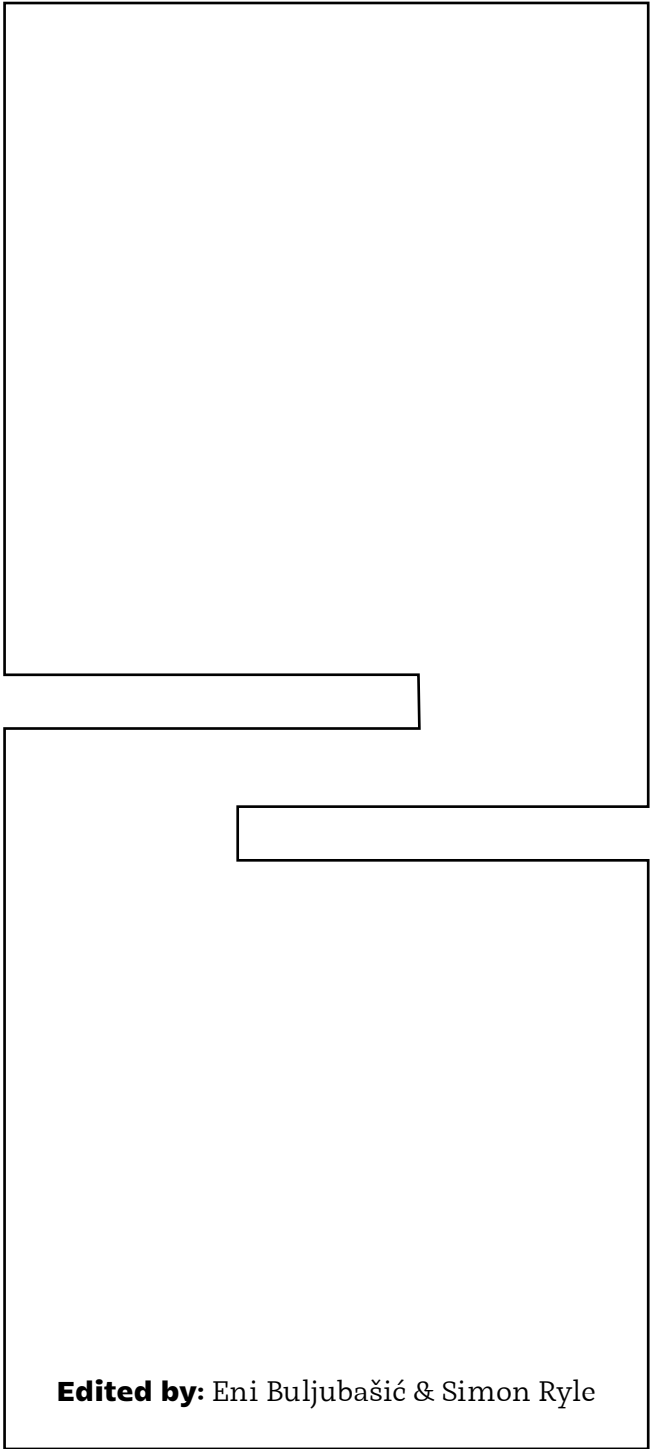


# Cross Cultural Studies Review

A journal for comparative studies  
of culture, literature, and the arts



**Edited by:** Eni Buljubašić & Simon Ryle

# Wavescapes in the Anthropocene

(explorations in Blue Ecocriticism and the Environmental Humanities)



# Conversations with Planet Ocean: Plastic Pollution and the Common Heritage of Humankind'

Rupert J. M. Medd\*

Independent Scholar and Creative Writing Tutor

Hélène Guyot

Illustrations

\* [tallsilverfish@googlemail.com](mailto:tallsilverfish@googlemail.com)

