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SEI magazine

Sydney Environment Institute Magazine
The Great Barrier Reef Collection



THE UNIVERSITY OF
SYDNEY

10 Stars in the Sand: Climate
Change & The Great Barrier Reef

20 Saving Turtles and Respecting
Culture...It's Complicated

25 Great Barrier Reef Stories:
Let's Talk About Coral Sex





Since the Sydney Environment Institute was established in 2013, the Institute has worked to foster a multidisciplinary network of researchers, activists and community leaders who are working to explore environmental problems faced by the Great Barrier Reef (GBR), including: loss of place and cultural heritage; biodiversity loss; depletion oceanic resources; and declining health of coral and marine environments.

Over the past five years, SEI’s GBR research projects, blog posts and public facing events have communicated that the GBR is in jeopardy if we fail to address climate change, and showcased that the reef is essential for the prosperity of marine ecosystems, and for human well-being.

While the SEI’s research presents that anthropogenic factors are having destructive consequences on the prosperity of the GBR, it also emphasises that WE have the power to change the current trajectory. As stated by SEI Co-Director Professor McCalman: “we can save the reef because we did it once before.” Much of SEI’s GBR research portfolio builds on the foundations of Iain’s work on the social, cultural and environmental history of GBR, including his book *The Reef: A Passionate History*, which highlights that there is hope for the future.

What follows is a collection of selected articles on the GBR which were originally published on the SEI’s website. The articles touch on important topics such as the history of GBR activism; key debates surrounding GBR political action; coral science and bleaching research; and GBR stories – all which weave together the narrative of SEI’s multidisciplinary GBR research portfolio and the important research being undertaken by SEI affiliated researchers and students.

In maintaining an SEI objective of supporting the voices of emerging scholars, many of the articles featured in this collection come from students and early career academics, who are demanding climate action for the reef.

We hope that this special issue will inspire you all to continue the conversations on the GBR and contribute to the ongoing and necessary GBR scholarship.

Anastasia Mortimer, Magazine Editor

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The Return of the Repressed: The First Reef War and its Significance Today

—
Professor Iain McCalman, Sydney Environment Institute
Published 26 September 2018



Photo by Martin-Maun

Between 1965 and 1975, the Australian poet Judith Wright led a successful popular political war to save the Great Barrier Reef from the Queensland State Government’s campaign to mine eighty percent of it for oil, gas, fertilizer, and cement, in conjunction with an associated drive to create a sugarcane industry by levelling adjacent Reef rainforests.

“Two decades later, Wright ended the anniversary edition of her famous book, *Coral Battlefield*, with a chapter called ‘Finale Without an Ending.’ She warned that politicians were fickle, and renewed attempts to mine the Reef region could resume any time.”

Iain McCalman

Wright had fallen in love with the Great Barrier Reef in 1949, while holidaying on southernmost Lady Elliot Island. Shocked by the scars of guano mining, she was nevertheless stunned by the beauties of the island’s fringing coral reefs. From this time coral reefs became her metaphor to describe how fearless individuals could, just like tiny coral polyps, create bastions of moral resistance in the very teeth of oceanic political forces.

‘Only those coral insects live that work and endure under the breakers’ cold continual thunder. They are the quick of the reef that rots and crumbles in calmer water. Only those men survive who dare to hold their love against the world; who dare to live and doubt what they are told. They are the quick of life.’¹

Midway through 1965, Judith Wright, as president of a small community Wildlife Preservation Society of Queensland received a plea for help from an artist, John Busst, who led a tiny local chapter of the Society at Mission Beach in the central section of the Reef. His region was experiencing rapid deforestation to enable sugar plantations, and a local sugarcane farmer had just made a formal application to the State Government to mine the supposedly ‘dead’ local Ellison Reef for cheap limestone fertiliser.

John lodged an objection: he pointed out that Ellison, like all coral reefs, comprised living corals on top of limestone buttresses created from ‘dead’ coral skeletons.

Unfortunately, the Mining Warden’s court has rejected these arguments because Busst lacked scientific qualifications.

Squeaking an adjournment, John sought help from scientists at the University of Queensland in Brisbane, but they proved unwilling to involve themselves in politics.

The first full-time Barrier Reef researcher, Dr ‘Charlie’ Veron, was appointed only in 1972, however, prior to Veron, Australian scientists knew remarkably little about this massive ecosystem. On the occasion of this Ellison Reef crisis, however, Judith Wright, managed to find a handful of university zoology students to agree to undertake an underwater survey of Ellison Reef, provided John funded their travel.

The student divers reported having recorded 190 species of fish and 88 species of living coral on Ellison. This, combined with the testimony a scientist who’d worked there some years before, pushed the Warden into recommending against mining, though parts of it had already been removed. This small victory unleashed a full-scale war because it goaded the Queensland Government into public action.

In 1967 a crafty Country Party populist and champion of unbridled development, Joh Bjelke-Petersen, became Premier and promptly zoned eighty per cent of the Reef for oil and gas exploration. He and his ministers secretly also made large personal investments in six global oil companies. Bjelke-Peterson’s 1960s’ rhetorical style will sound all too familiar today. He liked to abuse Judith Wright’s conservationist followers as ‘flower-sniffing fools,’ ‘nitwits,’ ‘cranks,’ ‘rat-bags,’ and ‘commies’, intent on overthrowing the Australian way of life.

Judith Wright diversified her talents by writing influential popular articles, including a famous piece, ‘Conservation as a Concept,’ which hailed the emergence of ‘a hopeful new science’ of ecology in ‘the human as well as... biological fields [18].’ It promised, she said, to bridge Western civilisation’s most tragic divide by providing ‘a point at which a new spark can ... jump across the gap that at present separates the arts and the sciences—to the great detriment of each—and allow a new kind of cooperation and understanding to grow up.’

The publicity campaign resulted in a watershed moment for the Reef’s protection, and by the early 1970s, polls showed that a majority of Queenslanders now opposed mining of the Great Barrier Reef. At this point, the war was effectively won. The election of the Whitlam Labor government in 1972, the Royal Commission’s report, and the High Court’s decision in favour of Commonwealth sovereignty paved the way for a political settlement. Both sides of Federal parliament agreed in June 1975 to establish a multi-use Barrier Reef marine park under shared Federal and Queensland management. Six years later this area also gained World Heritage listing ‘as the most impressive marine area in the world.’

Of course, much has changed in the forty-three years since the early 1960s. For a start, there is not the same deficit of scientific expertise that hampered Judith’s advocacy. The Barrier Reef now boasts four specialised marine research stations led by world-renowned coral-reef scientists. Paradoxically, it is the very quality of this Reef science that inspires today’s campaigns of obfuscation and opposition. Vested commercial and political interests decry their scientific findings as ‘mere opinion’ based on bias and self-interest. Climate Change scepticism has become the banner of populist right-wing political and cultural movements in much of the West, including Australia. Right-wing radio ‘jocks’, Murdoch journalists, and coral-caressing conservative politicians endlessly chirp the virtues of ‘job-creating’ coal mining.

Scientific methodologies also exclude today’s professional marine scientists from deploying a range of powerful social, cultural, and economic arguments in defence of the Reef. Hopefully, we will not let them down. We need to collaborate actively with eco-tourism industries that depend on the beauty, health and wonder of Reef corals and who attract thousands of national and international visitors each year to enjoy the pleasures of recreational swimming, boating, fishing, and coral viewing. It is the beauties of the Reef, not Adani’s coal that currently supports over 65,000 jobs.

1. Wright, Judith. (1994). *Australia 1970. In Collected Poems, 1942–85.* Sydney: Angus & Robertson, p.45.

“With this new Reef war, the stakes are absolute, and Judith’s warning is relevant now more than ever.”

Iain McCalman

Like our predecessors, we too, should be prepared to forge cross-disciplinary collaborations of the arts and sciences in order to halt potentially lethal operations like those projected by the forthcoming Adani Carmichael coal mine. Stopping Adani could be both a symbolic equivalent of the Ellison Reef victory of 1965 and a potent means of reducing major local and global threats to the Reef’s survival.

