plummeting populations, why go only so far as flipping individuals back onto their front and propping up portions of their nesting area over the rising seas? Socially okay to capture, tag, and track. To manually flip. To transport on tractors. To install clifftop barriers. To raise the beach height. But, having partially restored shelter to their refugia through all this intervention "now they're on their own. Andy and his team must not interfere at this stage." Why *on earth* is everything so far considered acceptable, but sheltering hatchlings from predators on their shell to sea journey is not?

Worse still – why tell ourselves we made right when so much more remains to even remotely get things back up the right way round? Manually flipping turtles and beach sand raising may appear to make good on Do-or-Die and Swim-or-Sink predicaments, but they are by no means "confirmation that Andy and his team have found the right way to restore this vital breeding area." At best they offer ephemeral and inadequate band-aid solutions to a wound that will only continue to fester. This "right way" begets a game of cat-and-mouse, between a fossil-fuelled civilisation that causes the seas to rise, while fossil fuel companies fund the raising and re-levelling of beaches so that not quite all the world will be a sinking stage.

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354 David Attenborough, quoted in Michael Davis and Anne Sommerfield, directors, *Great Barrier Reef*, episode 3, aired British Broadcasting Corporation, 13 January 2016.

355 Tennyson, *In Memoriam A. H. H,* Canto LVI, line 15.

The Dour lurks in these depths as well, though its comfort is, as ever, absolutely cold. A dour demeanour might counter Attenborough's claim that this is "the right way to restore this vital breeding area" with Richard Dawkin's dour appraisal, that "a time of plenty . . . will automatically lead to an increase in population until the natural state of starvation and misery is restored."[356] But even disregarding the cold comfort of such dour pronouncements, this story is still plagued by contradictions as to what *on earth* prompted Attenborough to set the limit to intervening here? It is not as if the Raine Island Recovery Project has any means to redress the myriad existential challenges facing coral beneath the island, turtles within the island, and seabirds atop the island. To boot, the acuteness of the situation is well-illustrated by the fact that the Modern Conservation mentality driving the project shows the same insatiable urge to cannibalise earth as the industrial capitalism (here in the form of a fossil-fuel company) that it depends upon for its primary funding. Hopley demonstrates this in his report's sobering rationale for Raine's *Present Status and Future Implications of Climate Change*:

> Nearby cays . . . before they disappear their value may be in providing the sand for any replenishment on Raine Island. This will be a no loss position, as within a few years as sea level rises, these cays will disappear completely and their sand resource lost forever.[357]

Thus far the universities and companies who paid to attach their names to the ModCon have celebrated success so-called in their marketing and public relations. Yet the fact that the neighbouring cays are disappearing under the water remains set aside. And even worse, they remain entirely mute on the acute existential threat that was subsequently unearthed when the project was only halfway through its tenure, a threat sufficiently acute to beget a genuine Now-or-Never dilemma.

Like reptiles in general, turtle sex is determined by egg incubation temperature. Below a certain sand temperature threshold, turtles are born male. Above, a female. As adults, Mertle, Tokolou, and Turturi herald from the 1970s and 1980s, when one male *Chelonia mydas* was born for every 6.6 females. By the time the beaches were being raised, this had changed to one male for every 116 females. In response to these findings from her research, turtle scientist Camryn Allen declared in 2018 that "this is extreme – like capital letters extreme, exclamation point extreme . . . we're talking a handful of males to hundreds and hundreds of

356 Dawkins, *River Out of Eden*, 154.
357 Hopley, *Raine Island*, 48.

females. We were shocked."[358] From this point on all talk, though still cheap, should be in capital letters all the same. Being petrified and becoming petrified are neither hyperbole nor metaphor respectively. EXCLAMATION.POINT.EXTREME.

When Attenborough crouched over hatchlings born in the re-covered heightened sands, he declared that "for the young hatchlings, the trials of life have only just begun." Beyond the usual proximal predators, their trials of life are actually at the behest of the distal suspect that is murder most foul: anthropogenic climate change. Behind the far more pernicious threat to the turtles' ongoing existence lies the same non-linear causation that is raising the water table up the beach. From climate change: too wet, they drown. From climate change: too hot, they cook. The breadcrumb trail has terminated, leaving incontrovertible evidence for human culpability, as well as woefully insufficient evidence for human ability to make good the flipped turtle.

Having drawn a line in the sand about not interfering in hatchlings' shell to sea passage, how *on Earth* would the social limits to life prefigure any intervention that could flip their male to female sex ratio back towards 1:100, let alone 1:50 or 1:10? Now-or-Never predicaments arising from acute existential threats are premised on accepting a situation has become so dire that the only potential means available to stave off human-caused extinction is to throw the dice and gamble on truly radical ModCon.