<sup>1</sup> Thank you kindly to all the conversationalists who, in varying degrees, took part in this oceanic story. A wonderful inspiration was Serpil Oppermann who sent me her publications on ecocriticism and material ecology. Serpil was the first to receive my full-length manuscript and enthusiastically invited me to Ankara, Turkey where I spent three full days in conversation with both herself and her research students. I am grateful for all her thoughts, time and friendship. This extends also to artist Hélène Guyot for her illustrations and help; Eni Buljubašić and Simon Ryle - the editors of this series; my two peer-reviewers at CCSR for their time and excellent criticisms; *Emilie Cousteau - my surf partner with a famous Grandfather*; Gizem Yilmaz, Serenella Iovino, Louise Westling, Timo Maran, Scott DeVries, Peter Jacques, Bo Söderström and Margery Masterson who all offered me direction. Through all their insights I also came to realise that the Environmental Humanities still has a long way to go before dialogues between the Natural Sciences and Humanities find mutual and fertile ground. However, Stockholm Research Centre really opened my worldly vision, and especially Patricia Villarrubia-Gómez for all her inspiring emails and views. I would also like to thank the tutors at SDSN for their wonderful course "One Planet, One Ocean"; The Canadian International Council; The Guardian Newspaper's "Green Light" round up; the editorial teams at *Resilience* and *Journeys*; Philip Hurst; Peru's late environment minister Dr Antonio Brack Egg (RIP); Jo Ruxton (BBC, "A Plastic Ocean"); Jennifer Lavers; Jan van Ewijk and Erika Träskvik (The OCEAN CLEANUP); Joanna Borczak; Matthew Brown; Ximena and Paco Maurial; Sandra Nava; Michelle Cassar (City to Sea); Anna Bunney and Sophie Tuppen (ORCA); Laurie Wilson and Andreas Krebs (International Fund for Animal Welfare); Matthew Taylor (environment correspondent for *The Guardian*) who "took" my idea of plastics being "as dangerous as climate change", as did George Monbiot in his article on the need to develop ecolinguistics; Levon Sevunts (Radio Canada International); Martin Jakobsson (Department of Geological Sciences, Stockholm University); photographer Walter Wust for his unfaltering collaborative spirit; Rich Pancost at The Cabot Institute - Centre for Climate Uncertainty for his time and support to hold a conference on marine plastic pollution. Lastly, thank you to my university friend Lina Ionta for her wonderful humour that she shared with me while we were campervan and housebound in Spain during the pandemic of 2020. Her stories kept me inspired and laughing out loud while alone with only the Atlantic Ocean for company.

## Abstract

This story-based journey is an eclectic discussion on marine plastic pollution. It responds to the Environmental Humanities by bringing material history, personal experiences as well as ecotheories and natural sciences together. The conversational style, like shifting tides, speaks to anyone who wishes to develop a broader understanding on plastic pollution and its ecological consequences. While much of the scientific data has been drawn from specialist journals such as *Marine Pollution Bulletin* and *UN-Oceans*, it is the mostly shared experiences on the World Ocean that inform this study such as dialogues and stories spoken by blue activists, general audiences, local groups, fishermen, researchers, students, scientists, surfers, sailors, divers, day-trippers, ferry crews, port authorities and marine protection societies. These voices speak from a position of ecocosmopolitanism on wide-ranging issues such as indifference, world-systems, modernity, ecological literatures, a common geostory, biosemiotics, the Anthropocene as well as Planetary Boundaries. By acknowledging that the World Ocean and its qualities have come to symbolise a fluid globalising world economy, alternative themes surface such as permeability, flows, agencies, loss, renewed sense of place, cross-species entanglements, peace and sustainability. The debates edge along fairly freely yet engage with three original ideas, namely: (1) plastic pollution may impact the climate more severely than the actual circulating concepts on climate change; (2) critical levels in the environment have been reached and this should, therefore, be part of a Planetary Boundary within “Novel entities” as it adversely affects the Earth’s systems; and (3) the question of language and how new education curricula centred around ecolinguistics and a shared geostory would better inform our environmental relations and altruistic natures. As presented here, plastic pollution is at its heart a debate involving a moral reassessment and appreciation of Planet Ocean, which constitutes our greatest personal gift – the “common heritage of humankind.”

**Keywords:** World Ocean, Plastics, Marine Life, Marine Pollution, Environment, Modernity, Anthropocene, Biosemiotics, Consumerism, Loss, Imagination, Ecology.