With this new Reef war, the stakes are absolute, and Judith’s warning is relevant now more than ever. Thanks to man-made atmospheric CO₂, mass coral bleaching and ocean acidification threaten the total annihilation of 2,300 kilometres of coral, one of the most beautiful natural sites on the globe and a crucial hub of Indo-Pacific Ocean bio-diversity. The full output of the Carmichael Mine will generate Greenhouse gas emissions on a global scale by releasing 120 million tonnes of CO₂ per annum into the atmosphere, an amount greater than the annual emissions of over one hundred individual countries. Adani’s mine will emit more than 4.6 billion tonnes of carbon dioxide over its lifetime. It alone will use up one-tenth of the world’s total carbon budget and ensure that our planet exceeds the fatal additional warming level of two degrees Celsius.

If we are to combat a global conglomerate like Adani, we need to be prepared also to work with global Reef conservation organizations such as Future Earth, 350.org, Get Up, the Ocean Conservation Foundation, Greenpeace, Reef Ecologic, and the Pugh Foundation.

At a time when Australian academics are being required by the Australian Research Council to demonstrate our engagement and impact beyond the university, there could be no better time for us to prove our worth by emulating the triumph of activists like Judith Wright.

Iain McCalman

is a Research Professor of History at the University of Sydney and Co-Director of the Sydney Environment Institute. Over his long academic career, Iain has established a national and international reputation as a historian of science, culture and the environment. In 2007, Iain was awarded the Officer of the Order of Australia for Services to History and the Humanities. He is a Fellow of the Royal Historical Society, the Academy of the Social Sciences in Australia, and the Australian Academy of the Humanities and the Royal Society of New South Wales.

Conference

Reef and Rainforest: Mission Beach Conference & Project

Hosted on Thursday 3 – Saturday 5 July 2014

SEI Co-Director Professor Iain McCalman joined community environmentalists and eco-minded tourist businesses from Mission Beach, south of Cairns on the Cassowary Coast, for the community conference-cum-workshop. This community run initiative was inspired by the story from Professor McCalman's book, *The Reef – A Passionate History*, and the conference explored future approaches to protect the reef and rainforests of the region.

The conference was linked to an important community building project called the 'Turning the Tide project', which established a Reef and Rainforest environmental research and arts centre at Ninny Rise, Mission Beach.

[More details](#)

Stars in the Sand: Climate Change, the Great Barrier Reef and the Importance of Sand Stars

—
Dr Steve Doo, California State University, Northridge
Published 01 April 2014



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The latest [2014] IPCC report (working group II, AR5) released yesterday found with ‘high confidence’ that there will be ‘significant change in community composition and structure of coral reef systems in Australia...the ability of corals to adapt naturally to rising temperatures and acidification appears limited and insufficient to offset the detrimental effects’.¹

These changes have been exacerbated by rising levels of atmospheric carbon dioxide (CO₂). For a few days in May of last year, CO₂ levels exceeded a crucial milestone of 400 parts per million (ppm).² These conditions haven’t been seen for over 3 million years since the last major climatic event that had significant repercussions for biodiversity worldwide.

A few weeks ago, CO₂ again reached above 400ppm, and for the first time is forecasted to remain at this level for the next few months.³ It’s important to understand where this data comes from, what it means for our reef and how microscopic organisms can help us.

CO₂ Data

The longest running monitoring program of atmospheric CO₂ exists in Mauna Loa, Hawaii, where scientists have been monitoring daily changes in the atmosphere since March 1958.⁴ These data have formed one of the most convincing pieces of evidence of anthropogenic fossil fuel emission effects on the atmosphere, known as the Keeling Curve.⁵

Within this increasing trend of CO₂, there are natural fluctuations that occur in the atmosphere due to seasonal changes. The greater land mass in the northern hemisphere takes up more CO₂ in the spring and summer months due to increased photosynthesis by terrestrial plants, causing an annual decrease in the June–August months.

Impact on the Great Barrier Reef

In 2009, a study published by the worlds leading coral reef experts highlighted the importance of keeping carbon emissions under 350ppm.⁶ The authors argued that this threshold allows for the preservation of biodiversity in marine ecosystems, whereas levels of >450ppm would lead to irreparable damage. Many organisations such as 350.org have echoed this benchmark, calling for decreases in carbon emissions worldwide.

In Australia, the Great Barrier Reef attracts upwards of A\$6 billion a year in tourism, a figure that is nearly completely reliant on the health of the marine ecosystem. In addition, the Australasia chapter of the latest IPCC report points out that, ‘the net present value of the reef alone over the next 100 years has been estimated at A\$51.4 billion’.⁷ Local issues, such as dredging at Abbott Point, have been discussed in a previous blog, but the reef is also facing global stressors from fossil fuel emissions such as ocean warming, acidification and sea level rise.⁸

A readily observable effect of climate change has been a 30cm rise in sea level since pre-industrial times, with a forecast of another 70cm rise by the end of the century (IPCC, 2014). While this sounds like a small increase, low-lying islands are already being affected, leading to beach erosion and loss of property. But as oceans are changing, how can we help solve these problems?

Steve Doo

is a Postdoctoral Fellow at CSU Northridge and SEI research affiliate. Steve completed his PhD at the University of Sydney in 2016 where he studied the impacts of changing climates on animals in the Great Barrier Reef. His research centres around a group of important, but vastly understudied organisms named large benthic Foraminifera (LBFs), and their role in sand production.

Star Sands

The Great Barrier Reef is threatened by climate change, but it is also producing organisms that could help to alleviate its impacts. One unique group of organisms that could aid in combatting changing climates are large benthic foraminifera (LBFs). These fascinating organisms are microscopic, single-celled and have calcium carbonate skeletons, similar to corals.⁹

Foraminifera come in an array of unique shapes, and are referred to in many Asian countries as “star sands,” due to their star-shaped skeletons.¹⁰ LBFs live on the surface of algae and when they die their skeletons degrade, and add to beach sands. Although they are individually small, their large densities and fast reproductive rates mean that their ecosystem function drastically outweighs their individual size.

In fact, some islands along the Great Barrier Reef, such as Green Island near Cairns, are reliant on the persistence of LBFs for the maintenance of beach sands.

An innovative project initiated in Tuvalu is even attempting to determine optimal growing conditions for these organisms, to aid in sand production to potentially mitigate beach erosion caused by sea level rise.

Increasing CO₂ emissions in the atmosphere are causing the earth to become an inadvertent experiment. Without understanding the key players and how they will respond it makes successful management of anthropogenic change nearly impossible.

This means looking beyond the larger picture, in particular at microscopic organisms such as foraminifera, that have an exponentially greater environmental impact than their small size would suggest. It is vital that we find creative and innovate ways to mitigate the predicted negative impacts of climate change on our marine systems.

1 IPCC. (2014). *Climate Change 2014: Impacts, Adaptation, and Vulnerability* (working group II, AR5). [Access Here](#)

2 Freedman, A. (2013). ‘Carbon Dioxide Passes 400 PPM Milestone, NOAA Finds’ [blog]. *Climate Central* (May 10th, 2013). [Access Here](#)

3 Ogburn, S.P. (2014). ‘Emissions: CO₂ concentrations reach 400 ppm 2 months earlier this year’. *Environment and Energy Publishing* (March 25, 2014). [Access Here](#)

4 SCRIPPS Institution of Oceanography. (2014). ‘Latest CO2 reading’. *The Keeling Curve* . [Access Here](#)

5 U.S. Department of Commerce. (2014). ‘Global Greenhouse Gas Reference Network: Trends in Atmospheric Carbon Dioxide’. *Earth System Research Laboratory*. [Access Here](#)

6 Veron, J. E. N., Hoegh-Guldberg, O., Lenton, T. M., Lough, J. M., Obura, D. O., Pearce-Kelly, P., & Rogers, A. D. (2009). ‘The coral reef crisis: The critical importance of < 350 ppm CO₂’. *Marine pollution bulletin*, 58(10), 1428–1436.