Through which things get really risky, complex, and uncertain: intervening directly into evolution itself to forestall extinction. Now-or-Never interventions into evolution are as acute as the Now-or-Never predicaments from which they arise. Such interventions are about catalysing effectively instantaneous phenotypic and/or genotypic modification for future descendants to inherit the modified traits. Say a discernible phenotypic or genotypic trait takes ten millennia to appear across a species, and scientists induce a discernible inhered trait in ten years in a population of the species. From an evolutionary time perspective that is effectively instantaneous.

Therein, redressing the sex ratio would necessitate radical interventions into both ecosystems and evolution. The risks, complexity, and uncertainty in this Now-or-Never predicament are palpable. The timeframe to act is now. Or never. The consequences quite literally determine the procreative viability of sea turtles,

358 Camryn Allen, quoted in Craig Welch, "99% of Australian Green Sea Turtles Studied Turning Female From Climate Change," *National Geographic*, 8 January 2018, accessed 6 May 2019, https://www.nationalgeographic.com/science/article/australia-green-sea-turtles-turning-female-climate-change-raine-island-sex-temperature; Michael Jensen et al., "Environmental Warming and Feminization of One of the Largest Sea Turtle Populations in the World," *Current Biology* 28, no. 1 (2018): 154–159.

due to the extinction prospects arising from one male for every ten females, or one for every 100, or one for every 1,000 . . . Against the rapidly diminishing timeframe for any efficacious intervention, what would such a flipping entail? More to the point, assuming any such means, vexing questions arise as to whether we could or should, in further contradiction to the already heady non-sense arising from whether humans are separated, effectively dissolved and thus absolved, from nature.

When the stakes are Now-or-Never, rolling the dice becomes a risk that is above and beyond that of rolling them against less acute and less wide-ranging Do-or-Die or Swim-or-Sink predicaments. The higher the stakes, the more bewildering the cause-and-effect chains that make up Clark's "geo-political or cosmo-political challenge of the Anthropocene." This challenge, he argues,

> May be as much about how we choose to engage with others whose experiments have fallen short or been overwhelmed, as it is about how we make decisions about our own strategic interventions. And ethical relating too, as the most searching theorists of the disaster have long observed, is a matter of risky experimentation and urgent improvisation.[359]

In other words, urgency and non-delimitable risk configure the play of interventions for something that has become "extreme – like capital letters extreme, exclamation point extreme." The burning question thus becomes: what would such "risky experimental and urgent improvisation" look like for Raine's turtles?

End Game

> Had I right, for my own benefit, to inflict this curse upon everlasting generations? . . . I shuddered to think that future ages might curse me as their pest, whose selfishness had not hesitated to buy its own peace at the price, perhaps, of the existence of the whole human race.
> – Mary Shelley, *Frankenstein* (1818)[360]

It is self-evident that localised, proximal interventions – fence building, individual turtle rescue, and sand raising – amount to woefully inadequate responses to the rupture. These are limited to proximal Do-or-Die and Sink-or-Swim predicaments. So *how on earth* should we respond to acute distal Now-or-Never predicaments that demand we choose between *now* or *never* right now? Is this, in fact, a choice at all? Because not only must the *now* happen now, but the means to make it possible are yet to exist, and, even if the die could be cast while *now* still exists, any

359 Clark, "Geo-politics and the Disaster of the Anthropocene," 34.
360 Shelley, *Frankenstein*, 299.

throw is cast by a hand that may or may not have already been blinded by the entity it enraged, and now seeks to placate by a last-ditch bet on the dice falling in its favour. What then, should ModCon entail if it is to be anything other than an empty gesture or cosmic joke?

There is a punchline to this joke though, though it can only be reached via an eccentric-orbit way of landing. Comedy = tragedy + time where time = zero. Because the climate system has roughly a five-decade lag between emissions and their consequences manifesting, the change in the Raine Island turtles' sex ratio from 1:6.6 to 1:116 in 2018 was due to emissions made around the time Attenborough first visited Raine in 1957. So *now* is already entirely too late.

This means that to be anything other than an empty gesture, only a seismic (and successful) intervention in the *Chelonia mydas* genotype could stop the sex ratio from going from its current 1:116 to 1:1160, all other things being equal. Let alone bring it back from 1:116 to 1:6.6. Will Attenborough lend his voice to campaigns to sculpt the *Chelonia mydas* genotype via millions of dollars of corporate donations? Will there be public outcry or even public debate about such proposals? Will there even be towns in which to assemble a Town Hall meeting so the assembled can collectively inhale and exhale the universal sigh when faced with these choices?