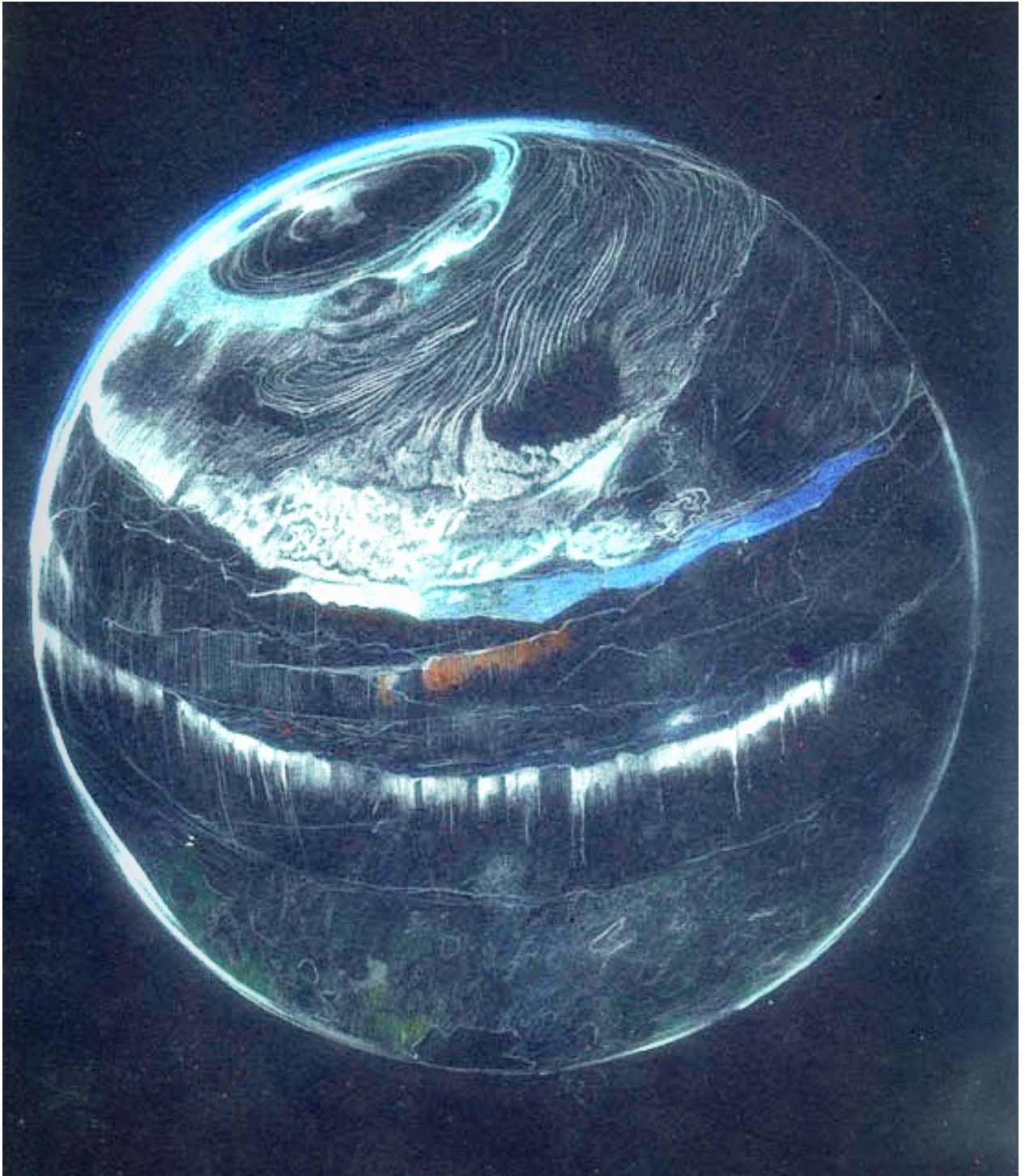


Image 1

Blue Beyond All Imaginations. Illustration by H  l  ne Guyot,  
[www.firsttrainofsummer.com](http://www.firsttrainofsummer.com)



Image 2-A

A sign on an empty beach on the magical Canary Island, El Hierro, reads:  
 “We do not ask you to clean the beach. We only ask that you do not dirty it.”<sup>2</sup>

## SEEN FROM ABOVE

... To preserve our peace of mind, animals die  
 more shallowly: they aren't deceased, they're dead.  
 They leave behind, we'd like to think, less feeling and less world,  
 departing, we suppose, from a stage less tragic.  
 Their meek souls never haunt us in the dark,  
 they know their place.  
 they show respect.

And so the dead beetle on the path  
 lies unmourned and shining in the sun.  
 One glance at it will do for their meditation -  
 clearly nothing much has happened to it.  
 Important matters are reserved for us,  
 for our life and our death, a death  
 that always claims the right of way.

— Wistawa Szymborska, *Nothing Twice. Selected Poems*, p. 189.