7 IPCC, 2014.

8 McCalman, I. (2014). ‘The Reef: history repeats itself first time as tragedy, the second time as farce’ (February 4, 2014). *Sydney Environment Institute* [blog]. [Access Here](#)

9 University of California, Berkley. (2014). ‘Introduction to the Foraminifera’. *The University of California Museum of Palaeontology*, Berkley [website]. [Access Here](#)

10 World Atlas of Sands. (2011). ‘Star sand from Okinawa, Japan’ [website] (February 18, 2011). [Access Here](#)



Photo by Sabangvideo

The Temporal and Spatial Scale of Coral Bleaching: Chasing Corals

—

Associate Professor Ana Vila Concejo, University of Sydney
Published 10 October 2017

The spatial extent of the bleaching covered thousands of kilometres and expanded all over the world; the temporal scale saw coral turning white on a matter of days. This begs the question: what would we think if most of the trees in the world suddenly turned white in a given year? People would be alarmed, and there would be no way to deny it; this documentary shows how this has happened to the world’s coral reefs and argues that the alarm raised has not been nearly enough for us humans to consider changing the way we live.

Ana Vila Concejo

is an Associate Professor in the Faculty of Science, University of Sydney. Her research investigates the morphodynamics of coral reefs, particularly the processes that transport and accumulate sand in backreef environments and the role that reefs have as wave dissipaters. In 2011 I was awarded an ARC Future Fellowship to support my coral reefs morphodynamics research and to continue the studies in the dynamics of coral sands. Ana is the Deputy Director of One Tree Island Research Station; between 2012 and 2015 she was the Director.

The effects of climate change on the Great Barrier Reef has been a component of the research to come from the University of Sydney’s Geocoastal Research Group and One Tree Island Research Station, which has mostly focused on the geology and geomorphology of coral reefs at different time scales with special emphasis on the geologic resilience of the Great Barrier Reef, and the effects that sea level change have on the morphology, hydrodynamics, and sedimentation of coral reefs; the effects of coral bleaching are also a part of their research.

The Geocoastal Research Group’s studies in coral reefs have shown that the Great Barrier Reef has been a resilient feature over hundreds of thousands of years. As sea levels rose and fell over the last half a million years or so, the Australian continent has seen about eight Great Barrier Reefs grow and die. Indeed, there are Dreamtime stories where the first inhabitants of Australia tell their account of changing sea levels and how the reef changed.

We know that, from a geological point of view, the Great Barrier Reef is resilient.¹ Yet, we have established that small changes in sea level might trigger large changes in the growth and morphology of coral reefs.² We know that coral reefs are the greatest wave dissipaters in the world and that,³ without them, the coasts that they protect would be exposed to waves larger than the waves they receive now. We are also starting to understand how wave exposure determines the geologic evolution of reefs.⁴



“The documentary *Chasing Coral* highlights the 2016 bleaching event in the northern Great Barrier Reef; this is important because it describes how coral bleaching is evident in the temporal and spatial scales, which are typically hidden from the public view.”

Ana Vila Concejo

The past few decades have seen unprecedented climate change, and scientists have proven over and over that this climate change is due to human causes.⁵ Consequently, coral bleaching has been happening somewhere almost every year, and in three occasions (1998, 2002, and 2016–17) this bleaching has occurred on a global scale, causing the death of large proportions of the coral around the world. If we just focus just on the Great Barrier Reef, just the 2016 event was so severe that caused the death of 2/3 of the coral in the upper third of the Great Barrier Reef.⁶

Professor Terry Hughes, in an event organised by the SEI, told us about their scientific findings and what needs to change if we want the Great Barrier Reef to revive for generations to come. Only recently, in the SMH, Professor Emma Johnston wrote about the efforts that scientists are doing to preserve the coral reef that includes creating heat resisting algae symbionts that can be frozen and released to the reef during bleaching events.⁷ However, we all know or should know that the first step to help the reef is to change how we obtain our energy and switch to renewable energy.

1 Nunn, Patrick. (2014). Geohazards and myths: ancient memories of rapid coastal change in the Asia-Pacific region and their value to future adaptation. *Geoscience Letters*, 1(3).

2 Harris, D. L., Webster, J. M., Vila-Concejo, A., Hua, Q., Yokoyama, Y., & Reimer, P. J. (2015). Late Holocene sea-level fall and turn-off of reef flat carbonate production: Rethinking bucket fill and coral reef growth models. *Geology*, 43(2), 175–178.

3 Vila-Concejo, A., Duce, S., Nagao, M., Nakashima, Y., Ito, M., Fujita, K., & Kan, H. (2017). Typhoon Waves on Coral Reefs. *Coastal Dynamics*, 263: 697–701.

4 Dechnik, B., Webster, J. M., Nothdurft, L., Webb, G. E., Zhao, J. X., Duce, S., & Puotinen, M. (2016). Influence of hydrodynamic energy on Holocene reef flat accretion, Great Barrier Reef. *Quaternary Research*, 85(1), 44–53.

5 NASA. (2017). ‘Scientific consensus: Earth’s climate is warming’. Global Climate Change: Vital signs of the planet. [Access Here](#)

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7 Johnston, E. (2017). The amazing biological fixes that could help save the Great Barrier Reef. *The Sydney Morning Herald* (October 3, 2017). [Access Here](#)

Public Lecture

Coral Bleaching in the Great Barrier Reef with screening of *‘Chasing Coral’*

Hosted Monday 16 October 2017, in partnership with the Geocoastal Research Group and Sydney Ideas.

In the last 30 years, we have lost 50% of the world’s corals, and coral bleaching events are likely to become even more frequent and severe due to climate change. The documentary *Chasing Coral* highlights a dimension of the global threat of coral bleaching to the world’s reefs that would otherwise be hidden underwater. The film screening was followed by a panel discussion with researchers from the University of Sydney’s One Tree Island Research Station, located in the Great Barrier Reef.

Chair

Associate Professor Ana Vila-Concejo, Geocoastal Research Group

Panel

Professor Maria Byrne, School of Life and Environmental Sciences
Assoc Prof Jody Webster, Geocoastal Research Group
Professor Iain McCalman, Sydney Environment Institute
Ariana Neuman, Greenpeace Australia Pacific

Podcast

Saving Turtles and Respecting Culture... It's complicated

Dr Leah Lui-Chivizhe, University of Sydney
Published 07 April 2015



Photo by Jacob Owens



Photo by Jacob Nasyr

Marine turtles are without a doubt, a charismatic species. We are all in awe of their ancientness, entranced by images of tiny hatchlings scurrying into the ocean and smitten with shots of them swimming or just “hanging out” on an ocean current.

In the Torres Strait, the lives of Islanders and marine turtles have entwined for millennia. As the seasonal winds and ocean currents continue to usher turtles into the region, water depth and the right environmental conditions combine to ensure the growth of extensive seagrass meadows, an all-important turtle food.

Every year thousands of green turtles move through the Torres Strait to eat sea grass, jellyfish and other small sea creatures, to mate and for some, to nest.

As turtles have moved through the swirling waters of the Torres Strait, they have also nourished the bodies and cultural lives of Islanders for thousands of years.

To Islanders, the green turtle (*Chelonia mydas*) in particular was and is food and archaeological dating of our use of turtle for subsistence and ceremonial purposes is between 6000 to 7000 years BP. The longevity of our use of turtle facilitated the development of a rich bank of knowledge on turtle and turtle ecology and particular taxonomies exist in the two languages of the region.

Leah Lui-Chivizhe

is an SEI Researcher in the Department of History, University of Sydney. Leah researches in Indigenous histories with a focus on Torres Strait cultural histories and performance. Her current work focuses on 19th c. Ethnographic and natural history collections from the region and Islander engagements with these collections for remembering and performing history.