Instead, our *now* is stuck in the meantime of ad hoc reactive interventions. One being to relocate eggs to cooler sands, including on neighbouring islands. Another being to lower sand temperature by modifying the albedo ratio, say by adding light coloured sand to nest tops. Sand which could not stay on top for long, given the how much sand the burrowing turtles redistribute. Uncertainty also abounds as to whether imported sand would bring fresh existential challenges to incubation mortality at the microbial scale, from microorganisms that inhabit coral cay sand.

To circumvent these ground-level problems, another proposal simply moves higher up, suggesting shade cloths be used to modify the albedo ratio, suspended above the vicissitudes of sand morphology and terrestrial microbes. Such experiments have already taken place in a handful of key rookeries across the globe, including over the Mon Repos rookery in the southern Great Barrier Reef, in an initiative by the Queensland Department of Environment.

While shade clothes demonstrably result in proportionally more males being born, Raine's logistics are unwieldy. Consider 20,000 turtles arriving and departing all hours of the day, weeks on end over nesting season, which is also hurricane season. Having the right nest in the right area at the right time becomes a game of cat and mouse – unless human intervention extends to completely covering these so-called natural environments in shade cloth tents. While this is under consideration for Raine, due to the remote location and unwieldy topography,

such structures would turn it into a triage centre, requiring round-the-clock vigilance on par with a hospital emergency ward.

To circumvent these immediately-above-ground-level problems, some suggest going further upwards, above the vicissitudes of shade cloths and endemic hurricanes. Precipitating artificial rain by cloud seeding is nothing new under the sun, though it prefigures planetary scale proposals to engineer the climate, to avert runaway climate change. Will BHP or another fossil fuel company sponsor such intervention? Does this not show up the ludicrous mindset of funding technofixes via the same tyranny that catalysed the rupture to begin with?

In any event, both shade cloths or artificial rain are still only ephemeral interventions. While they are at the forefront of existing Modern Conservation experiments, they do not remotely amount to the seismic *now* that can avert the impending *never*. As regards this most vital rookery-turned-triaged-emergency-ward, ephemeral interventions are band-aids to the insoluble condition known as evolution. Given how precipitous the sex ratio already is, further proposals to systemically redress this sex ratio are far more insidious.

To have any chance of averting the *never* facing down turtles, other conservation experiments propose to intervene not in ecosystems but in evolution itself, by means of assisted evolution and synthetic biology.[361] Both of these nascent and promissory scientific fields sound like they took a page out of Shelley's *Frankenstein*, celebrating all the main character's hubris and arrogance but failing somehow to read the book to the end to discover what tragedies befall those who play games with the limits of life and death. At least for those who do not first ask "had I right, for my own benefit, to inflict this curse upon everlasting generations?"

Assisted evolution is the field of breeding organisms in a laboratory to develop strains that have increased tolerance to accelerating rates of biophysical change. Synthetic biology is the field of designing entire organisms, or components of organisms, to engineer their genotype. It is currently limited to microbial life, though commercial, industrial, and fundamental scientific research are increasing dramatically.[362] As neither field has yet been formally proposed for any reptiles, Part VIII will leave the turtles on the beaches of Raine Island to go down into the foundations of the cay itself, since a primary objective of both assisted evolution and synthetic biology is to intervene with another precipitously endangered lifeform fundamental not only to Raine, but to unimaginable swathes of marine life: coral.

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361 Kent Redford and William Adams, *Strange Natures Conservation in the Era of Synthetic Biology* (Yale: Yale University Press, 2021).

362 Jane Calvert, "Synthetic Biology: Constructing Nature?" *Sociological Review* 58, no. 1 (2010): 95–112.

In relation to turtle conservation, synthetic biology would entail discovering the genes that assign sex according to temperature, modifying them, then using gene drives to get the modification inherited across generations. For example, sand that is 29°C produces more females than males. At 33°C, all hatchlings are female. At 23°C, all hatchlings are male. Synthetic biology would modify the genome so that the eggs of future descendants would become male at a higher temperature, say 31°C.

To date, no such research has been publicly proposed. Even Tyrell found his technoscientific prowess ran up against biophysical limits to life. Recall Attenborough drawing a line in the sand about stopping the birds and crabs from eating hatchlings on their journey from shell to sea. How would he, or younger generations of conservationists or environmentalists, draw a line in the sand about such Modern Conservation? Existing ModCon can only act on proximal effects, whether a flipped turtle or two hundred, whereas what is required is an efficacious ModCon for the distal scale of the actual existential challenges.

Such is the measure by which ModCon comes to terms with the potential efficacy it could offer the more-than-human world, as it faces down the rupture unfolding now. And in so doing, ModCon must also decide whether it has in fact now been reduced to a fantasy for modifying biophysical limits to life to better withstand the unfolding rupture, given that the *now* is right now, and these are sciences that are at best nascent, and at worst, still non-existent. Bert the Turtle in *Duck and Cover* may survive an explosion of dynamite right next to his shell, though the cartoon is presented as a child-like whimsical fantasy, with Bert beaming a wide smile after emerging from his shell once the explosion has ceased. In the propaganda film the fantasy continues, suggesting that humans could survive nuclear explosions by merely ducking and covering under a desk.