2 Unless indicated otherwise, all photography has been taken by the author. Cameras used for the images in this essay: Nikon F 35mm film; Mamiya RB67 120mm medium-format film; Leica M240 with Summicron lens; GoPro Hero 4 for underwater images.

## Introduction, One World Ocean

In a recent essay by Stacy Alaimo titled “Oceanic origins, Plastic Activism, and the New Materialism at Sea,” the dire condition of the World Ocean is given to us like this:

Climate change. Ocean acidification. Dead zones. Oil “spills.” Industrial fishing, overfishing, trawling, long lines, shark finning. Bycatch, bykill. Ghost nets. Deep-sea mining. Habitat destruction. Dumping. Radioactive, plastic, and micro-plastic pollution. Ecosystem collapse. Extinction (186).

On “World Oceans Day 2018” Erik Solheim, the Executive Director of the United Nations Environment Programme stated “let there be no doubt: we are on edge of a plastic calamity.” His projections show that global plastic production will “skyrocket in the next 10-15 years. This year alone, manufacturers will produce an estimated 360m tonnes. With a booming population driving demand, production is expected to reach 500m by 2025 and a staggering 619m tonnes by 2030. So the next time you see scenes of plastic choking a river or burying a beach, consider double that impact in just over 10 years” (2018).

Plastic is an associate of monumental modernity and “man’s surrogate.” This is because we can easily imagine plastic as “a horrific extension of ourselves, a discarded and disavowed entity that bobs along, wreaking incalculable harm” (Alaimo 2014: 200). During the 1940s the total production reached 175,000 tonnes; in 2016 this quantity had leapt up to 300 million tonnes; by 2050, and according to the United Nations, the total global production will reach 34 billion tonnes with 250 million tonnes of mismanaged plastics in the environment. If we understand that in 2015 a mere nine per cent was recycled with 50-100 million tonnes already circulating in the World Ocean, it seems probable that these predictions for mismanaged waste are hugely misleading. It will be worse than the United Nations’ estimates; let us already consider the billions of plastic test kits used in response to a global health pandemic. In 2020, the new tides of the Plastic Pandemic are already depositing colossal amounts of facemasks, gloves and baby wipes along the shores of the world’s beaches.

The first literary reference of the problem came to my attention while reading Norwegian explorer-ethnologist, Thor Heyerdahl’s (1914-2002) account of his journey from the west coast of Africa to the Americas on a papyrus reed boat. This incredible journey – that mixed pure adventure with

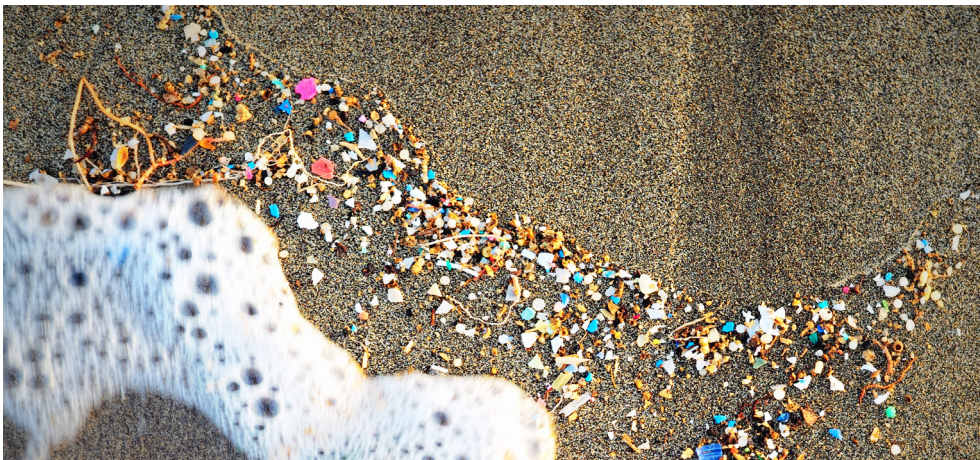


anthropological enquiry – was captured in his book, *The Ra Expeditions*. In an entry in 1970, and while on the open Atlantic, Heyerdahl noted:

Next day we were sailing in slack winds through an ocean where the clear water on the surface was full of drifting black lumps of asphalt, seemingly never-ending. Three days later we awoke to find the sea about us so filthy that we could not put our toothbrushes in it... The Atlantic was no longer blue but grey-green and opaque, covered with clots of oil... Plastic bottles floated among the waste... It became clear to all of us that mankind really was in the process of polluting its most vital well-spring, our planet's indispensable filtration plant, the ocean... (234).