“And for the tiny turtles that make it out to sea, not only do they have to avoid being eaten by birds, and crabs and sharks, there are also human-made dangers.”

Dr Leah Lui-Chivizhe

In the 1970s it was recorded that of all marine fauna, it was turtle and dugong that Islanders described with the utmost precision. As well as being food, the turtle has other cultural, totemic and symbolic meanings for Islanders. This was emphasised in a recent report from the Australian Government’s National Environmental Research Program which flagged the “immense spiritual significance” of turtle (as well as dugong) to the people of the Torres Strait.¹

While the hunting and consumption of turtle by Islanders is classified as a traditional fishery in the region and a right of native title holders it also rubs up against wider community concerns about animal cruelty and species endangerment.² It is possible that finding and implementing more efficient methods of killing turtles might go some way towards dealing with claims of cruelty, but species endangerment remains an ongoing concern. In this often fraught conversation, at one end of the spectrum are various conservationists and animal rights activists who cast traditional hunting as barbaric and unnecessary. Indeed Islanders’ traditional practices in this model are seen as the cause of future extinction. At the other end of the spectrum are many Islanders and other indigenous people, who say we have hunted and eaten this food for thousands of years and we have a right to continue practising our traditions.

As the opposing groups cast around for scientific, political and community support to bolster their own position, the complexities and multiple challenges of saving turtles are in danger of being overlooked. Sea level rises, and pollution plays a significant part in the future survival of marine turtles. Extreme weather events and rising sea levels can devastate hatching success. Storm surges wash away nesting beaches, and if the nesting turtles are disoriented by the shifting sand, they won’t know where to lay their eggs.

If they lay their eggs too low on the beach, the nest will be flooded by the high tide, and the eggs will die.

And for the tiny turtles that make it out to sea, not only do they have to avoid being eaten by birds, and crabs and sharks, there are also human-made dangers. Turtles caught up in the nets of fishing, and prawning trawlers will die by drowning or from their injuries. Trawling is believed to be responsible for more sea turtle deaths than any other human factor.³ Throughout northern Australia –discarded or lost fishing nets, known as ghost nets – drift in the sea and move in the same currents used by turtles.

Turtles that become entangled in ghost nets will drown. On Raine Island, a coral cay on the northern edge of the Great Barrier Reef recognised as the largest green turtle hatchery in the world, overcrowding and erosion are devastating hatchling survival rates. The loss of hatchlings is so dire one proposal is to transport tonnes of sand to the island to rebuild nesting beaches.⁴

Islanders are also worried about the multiple threats to future turtle numbers posed by pollutants, commercial fishing and rising sea levels. Islander rangers across the region routinely monitor the status of sea-grass meadows and nesting beaches and record how many eggs, and hatchlings survive each nesting season.

This helps to give scientists and Islanders important information about and hope for the possible future of turtles in the Torres Strait. Islanders also know how important it is to limit pollution in the region. For island peoples, the sea is the ‘supermarket’ providing fish to feed families and turtle for ceremonies. Damage to the regions marine ecosystem will have drastic, potentially irreversible consequences for turtle populations as well as for populations of Islanders.

So, yes ... it’s complicated!

1 Australian Government Department of Environment. (2014). *NERP Tropical Ecosystems Hub Conference 2014*. [Access Here](#)

2 SBS News (2015). Traditional hunting ‘not animal cruelty’. [Access Here](#)

3 The Australian Government Department of the Environment and Energy. (2015). ‘Chelonia mydas — Green Turtle’. *Species Profile and Threats Database*. [Access Here](#)

4 Queensland Government. (2015). Raine Island Recovery Project. Environment. [Access Here](#)



Photo by Pei Yan

Great Barrier Reef Stories: Let's Talk About Coral Sex

Dr Killian Quigley, Sydney Environment Institute
Published 29 November 2017

Talking with family and friends about coral sex can be uncomfortable. At places like the Great Barrier Reef, coral colonies spawn en masse, and in sync, in what might be the world's most technically and visually accomplished orgy.¹ Gracefully promiscuous, they discharge innumerable spheroid parcels containing gametes (eggs and sperm), which float toward the surface like perfect submarine balloons.

They're giving it all away, sure, but if they're profligate, they're also romantic: spawning events tend to happen in springtime, and just after full moons. (Their timing depends on other factors, like water temperature, too.) I think of nocturnal poetry – of John Donne, of Anne Finch, and of Samuel Taylor Coleridge. Harkening to a nightingale by “moon-light,” Coleridge savoured its “delicious notes,” sung as if the bird were anxious that the night.

“Would be too short for him to utter forth / His love-chant, and disburthen his full soul / Of all its music!” How dazzled, one wonders, might Coleridge have been by coral spawning, its unburdening, its music?

The corals of the Great Barrier Reef began spawning early this month. Over the next couple of weeks, the austral spring will continue to warm, meaning even greater extravagances are to come, after a full moon on December⁴. Spawning events are riots of colour, motion, and – above all – of life and life-making, and at the Reef, the dissipation occurs on an almost unimaginable scale. It has recently, and memorably, been called “the greatest orgasm on earth.”²

Sex and desire are, to put it very mildly, significant features of ourselves, our ways of being and relating, our imaginations – our stories. And so it's interesting to consider how we respond to – and narrate – nonhuman sex on a spectacular scale. *Is it romantic? Is it sexy? Is it even recognisable as sex? Is it loving?*

That we have some difficulty with these questions is partly a consequence of the distance we perceive between ourselves and coral “selves,” between organism-us and organism-them. Coral hermaphroditism is only one example of the ways these animals can bridge or disrupt familiar categories. The art historian Marion Endt-Jones has put it well: coral, she writes, “obstinately refuses to fit the philosophical and epistemological binaries that have structured Western thought since the Enlightenment and that are still deeply engrained in our cultural and institutional frameworks.”

This matters for Great Barrier Reef stories, because those frameworks, and the binaries that inform them, do a great deal to direct the ways we interpret the world, and the ways we narrate happenings and transformations therein. This is especially relevant, I think, for stories of intimacy, love, and sex. Not uncommonly, sexual behaviour among nonhuman beings is considered and described in terms of bare reproductive function. But when human beings are described in similar terms, the effect is often to dehumanise – to deprive certain persons of the mind, agency, and dignity that, many believe, set us apart.

“Animals have sex and human beings have eros” – thus the critic and philosopher Allan Bloom. For thinkers like Bloom, sex isn't an enticement to celebrate humans' physicality – let alone animal qualities – but a domain in which it becomes more important than ever to differentiate between ourselves and our nonhuman neighbours.

Killian Quigley

is a postdoctoral research fellow at the Sydney Environment Institute, and he is currently researching the poetic, aesthetic, and broader cultural histories of environments and ecosystems. Killian is currently at work on a monograph, entitled *Submarine Poetics*, which proposes that cultural histories of the undersea which focus primarily on technologies of access have tended to simplify rich and polysemous legacies of subaqueous poetics and aesthetics.

This seems related to the tradition of dualistic thinking that we commonly trace, in the Western tradition, to the work of the seventeenth-century French mathematician and philosopher René Descartes.³ And it’s vitally related to stories, so very many of which involve – indeed, derive their entire *raison d’être* from – sex, love, desire, intimacy, and related energies. See, for instance, chivalric romance, which flourished in late medieval Europe through works like *Sir Gawain and the Green Knight*, Chrétien de Troyes’s *Lancelot*, and Thomas Malory’s *Le Morte Darthur*. Little as we may recognise ourselves in their tales of knights, damsels, courts, and fantastic beasts, the sense of “romance” cultivated by these works still exerts a powerful influence upon Western culture. And the conventions of chivalric romance promoted certain values, characters, settings, and storylines, which contributed to a widespread sense that those values, characters, etc. were inherently romantic. In the chivalric instance, this tended to entail the prioritisation of heterosexual love, aristocratic ideals, and an almost religious devotion between lovers.