In the rupture currently unfolding, ModCon can neither be reduced to a mere fantasy, nor can its prospects for yielding anything efficacious be considered even remotely real, nor commensurate with the timeframes available. So much for throwing the Dice with still woefully ignorant human hands, petrified by the direness of the predicament and, lost in that dire demeanour, unable to see past our guilt and also our skewed self-conception as saviours of the more-than-human-world, distinct from nature and its immutable laws.

What, then, is left to consider? In the midst of such seemingly certain peril, it is the Dour that reminds us of the true cosmic measure of the desperation surrounding Raine's turtles. Throughout their existence, turtles have accommodated the comings and goings of things essential to their livelihood, such as nesting sites, the seagrass species they eat, currents, and ocean temperatures. Their adaptive capacity to avoid maximum sand temperatures includes nesting at cooler times of the year and changing to beaches with a lower solar albedo. The same

being that is so insistent on returning to nest at its birthing beach, even when it proves perilous, is also able to collectively revise that instinct and switch to new times of the year and new locations, when the timeframe is sufficient to accommodate the gradual pace of such evolutionary change.

Ironically, the turtles' instinct to return to their exact birth place makes them less able to accommodate durational change, such as the comings and goings of entire rookeries. The antiquity of their tenure on earth self-evidently attests to their ability to shift *en masse* to different islands, though their instinctive return to birth sites also attests to their propensity to nest in sites that have since become perilous. A rookery that disappears within a century may not provide enough time for turtles to shift *en masse* to a new breeding ground. But disappearance over a millennium may suffice. As always, adaptation is a matter of time. The same algebra of comedy = tragedy + time can be applied: evolution = adaptation + time.

Same for a food source disappearing, or ocean temperature substantially changing. Yet seismic and catastrophic change of the stochastic and non-linear variety is nothing but normal. A 2018 hurricane eviscerated an entire Hawaiian island that was a sea turtle refugia – even if we set aside the inarguably just, but at this point ineffective game of poring through fragments to determine the extent of human-induced amplification of that hurricane, shift happens just as shit happens.

And yet the timeframe for playing Now-or-Never dice games bears next to no relation to either saltation moments of evolutionary exuberance – such as when turtles adapted to prior rapid biophysical change – or atmospheric turbulence which could eviscerate Raine in a single hurricane season. The game can in fact be squarely placed in the timeframe between the rise of nineteenth century colonial and industrial activity and today. The seismic local impacts of the 1842 beacon construction and 1890s mining took 120 years to ensue. They offer scaled down proxies for the cataclysmic planetary impacts stemming from the 1970 to 1971 catalyst for a *New World Coming,* extrapolated an equivalent distance in the future, say 2090, 120 years after 1970.

While those details are lost to a future of ever greater fragmentation, the song foretells only greater planetary volatility and bodily vulnerability for respective abiotic and biotic bodies in the maelstrom. Any doubt about the human role inherited from the nineteenth century legacy was shredded decades ago, and now there is no doubt about the anthropogenic legacy that foreshadows the future. The mystery was solved, the murderers cannot be absolved. It was all fun and games until some lost an island.

For Raine, the fun and games will come home to roost much later than any of its neighbours. Once climate change drowns all the surrounding islands, Hopley predicts that "Raine Island is likely to be the last cay to disappear in the northern

Great Barrier Reef."[363] This depends upon the unique phosphate cap continuing to provide a bulwark against erosive ocean currents, and coral continuing to replenish aggregating sediment. Which in turn means that Raine is ultimately dependent on the ongoing living and dying of coral.

An end to living coral means an end to replenishing the dead coral which provide aggregating sediment piled into the raised area that makes Raine's seashore. Which in turn means that Raine's story begins and ends with a rock, albeit a living rock of abiotic progeny: coral corpses. Which in turns means that the next dice roll turns to coral, journeying into the earth as a kind of living rock itself.

But Raine's other story – the human one – begins and ends with another, different kind of rock: the beacon. That piled high aggregate of mined phosphate cap now stands at a maximum seven metres above sea level. One day, when the rest of Raine has gone under, a beacon poking up out of a flooded sea is all that will be exposed, its sociopathic means of creation thus obscured, and so of the myths by which the civilisation of its day lived and died.

363 Hopley, *Raine Island*, 48.

Fig. 15: Green turtle (*Chelonia mydas*), Raine Island, Australia, 12 August 2014. Photograph by Neil Mattocks.