They had been the first to encounter and write about a plastic ocean gyre. The scientific research into marine pollution has burgeoned since then, and especially over the last two decades. This is because the advent of plastic as a major consumerist product and persistent organic pollutant (POPs) is also recent. Now that plastic pollution is understood to be highly invasive, is being ingested by marine biota while also being transferred across the entire ocean's trophic levels, it has become a priority to understand its effects further.

Under the United Nation's University programme, I had all the figures of Planetary Boundaries, changes in terrestrial ecosystems, mega dam constructions, glacial melt and collapse, mangrove and forest reductions, habitat losses for wildlife, yearly agricultural yields, algae blooms, energy and water consumption, pesticide and fertiliser usage, depleted ocean stocks, fishing subsidies, waste measured in billions of tonnes and so much more hurled at me. The figures are titanic. As I step back now from a laptop screen and ask myself what 300 million tonnes, or even 1 million tonnes, or 5 trillion pieces of plastic look like, it all seems completely beyond my imagination and impossible to visualise.



## Image 2-B

The waves wash up; they deliver uncountable quantities of differing plastics. As seen, these are particles that have already spent many years, even decades at sea, being worked by the elemental forces and broken down into ever-increasingly smaller fragments. This is the point at which they truly become an environmental hazard for all marine life. Photograph taken by the author.

Our planet is fundamentally one World Ocean and its health has formed our past, present and will also determine our futures. On the beds of the ocean our planet is breathing and pushing out the actual minerals fundamental to all life through vents known as “smokers.” Plastic deposits throughout such depths confirm how our modern lifestyles are centred around hyperconsumerism and an unwillingness to dispose effectively of our by-products. This pervasive reality amounts to humankind’s inferior ecological condition and inability to engage with non-human life by allowing such encounters in any equal and natural form. Today, and especially heightened by the threat of pandemics, everyone knows that no magic forces will come from elsewhere to save us from ourselves and, therefore, a decentring of humankind has been triggered by our planet’s responses to our behaviour.

In Pieter Vermeulen’s thinking on today, the contradictory nature of life is often “theorized under the rubric of the Anthropocene.<sup>3</sup> From this perspective, human life does not stop being a biological, psychological, and linguistic phenomenon, but it now also plays in the same league as, say, heat waves, volcanoes, and Antarctic ice” (185). We are awakening to the realisation that all previous readings of human life and histories have to be reimagined and told differently by weaving more non-human life in to the emerging narratives. This includes stories that engage with the effects of our waste and destructive actions such as Neal Layton’s recently published book for children, titled *A Planet Full of Plastic and How You Can Help*. The rapid rates of biodiversity extinctions propel a growing sense of collaborative survival and this encompasses a world-view of “humans as a species, a species dependent on other species for its own existence, a part of the general history of life” (Chakrabarty 219).

3 Experts have formally classified the present period as a distinct époque in planetary history, this neologism referring to an “Age of the Human.” Drawing on Paul Crutzen’s and Eugene Stoermer’s hypothesis in 2000, human activities and behaviour have shifted Planet Ocean from beyond the safe boundaries of the Holocene period of the last 13,000 years and into the Anthropocene. A date that is frequently passed around for this event is 1750 and thereafter. See [www.anthropocene.info](http://www.anthropocene.info). The author’s personal position is that Earth’s climate stability has been massively disrupted since 1952, and thereafter, following the thermonuclear testing of hydrogen and nuclear bombs in the South Pacific region by the USA, UK and France.

A wider world-view that speaks of interdependencies, while bringing language to the foreground in such a way that it can be refashioned into an ecolinguistics for the future, concerns biosemiotics. This would allow humans to develop altruisms to actually feel Nature, sense landscapes in terms of their geological and naturalcultural histories. A degree of biosemiotics, according to Wendy Wheeler “does away with the idea that nature and culture are very different, and even opposed, phenomena. Biosemiotics suggests, rather, that culture is emergent in nature. It puts us back in nature” (144) and, therefore, back into a natural and cultural worldly state. This brings to mind the ethos of travel writers and naturalists such as Alexander von Humboldt, Henry David Thoreau, George Perkins Marsh, John Muir, Nan Shepherd and Robert Macfarlane and so on.