What about coral romance? There are almost as many reasons to care about Great Barrier Reef sex as there are gametes ballooning skyward. But without the language and concepts we need to not only recognise, but appreciate, spawning as sex – or something like it – we are unlikely to find it as important, compelling, precious, or vulnerable as we ought. In *Beyond Good and Evil*, the German philosopher Friedrich Nietzsche observes the ways language can

limit us: “Where there exists a language affinity it is quite impossible...to avoid being prepared in advance for a similar evolution and succession of philosophical systems: just as the road seems to be barred to certain other possibilities of world interpretation.” Nietzsche’s point, here, is that with shared language come shared horizons, and if those conduce to mutual understanding, they can also make it hard to look beyond those horizons to truly original vistas.

Not that no one’s trying. Earlier this year, the Borscht Film Festival, in Miami, hosted *Coral Orgy*, a splendidly immoderate event at New World Center. Frank Gehry’s building – its interior as well as its exterior – was overwhelmed by footage of coral spawning, courtesy of Coral Morphologic. The night’s superstructure, in other words, was coralline. This encouraged attention to coral lives in ways that, Monica Uszerowicz observed,⁴ were “as psychedelic as...educational.” As Uszerowicz pondered the shapes, colours, and textures projected all around her, she wondered at their surprising mobility. Animal Collective scored the spectacle, but from her vantage, Uszerowicz thought it might’ve been the corals that were singing, “their neon-green circular orifices opening and closing in serendipitous time with the music.”

Coral love-chants, and coral souls: these words don’t get us past the horizons we’ve inherited, but in the weird mixture that is coral romance, we might unburden ourselves of certain bounds, and inherit new fluidities.

Featured Books



The Reef: A Passionate History

By Iain McCalman
Penguin, 2014

The first social, cultural and environmental history to be written on the Great Barrier Reef, McCalman’s *The Reef* charts the shifting status of *The Great Barrier Reef* from labyrinth of terror to global treasure, in twelve extraordinary tales and describes encounters between peoples and places, ideas and environments, over the past two centuries.

More details



Australian Echinoderms

Edited by Maria Byrne & Timothy O’Hara,
CSIRO Publishing, 2017

Australia’s 110 families of echinoderms, including feather stars, seastars, brittle stars, sea urchins and sea cucumbers, are some of the most beautiful and interesting animals in the sea. *Australian Echinoderms* brings together in a single volume, comprehensive information on the identification, biology, evolution, ecology and management of these animals for the first time.

More details



The Aesthetics of the Undersea

Edited by Margaret Cohen & Killian Quigley
Routledge, 2018

The Aesthetics of the Undersea draws case studies that explore the aesthetic engagements with underwater worlds. The chapters deal with the sensory, material, and formal provocations of the underwater environment, and consider the consequences of such provocations for aesthetic and epistemological paradigms. *The Aesthetics of the Undersea* establishes crucial relations among temporally remote entities, which will resonate across the environmental humanities.

More details

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In the Eye of the Beholder: A Personal Story of Two Seeds

—
Associate Professor Monica Gagliano, University of Western Australia
Published 10 May 2017



Photo by Monica Gagliano

The reef is not dying due to climate change. The reef, and more generally the planet, is being killed by our pathological indifference. The question is ‘why’? Let me share a personal story of two seeds. For years, I spent months breathing under the surface in the waters of the Great Barrier Reef to learn about the private life of a little damselfish species, which Science calls *Pomacentrus amboinensis*.

During the warm summer months, I observed females laying eggs in perfect little nooks within the complexity of the reef structure and males aggressively protecting these benthic nests from egg predators and other intruders. The eggs will be under the watchful paternal eye for a few days until hatching. All born females, the tiny larvae will wriggle their way out and away, embarking on a courageous journey far from the reef and out there, in the open ocean where mortality is almost absolute. Those few that do survive, swim their way back to the reef under the protective darkness of the new moon as their diaphanous shapes are transformed into the beauty of catchy colours we love.

As time progresses, juveniles audaciously venture further and further out from the safety of their hidey-hole to catch some plankton in the water column or competing over new prime spots in the coralline estate. Thanks to the black spot at the rear of the dorsal fin, which does not function—as popular belief would have it—to confuse predator but speaks of their immature reproductive state, these youngsters are tolerated by the dominant males, who allow them to hang around the nest sites and indirectly protect them from predators.

The spot will eventually disappear with age as juveniles mature into reproductive females, after which some will also change sex to become the dominant males. But the story is not over; to spice things up, some retain the spot although they are clearly no juveniles anymore. It turns out that these individuals are all mature males who have taken an alternative route (so to speak). By closely resembling the body shape of females and retaining the spot that flags them as immature, these males will sneak their way in the nest sites of the tolerant (albeit oblivious) dominant males to contribute to the renewal of the population with minimum effort.

The presence of these bright yellow bodies of different shape and sizes flickering in the water column like wild confetti feels like a true miracle, a celebration of Life. Today, this pondering fills me with a great sense of awe. At the time when this species was the main object of my scientific research, however, their commitment to life didn’t stop me from fulfilling the murderous necessity of science.

It was so until the fish ceased to be an anonymous data point, just another fish in the agreed sense of the word—the human-centred categorical boundaries asserted through to the Linnaean classification system, which is a fiction brought into being by a particular worldview. No longer an elusive entity void of individuality, the object of my research became a subject for my learning. And everything changed.

I remember that morning, vividly. I had been in the water every day for months, monitoring the reproductive output of wild *P. amboinensis* pairs. Every day, we encountered each other at the edge, where the safety of the reef ended and my hand stretched out opened. A week into the study, these wild animals snuggled inside that hand as my fingers gently curled around their scaly bodies and then uncurled open again. They knew me, personally. I knew them, one by one. On the last day of the study, I went into the water with the intention of ‘saying goodbye’ before returning in the afternoon to capture and kill them all. That morning, no one was in sight; no one was approaching me, let alone my open hand. A chilling sensation filled me. At that moment I knew they knew.

I felt the blood of all the past killings I had done in the name of my science and a dreadful feeling of guilt arrived in my heart. Frozen and not knowing what to do, I did what I knew. That afternoon, I went back in the water with nets and caught bags and killed them all. I understand now that theirs was an incredible sacrifice that delivered the one gift that would change everything. Because through the intimacy of our encounter, the time spent *being together* and *being with* each other had broken down the taxonomic boundary. In this permeability, a true nakedness had emerged, the kind of vulnerability necessary to establish openness. They taught me *empathy*. And I never killed again.

I called this the story of two seeds—namely, Guilt and Empathy—because I had been given the opportunity to choose to plant one of them and change my life. In the wider global context, I feel we have arrived at the same point of choice, an opportunity to change the world. So which seed shall we choose to plant in our collective garden? We have zealously been planting *Environmental Guilt*, now fashionably referred to as the *Anthropocene*.



Photo by Erin Simmons

To me, this word smells mouldy. It smells of patriarchal colonialism, still celebrating our dominion over the environment while religiously confessing our sins of devastation and hoping for redemption. But Environmental Guilt cannot save us, nor the planet.

Environmental psychologists tell us that Guilt is an emotion that only works when people are faced with ‘small’ issues. When the challenge is perceived to be too big—and our current task is of planetary proportions—Guilt overwhelms and immobilises us in a state of hopelessness and helplessness. And just as I did with my fish, we freeze and end up doing what we already know, repeating the past that has caused the very circumstances we are trying to resolve and, thus not allowing us to move into a new future.

To choose Guilt is to plant the seed that ensures that the individuality of the “other”—in the context of my story, the fish, in the bigger story, the planet—remains an elusive entity, an objectification that is central to the lack of empathy and essential to our reckless exploitation. And yet, we can plant and nurture the other seed, the seed of *Environmental Empathy*. Empathy is a seed of wisdom, central to our human capacity for true care and essential to our creative inspiration.