Effectively what is being raised here is the notion of giving deep meaning to a space in order to transform it in to a place with culture, memory and homely imaginaries – all of which requires language as we forge meanings from and set roots across our respective environments. But natural and cultural worlds also have specific rhythms and take time to experiment, adapt, harmonise, interconnect and so on. The Earth’s motions and emotions – processes referred to as agency in Bruno Latour’s thinking – are strongly tied to human and non-human languages, their cultural backgrounds and Earthly connections as the essential phenomena, including ancestral voices. It concerns being grounded to the Earth and sharing a common lively story – a geostory (Latour’s term) – as opposed to being reduced to the rationality of bare bones and facts. As humans we become more permeable, receptive and linked to a world that has forever been brimming with narrations of every kind since the beginnings.

In Latour’s assessment of agency and the Anthropocene, he writes “Neither the extension of politics to nature, nor of nature to politics, helps in any way to move out of the impasse in which modernism has dug itself so deeply... The point of living in the epoch of the Anthropocene is that all agents share the same shape-changing destiny, a destiny that cannot be followed, documented, told, and represented by using any of the older traits associated with subjectivity or objectivity” (15). Latour stresses the terrifying edge of all our predicaments. In short, we are navigating unknown forces now and unable to apply with any certainties the preconceived knowledges that have been drummed into and across civilisations over millennia. A shape-changing destiny that *cannot be followed, documented, told, and represented by using any of the older traits associated with subjectivity or objectivity*.

Incidentally, in Michel Serres’s book, *The Natural Contract*, there is a strange form of nostalgia for the older traits – for those days when it was still possible to dream of making a contract with Nature, as the

Enlightenment thinkers had envisaged during previous centuries and then the deep ecologists from the 1960s. For sure, the idea of such a contract is not unnatural, “but,” Latour writes “because in a quarter of a century, things have become so urgent and violent that the somewhat pacific project of a contract among parties seems unreachable. War is infinitely more likely than contract” (5).

Using a historical lens, since industrialisation took a firm iron-grip hold (1750 onwards) as well as the powerful drivers of capitalism (1450, the Age of Capital and its new technologies and *technics*, being a “repertoire of science, power and machinery – that aimed at...appropriating new Cheap Natures” (Moore 2017: 610), humankind is now being reassessed as a *geological agent*. Humans and their economies are, therefore, recognised as having stressed the planet beyond its natural carrying capacity. The Planetary Boundaries are being rapidly transgressed and no longer offering “safe operating spaces” for future life. Whereas the massive extension of the conditions for life, Earth as a self-cleansing and stable mechanism, healthy and thriving ecological webs and so on, have all been the hallmarks of the Holocene. Not so for the Anthropocene, as Latour has highlighted.

Interestingly, Dipesh Chakrabarty in his influential essay “The Climate of History,” aligns the “mansion of modern freedoms” that came under the auspices of the Enlightenment with the ever-expanding base of fossil-fuel usage. He poignantly asks “So, has the period from 1750 to now been one of freedom or that of the Anthropocene? Is the Anthropocene a critique of the narratives of freedom?” (210). This is a poignant comment as all of us reading this have interacted with the structural fabric of modernity to differing degrees. As much as it concerns freedoms it is also highly selective about what and who to include, being controlled through operational powers from above. Thus, in order to make the transitions towards sustainability truly viable as well as give credence to ecoactivism, we also have to be certain that this movement's new voices for change are *new* and that they will not repeat “the errors that undermined modernity's positive emancipatory aims and led to such ecological destruction” (Zimmerman 7). The scale of climate action now needed will certainly end the freedoms and excesses of Western societies by appealing for a universal sacrifice as “what many people want may not be immediately compatible with what is ecologically sustainable” (Nadir 37). If we are going to be able to express our new condition that will emerge from our sacrifices, then having a biosemiotic will be a necessary linguistic and emotional set of skills.



Image 3

Meaning and identity for humanity because we are a part of this cosmically unique life system and every single aspect of its interactions. Medium format photograph taken by the author. Location, Tarifa's beaches, Cadiz, Andalucia, Spain.

## Indifference

"What I find the most difficult is the fact that we are basically today in a dynamic of denying what I call our collective commitment, or our ideals of solidarity, worldwide."

— Joanne Liu, International President of Médecins Sans Frontière.