To choose Empathy is to plant the seed that ensures we encounter the “other” who is constantly beckoning us to open fearlessly, and discover who we are. Just like in my own story, empathy is the inspiring seed that changes everything. By making us available to real change within and out, planetary wellbeing is the inevitable outcome. This brilliant turning point is only one little seed away.

Monica Gagliano

is a former research fellow of the Australian Research Council and currently a research associate professor of evolutionary ecology and adjunct senior research fellow at the University of Western Australia. She is author of numerous scientific articles in the fields of animal and plant behavioural and evolutionary ecology and has pioneered the new research field of plant bioacoustics and extended the concept of cognition to plants, reigniting the discourse on plant subjectivity and ethical standing.

“To choose Empathy is to plant the seed that ensures we encounter the “other” who is constantly beckoning us to open fearlessly, and discover who we are. Just like in my own story, empathy is the inspiring seed that changes everything.”

Monica Gagliano

Great Barrier Reef Stories: Reef Music

Dr Killian Quigley, Sydney Environment Institute
Published 13 February 2018

I’m not a marine biologist or a coral reef ecologist. My PhD is in literature, and my research focuses on cultural histories of environment. When I write, my subjects typically include writers, visual artists, and philosophers.

How does this kind of work pertain – how can it be made pertain – to biotic phenomena of pressing contemporary concern, like the correlation between plastic pollution and coral disease in the Asia-Pacific region?¹ One answer lies, I think, in articulating new ways to understand and articulate these phenomena – ways that rely, say, on metrics other than quantitative scientific surveys, and on language other than biodiversity and ecosystem health.

So for instance, I like thinking about environments – not least the Great Barrier Reef – in terms of their aesthetic properties, by which I mean the things they offer to our senses: their distinctive forms, colours, textures, and so on. (I talk about this quite a lot in an upcoming Open Learning Environment course here at the University of Sydney,² “Global Ethics: The Great Barrier Reef.”) The idea isn’t that the aesthetic stakes are more important than the ecological ones – rather, it’s that by thinking seriously about the relationship between sensory richness and biological vitality, we might give ourselves new ways of perceiving, and feeling, the globe and its lives.

But I’m increasingly mindful of gaps in my thinking. Above, I summarise the sensory by referring to sight and, to a limited extent, tactility. What about hearing, taste, and smell? I realise that I’m half-wittingly practising what media scholars might call ocularcentrism, or visualism.

This habit of prioritising vision has an august history in European thought: we can recognise it in the classical Greek philosophies of Plato and Aristotle, and in countless other sources besides. Contemporarily, much of the language deployed to describe the Reef – and to make appeals for its protection – relies on visual superlatives: on claims that it’s “the largest living structure in the world,” the “only living thing on earth visible from space,³” and so on.

Assertions like these are mighty, and inspiring, but they leave a great deal of room for other sensations, and for other scales: how best to describe the Reef’s nonvisual particularities? Could getting in touch (ahem) with them make us more likely to relate viscerally to the Reef, and to care for it?

I’ve been preoccupied by audition lately, thanks to a few felicitous encounters. I recently heard a memorable interview with David George Haskell, biologist and author of *The Songs of Trees* (2017).⁴ Haskell argues that biodiversity is something it’s possible to train ourselves to hear.

This can happen, for example, by tuning in to raindrops falling through the diverse plants that make up a forest canopy: “each leaf,” Haskell says, “is revealing the particularity of its form.” And my own auditory attention was exceptionally roused, a few weeks ago, during a walk in Sanctuary Mountain Maungatautari, in central North Island (Te Ika-a-Māui) New Zealand (Aotearoa). SMM is a fenced, 3400-hectare “ecological island” which aims to approximate, if not actually recreate, “the pre-human New Zealand environment.”

This sort of undertaking – some might call it “rewilding” – seems to me imbued with a complex mixture of salutary ecocentrism and faintly troubling nostalgia. But sonically speaking, I can say that the place is marvellous. I came away fascinated, above all, by the tūī (*Prothemadera novaeseelandiae*), an indigenous mockingbird with a song that seemed, to me, like a beautiful, meandering, musical experiment. Finally, I was privileged, last month, to participate in *What Lola Heard: Theatrical Sounds from Climate Change*, where improvisational music scrambled my senses, rendering me thrillingly aware of the power of unexpected arrangements of sound to reorganise my world.

What does the Great Barrier Reef sound like? An arresting new article describes and interprets the underwater soundscape around Lizard Island, in the Reef’s northern stretches.⁵ (Australian artist Janet Laurence’s 2016 installation, *Deep Breathing (Resuscitation for the Reef)*, was inspired by her time at Lizard.⁶ Jamie McWilliam and his co-authors identify six distinct “fish choruses” in the surrounding reefs, and observe the “distinctive spatial and temporal patterns” they express. For instance, by listening for, and noting, particular bioacoustic figures, the researchers gained insight into fishes’ habits of movement, and indeed their “site fidelity. These reefs are, in other words, geographies laden with meanings, meanings that are sensed and experienced differently by different creatures: “by no means,” as Deborah Bird Rose has written, are humans “the only creatures to form attachments to place.”⁷

“By thinking seriously about the relationship between sensory richness and biological vitality, we might give ourselves new ways of perceiving, and feeling, the globe and its lives.”

Killian Quigley



Photo by Logan Lambert

Nor, for that matter, are they the only creatures to compose their lives in time: McWilliam and his collaborators report “a broad range of periodicities” evident in the choruses, as fishes swim and sing rhythmically, and in response to “environmental variables” like “temperature and moonlight.” Through listening – through counterintuitive unfoldings of sensory regard – fish-worlds, reef-worlds, and the tantalising horizons they suggest become suddenly, wonderfully available to our minds and our imaginations.

Of course, human beings are in relationship with those fish- and reef-worlds, rarely though many of us think of them. And while some field recordings provide stunning, and practically – never entirely – unmediated, impressions of the sounds of underwater worlds, it’s important, too, to acknowledge what an embodied person actually hears on the Reef. Take scuba diving, for instance: as Michael Adams writes in an award-winning essay on freediving, breathing through pressure regulators is a noisy business.⁸ Personally, I appreciate the way the bubbling makes me unusually aware of my respiration – but I understand how it can seem like so much sonic interference.

“Take scuba diving, for instance: as Michael Adams writes in an award-winning essay on freediving, breathing through pressure regulators is a noisy business.”⁸

Killian Quigley

As for external stimuli, humans are bound to hear certain things very well underwater, and other things markedly less so – to say nothing of the possible impacts on the ears from water pressure, and indeed barotrauma. But maybe these hindrances and imperfections make up precisely what’s worth mulling – worth sounding, as it were. Because hearing the Reef mustn’t amount to reducing and rationalising it, to receiving sounds as mere novel additions to our old collecting cabinets. Better instead to listen in a spirit of humble and ecstatic wonder, to sense the exquisite unreachable, to hail places, movements, times, and lives impossibly beyond our comprehension, and infinitely worthy our respect.

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Bleach-hot Reality

The Great Barrier Reef of your childhood is gone, what are you going to do about it?

Jodie Pall, Sydney Environment Institute
Published 06 April 2017

Professor Terry Hughes is a big deal in the reef ecology arena and currently spearheads the National Coral Bleaching Taskforce. So when an undisputed expert has to hold back tears as he describes the future of our reef, you realise we must be in dire straits.

Hughes, speaking at the Sydney Ideas public lecture called *Global Warming and the Mass Bleaching of Corals* last week, sounded the death knell for the Great Barrier Reef. He was joined by three other panellists, all of whom emphasised the importance of taking climate action. While I could critique the event for who it failed to invite to speak about climate action and coral bleaching (Traditional Owners, Aboriginal activists, students, people who depend on or work near the reef who are not part of the educated elite), as a young climate activist I was powerfully touched and motivated to action and believe passing on the information from Hughes’ might inspire others to get involved in doing something about it.