The huge quantities of plastics now circulating in the World Ocean have come to signify a "globalisation of indifference." This cultural amnesia symbolises the hyperconsumerism of the global economy, the unforgiving exploitation of resources, other humans and sentient animals. This



indifference that prevents us from proactive environmental action and living within a planetary state of peace has its origins particularly in the processes of modernity. Its theory, therefore, is useful in deepening the discussion on human cultural attitudes toward the natural world.

Colossal amounts of plastic waste have been located throughout the World Ocean and their harmful effects across the entire chain of marine life are well studied and known. Even so, the scale of plastic production is increasing, while an entirely safe means of its disposal is impossible due to its toxic essence and sheer unmanageable quantities. Governments have been far too slow to bring in stricter measures to control its uses and production rates. As our planet is 71 percent ocean (and as glaciers collapse and meltwater runs off then this figure is rising), we are failing to tackle this issue with the severity it deserves. The resulting outcome has created indifference, a philosophical space of emotional neutrality. Let us be clear, without doubt a deteriorating planet propelled by biodiversity extinctions and pollution will equate to a total breakdown in security and an erasure of deep meaning and identity for humanity.

Loss can be viewed as an “event” as its moment comes unannounced – even if expected. It can become “an individual and collective problem when it involves basic resources, relationships, values, or meaning systems necessary for psychological strength and well-being” (Lear cited in Kirmayer 310). Pope Francis, aka the “Climate Pope” celebrates earthly contemplation and has tuned his ear and mind’s eye toward Nature. His private philosophical explorations are no longer limited to a *conversation in the cathedral* (as per the title of Peruvian author Mario Vargas Llosa’s novel), but a steadily intensifying message that these local-global struggles are leading to nothing other than that of saving the planet in its entirety as it is already over-saturated with consumerist demands, inflicted by mass poverty and well-beyond its carrying capacity.

Pope Francis declared that we are “At the limits of suicide... The Earth, our home, is beginning to look more and more like an immense pile of filth.” In 2016 for the XLIX World Day of Peace he said, “But in our day, indifference has...taken on broader dimensions, producing a certain globalization of indifference.” The French anthropologist, Claude Lévi-Strauss in the 1970s wrote “The first thing we see as we travel round the world is our own filth, thrown into the face of mankind” (43-44). Peace, the Earth, our home, living on the edge, filth and indifference are all bound uncomfortably together here. Our lives and those of our companion species and planet are being suffocated by the plastic packaging and oil economies that define our wasteful industrialisation, individualism and consumption. The huge production and industry chain behind plastics – which are increasingly the lifelines for oil companies and all their directors and shareholders – continue to spill out this unmanageable toxic product

into the global markets. Worryingly, we continue to engage ever deeper with these primary drivers.

The globalisation of indifference is partly the result of the inadequacy of words and equally of our (Western) framing of ways by which to see and imagine our amazingly diverse planet amid the bigness of it all. Everything considered, how hard ought this to be when we reflect that our Blue Planet is utterly alone “out there”? It is but a miniscule speck of life-affirming energies, an isolated blue beauty, in the enveloping cosmic darkness, lit by the sparkling of distant stars.

I have always been fascinated by what can now be termed as planetary distancing and questions such as “why are we here”? When at sea and as night falls, the immensity of it all provokes such conversations that go beyond an earth-bound imagination. Gayatri Chakravorty Spivak wrote that the planet “is in the species of alterity, belonging to another system; and yet we inhabit it” (338). The sense of belonging raised here for humankind is ephemeral; this organised spatial system denies us roots in deep time. As mere inhabitants, we are made to understand that we are recent participants, somewhat homeless, and stepping gingerly on timeless shores. *As an aviator, the hugely-loved French author Antoine de Saint-Exupéry came to similar conclusions as he star-gazed from his cockpit, believing that we are still denied a homeland (see on).*

Serres is another philosopher who contemplated the lives of planets and their interplanetary relations – what he termed as laws, contracts and points of view. His vision that panned steadily outwards and beyond is one that is relevant to the collateral damage being inflicted on our planet and the wider system: “*The great planetary bodies grasp or comprehend one another and are bound by law, to be sure, but a law that is the spitting image of a contract...* The slightest movement of any one planet has immediate effects on all the others, whose reactions act unhindered on the first. Through this set of constraints, the Earth *comprehends*, in a way, the *point of view* of the other bodies since it must reverberate with the events of the whole system” (cited in Latour 6).