The reef experienced two coral bleaching episodes in 2016, the hottest year on record, and another two in 2017. That’s four bleaching events with less than one degree of average global warming, and if the predictions are true, we can expect innumerable more terrifying changes to be unleashed globally.¹

In 2016, Hughes’ surveyed the extent of severe bleaching along the entire Great Barrier Reef. His team found that the most severe bleaching is occurring in the northern third of the Great Barrier Reef,² where half of those reefs saw more than 65% coral death.

Hughes’ team will undertake an identical survey in 2017 regarding this year’s back-to-back beaching, but expectations are grim. Like Maria Byrne, Professor of Marine Biology at the University of Sydney, says, the damage of a pulse of warm sea surface temperatures is like “ten cyclones holding hands, walking toward the reef.” Byrne echoes Hughes’ message: we cannot afford to go above two degrees of warming under the 2020 COP21 target. If we don’t transition to renewables, we are likely to see annual bleaching events.³ Sadly, but unsurprisingly, Hughes emphasised that even if we stay below that target, the fate of the reef is likely to get worse before it gets better.

Addressing the sombre audience, David Ritter CEO of Greenpeace Australia Pacific recalls a quote, “The earth is not dying; it’s being killed. And those that are killing it have names and addresses.” A complex of banks, federal and state governments as well as peak business bodies in Australia are investing in the destruction of the reef, he remarks.

The government is lending \$1 billion of taxpayer money to billionaire Mr Adani to build Australia’s biggest coal mine next to the reef.⁴ At the same time, peak bodies are not addressing the issue and politicians are extolling the virtues of coal in parliament.⁵ Commonwealth Bank and Westpac have remained silent, and have not ruled out funding the new coal project expected to last for 60 years, well past the time of coal being considered a viable energy source.

Jodie Pall was an SEI 2017 Honours Research Fellow in the School of Geosciences. Her Honours research investigated the impact of climate change on reef growth in the Great Barrier Reef, using stratigraphic forward modelling. Outside of her research interests, Jodie is a member of many grassroots organisations including the Australian Student Environment Network (ASEN) and the #StopAdani campaign and is deeply committed to climate justice.

All panellists urge that we have no option but to take action. They respond to the question we’re all asking ourselves: What can we do? Ritter lists a dozen of actions we can take including making a meal for your five closest friends and share Hughes’ message; write to your local member, a surprisingly effective measure given how few letters they generally receive; or get involved in an organisation that is already committed to taking action like the Australian Conservation Foundation, AYCC, Greenpeace, GetUp! or a #StopAdani group.

It is not unprecedented that people have taken radical action to protect reefs before. Iain McCalman, Co-Director of the Sydney Environment Institute, draws upon the lessons learned from the campaign to save Ellison Reef beginning in 1967, a movement led by John Busst, poet Judith Wright, and CSIRO forester Len Webb. At that time, threats of mining the reef and turning reef skeleton into fertiliser were resisted by passionate locals in a watershed event which has come to be known as the birth of reef conservation in Australia.⁶

McCalman forecasts that this is our ‘Ellison Reef moment’; the Great Barrier Reef that we know from our childhood will never be the same, but while temperatures continue to rise, he and the other panellists urge us to act together to stop this train-wreck of climate disasters from destroying our future.⁷

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Film Screening

Global Warming and the Mass Bleaching of Corals

Hosted on Friday 31 March 2017 in partnership with Sydney Ideas & Greenpeace Australia Pacific.

Director of the ARC Centre of Excellence for Coral Reef Studies, Professor Terry Hughes and a distinguished panel of academics and environmental activists, discussed the future of the Great Barrier Reef in the face of climate-induced coral bleaching. The panel explored the outcomes or the long-term survival of the Reef should the present patterns of recurrent bleaching continue or intensify and considered what could be done to prevent recurrent coral bleaching.

Panel

Professor Terry Hughes, ARC Centre of Excellence for Coral Reef Studies
David Ritter, Greenpeace Australia Pacific
Professor Maria Byrne, University of Sydney
Professor Iain McCalman, Sydney Environment Institute

Podcast

Great Barrier Reef Stories: Reef Grief

—
Dr Killian Quigley,
Sydney Environment Institute
Published 30 May 2018

Matters of death and dying, of grief and of mourning, are present, for better and for worse, in proximity to any serious contemporary discussion of the Great Barrier Reef. They are, in other words, among the most powerful of the narrative energies that power Reef stories. For some, this state of affairs represents a serious practical, and perhaps moral, hazard: Andy Ridley, CEO of Citizens of the Great Barrier Reef, has warned that to call the Reef dead is to invite public indifference to its plight.¹ This can get personal, too: in my own, limited experience, I have heard Reef researchers take umbrage at the insinuation that the habitat they study – and love – is effectively a goner.

On the other hand, from some points of view, the Reef’s fate can appear sealed. *What Is Missing?* is architect Maya Lin’s “global memorial to the planet,” where testaments to the “sixth mass extinction,” including video footage of a desolate underwater reefscape, are assembled in hopes of spurring mourners to “reimagine our relationship to the natural world.” Accompanying forecasts of reef death suggest that these are ecosystems beyond saving, terminal emblems of anthropogenic habitat destruction and climate change.

The point is not that this is an argument someone had better win, so we can all find a single groove of feeling to slip confidently inside. The point is that responding to knowledge of transformation, deterioration, and death is never easy and may be more difficult when applied to lives and homes beyond the human. And perhaps coping is more complicated still when it gets tangled up with our understanding of the Anthropocene’s bizarre processes and temporalities. Consider the pervasive, and mounting, sense of “time lag,”¹ an awareness that the alterations we’ve wrought upon the biosphere have set in motion certain phenomena that we no longer have the power to stop.

This is the sort of thing I recognise when I encounter doomful reports that major coral bleaching events tend now to follow one another too quickly for reefs to recover, and in coming years are likely only to quicken.² How is one supposed to feel about all this? What sorts of practice – what kinds of ritual – are commensurate to these becomings?

These questions have led me to the work of Ashlee Cunsolo and Karen Landman, editors of a recent volume called *Mourning Nature: Hope at the Heart of Ecological Loss and Grief*. They and their collaborators are activated by the ways that certain bodies and certain conditions, in certain historical and cultural contexts, have been treated as more “mournable” than others. Mourning, Cunsolo and Landman write, can be “ecological work” when it manifests in practices that entail not resolution or consolation but responsibility and response. But to what, exactly, does one perceive oneself responding?

Cunsolo and Landman refer acutely to the manner in which “more-than-human loss” sometimes presents itself elusively and uncannily, through instances of “spectral haunting.” And recalling the Reef, what to feel for ecosystems that are threatened or ailing – and merit, in their vulnerability and their suffering, grieving of some sort – but nonetheless remain with us?

In an exceptionally valuable contribution to *Mourning Nature*, the artist and scholar Jessica Marion Barr describes practices of “proleptic elegy,” involving a complex poetics of anticipation, possibility, and necessary uncertainty.³

Of course, submarine environments entail yet other entanglements. If it’s a fact that no life, in any habitat, can be disintegrated from the lives that surround it, this truth declares itself with special force at the Reef, where – to borrow some words from Maria Byrne – “symbiosis rules.”⁴ When a coral assemblage dies, whom do we mourn? A colour? A polyp? An algae? A relationship? The invertebrates, fish, reptiles, birds, and mammals who rely, with varying degrees of directness, thereupon? An ocean? The planet? Ourselves? By fixating on narratives of death, are we avoiding messier – but more integral – conversations about transformations and shifts? Is death simply another word for change? Cunsolo and Landman call for “cultivating new emotions,” which seems a vital charge⁵; we’re needing new language, too, and new stories. Or we’re needing to better recognise those old languages, and those old stories, that we’ve failed to hail. Perhaps by better grieving we can better live, and better symbiose.

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¹ Bradbury, P. (2017). ‘Don’t give up on the Great Barrier Reef. It is not ‘dead’, environmentalist urges.’ *The Telegraph* (September 15, 2017). [Access Here](#)

² See, for example, Andreas Malm, *The Progress of this Storm: Nature and Society in a Warming World* (London: Verso, 2018), 9.

³ See Terry Hughes et al., ‘Spatial and temporal patterns of mass bleaching of corals in the Anthropocene’. *Science*, 359.6371 (2018): 80–3.

⁴ Cunsolo, A., & Landman, K. (2017). ‘To Mourn beyond the Human’. In *introduction to Mourning Nature: Hope at the Heart of Ecological Loss and Grief*, Cunsolo & Landman (eds.). Montreal & Kingston: McGill–Queen’s Univ. Press, 3–26.

⁵ Maria Byrne, “Mass Coral Bleaching” (presentation, Geosciences Seminar Series, School of Geosciences, University of Sydney, April 9, 2018)

⁶ Cunsolo & Landman, “To Mourn beyond the Human,”⁶

Coral Futures: Finding a Compromise

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Photo by Liberty Lawson



Earlier this year, Australia Research Council’s Coral Reef Futures Symposium (July 18–19) was a chance for coral scientists and researchers from a variety of disciplines to meet, present their current research, and discuss future avenues. There was a curious atmosphere in the darkened auditorium at Queensland’s Gallery of Modern Art, a sense of determination diffused by tentative hope.

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Over the past few years, between Adani’s Carmichael mine proposals and the 2016– 2017 Great Barrier Reef bleaching epidemic, moments of peace and optimism for coral scientists are becoming few and far between. These challenges, however, if nothing else, have taught us that we humans don’t understand this world as well as we might have thought. While this may not sound promising, it is, in fact, a momentous realisation for our species. On the one hand, yes, we finally can change the world, like our proto-agrarian ancestors would have dreamed, but ultimately this is bittersweet because, on the other hand, it is becoming more and more evident that understanding and controlling how the world changes is still something far beyond us.

Hearing the conviction in the voices of some of the best researchers in the world wasn’t quite a soothing antidote to the current climate, but rather, an inspiring wakeup call that it isn’t the world that needs to change, it is *us*. Not just our plastic use, not just our carbon emissions, but the way in which we *think* about the world. Our most fundamental tenets of social structure and economics – infinite growth, infinite wealth – all need to be reconsidered and reframed. What humanity needs, desperately, is a shift in our conception. We need to compromise on our values and update our mode of thinking.

This idea of ‘compromise’ was something of a leitmotif of the symposium, a theme that was reflected within a surprisingly vastly array of disciplines, from sociology and economics to evolutionary biology and genetics.

One of the core issues brought to light was that the segregation of local and global modes of thinking, in ecology, conservation and in politics is ultimately the source of the issues we are facing as a planet. Climate change, environmental degradation, non-compliance with zoning laws – these are all merely symptoms of an economic and social system that is no longer aligned with the reality of our planet’s population growth. When we base conservation practices within localised parameters, or we look at global trends, we do not see the reef for the coral, to paraphrase an old idiom. Like the reef itself, our world works in a series of inextricably complex and interwoven symbioses, from the macro down to the micro scale, in terms of both space as well as time. What might be a great short-term solution could lead to vastly long-term implications, such is the nature of complex network systems.

James Cook University’s Graham Cumming pointed out the need for us to start compromising. He noted that increasing a country’s GDP can mitigate local pollution, but only ever at the expense of another, less developed nation. This ‘bimodality’ of development further compounds on the fact that neither the global ecosystems nor the global economy is truly bottomless, and thus infinite growth in one direction is simply not possible, so what appears to be growth in one sector is indicative instead of an increasing disparity in wealth.

Cumming suggests that we need a new model for development to account for the fact that the earth’s resources are not infinite, and that population growth cannot only be sustained when it implies instability of the supporting ecosystem.

Evolutionary biologist David Bellwood brought up the notion of compromise as well, taking us through what he proclaimed to be the ‘most unpopular paper’ he has ever written, in which he suggested that rabbitfish, which are macroalgal herbivores endemic to the Mediterranean (where they strip natural algae cover, causing erosion to the bedrock) could help mitigate damage done by the invasive lionfish in the Caribbean.¹



This is understandably a controversial idea. However, Bellwood suggested that the backlash was perhaps indicative of a more primal fear, the fear that we might be responsible for potential damage. Of course, this is a paradox, because the damage has been long-done. Rabbitfish, in the last decades, have in fact somehow made it across the Atlantic, after millions of years in the Mediterranean, to live in small populations along the coast of South America, Bellwood says. The ‘changes’ which we are so afraid of are already happening. They *have* happened, and they are irreversible. Now, the challenge will be reframing our ideal of what the future might look like because it won’t look like it was a century ago, so we need to stop using that ideal as our aim. We need to imagine a new future.

Bellwood’s other point was to remind us that while coral may be the framework for the reef, it is the fish that undertake all the maintenance. We understand the roles of species within local ecosystems, but far less research into broader functional groups (herbivores and so on) has been done, and as the composition of ecosystems change, it will be the functional groups that need to be maintained, rather than individual species – again, a restructuring of how we *think* about ecology. Thus, we face a conundrum; we need to change our idea of the future, we can either attempt to maintain reefs as they are, or we can compromise, and try to find novel solutions. “We understand reef systems in the old world”, says Bellwood, “but not this current world”. We cannot continue applying the same rules; we need to redefine the game.

“There has never been a greater need for coral science,” echoed David Wachenfeld, the chief scientist at the Great Barrier Reef Marine Park Authority (GBRMPA), “we need to thoroughly investigate all our options”. He emphasised the need for governments to plan, rather than react. Just prior to his talk, sociologist Katrina Brown noted that most governments fall prey to the lure of short-term maintenance, rather than engaging in long-term planning. This is a problem of management, and the increasing risks of a ‘PR nightmare’ resulting from long-term damage, as opposed to an aversion for damaging the environment itself. Maintenance is easier and less risky, from a management point of view, and according to Brown, the fact that so many NGO’s rely on the government for funding and legitimacy, means that they aren’t capable of providing the kinds of spaces needed to explore truly novel options.

Nonetheless, the biggest challenge scientists will face is mitigating expectations. Our idea of a healthy coral reef in the ‘old world’, as Bellwood put it, could be vastly different from the coral reefs of the future. Ecologist Sophie Dove, for example, presenting her research on coral mesocosms, demonstrated that in warmer, more acidic conditions, fleshier corals such as fungidae seem to be more resilient. Overall, according to her studies, the corals under stress favour adding biomass rather than expanding their surface area to cover more space. Additionally, reefs that recover from a bleaching event might not have a strong foundational scaffold, and corals might not have the thick tissues they need to be truly robust. Primary and secondary calcification might not be happening as efficiently, so even if the coral doesn’t bleach, it might have a weakened skeletal structure.

Reefs are simultaneously fragile and resilient; they are independent and infinitely symbiotic. They are a paradox, a cradle and a museum. Many coral species are millions of years old, but they might not make it into the next century, whereas younger (evolutionarily speaking), more robust corals might be better suited to surviving unpredictable climates. The biodiversity of reefs worldwide are shifting, and we need to accommodate these shifts and most importantly, manage our expectations. The dotted line of a marine park sanctuary isn’t enough to stop acidification, and if the idea of protecting ‘pristine’ nature is hindering other interventions, then we need to find flexibility within those ideals.

At the beginning of the symposium, Turrbal Elder and Songwoman Maroochy Barambah gave a beautiful Welcome to Country on behalf of the Turrbal People, the traditional owners of the Brisbane region. “As the globe turns”, she said, “we are all just learning to get along with one another, and to enjoy the little time we have on earth”. Her heartfelt words resonated deeply with many of us in the room fighting for climate and social justice. The time we have is indeed little, and precious, and perhaps by finding some humility and learning to compromise, we can walk this earth more gently.

“There has never been a greater need for coral science.”

Liberty Lawson

1. Bellwood, D. R., & Goatley, C. H. R. (2017). Can biological invasions save Caribbean coral reefs? *Current Biology*, 27(1), R13–R14.

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