In this light, under these hostile conditions of the Anthropocene, the Earth is quaking anew and like ourselves, in total fear of any deviation caused to the surest of equilibria. I once heard that Inuit people of the Canadian Arctic acknowledge Time as geography without landscape. It is indeed fascinating material to imagine planetary *contracts, points of view* and geographies without landscapes. Their interactions comprise a basic acknowledgement that states of equilibrium must be maintained – what could be considered as planetary agency peace and ethics.

Many voices throughout this project have acknowledged the lack of a wider world-view and the limitations of our tellurian language mean that we are failing to convey the signs that denote the true scale

of today's environmental crises. This shortfall in our environmental imaginaries questions whether we are even interpreting them realistically. Additionally, in terms of acknowledging our current perspective on events, the global hegemony of the English language gives further cause for concern. This led Ursula Heise to note how "monolingualism is currently one of ecocriticism's most serious limitations. The environmentalist ambition is to think globally but doing so in terms of a single language is inconceivable – even and especially when that language is a hegemonic one" (513).

Hegemony, and its innate qualities such as control of economy, subjectivity, language and so forth, became a fairly frequent conversational topic. It poses the supposedly culturally impossible question as to how alternative ways of being in the world can be made possible? The marvels, order and harmony that so many of us in the West have enjoyed until today have been brought about by modernity: processes that have travelled the globe in line with Western social and economic domination. When Europeans presented as fact "the notion of being the centre of world history" this equally became an essential trait of the modern world. Professor of ethics, Enrique Dussel explains how this "centrality is achieved from various perspectives: state, military, economic, philosophical. In other words, there was not a world history in an empirical sense before 1492 (as this date was the beginning of the "world-system" (470-471). Modernity emerges from an entangled history of "unfinished paths, dialogues, negotiations that, in spite of the multi-directional pulls, like an anchor, are forever reaching directly for the bed of struggles and encounter formed through contact" (Emberley 748).

The true origins of modernity and globalisation stem from the moment when the totality of a male Eurocentric capital-driven world emerged through processes known collectively as coloniality, having four leading components: (1) the control of economy; (2) authority; (3) gender and sexuality; (4) the control of subjectivity and knowledge within a Eurocentric framework.<sup>4</sup> However, Chakrabarty also notes that global climate change does unsettle this postcolonial premise that capitalism and globalisation are driven by a distinction between natural history and human history. He wisely reminds us that "we still need the hermeneutics of suspicion that postcolonialism offers but that we must not conclude that our human experience and our human responsibilities can be reduced to the self-understanding that historical knowledge produces for us" (cited in Deloughrey and Handley 29).

As our minds cumulatively work within the discipline of history (I

4 For further reading on coloniality see Mignolo 2007; Moraña, Dussel and Jáuregui, eds. 2008; Quijano 2008 and 2007; Wallerstein 1987.

am who I am today and 12,000 years of history), we resist any separation of the history of empire from ecocritical reflections. This is important when historicising Nature due to their unequal influences on each other. In short, our planet's life-affirming environments have stood as victims and witnesses to these processes of coloniality. Modernity, and especially monumental modernity such as mega dam constructions and hydrogen/nuclear bomb testing, are the ultimate displays of this. Their dominant features and effects are hugely responsible for humanity's poor cultural attitudes toward the natural world, including our failure to make the rapid transition toward sustainable lifestyles as well as act with urgency on critical climate chaos. Ultimately, it shows Nature to be "the other," a subordinate alongside colonial and third world Natures, women's and brown bodies and alternative spiritualities. Thus, in Arturo Escobar's words, this environmental crisis demonstrates how "modernity has failed to enable sustainable worlds" and, in doing so, also failed to articulate the histories of Nature and people save through the "capitalization of nature and labor" (2007: 197; see also Plumwood 2003 and most of her other publications).

This predominantly colonial mindset constructed continuous dichotomies within its framework of global power. Relevant examples are nature/culture; European modern peoples/non-Europeans as primitive peoples living in Nature; capitalism/non-monetary exchange and so on. Martin Lukacs describes how such a world-system has produced a disposable collective narrative – like our plastic consumption – and one that demonstrates our willingness to rip our planet's processes apart, while making the transition toward sustainable futures appear unlikely by ensuring this agenda is politically unrealistic and culturally unthinkable. He writes, "Its celebration of competitive self-interest and hyper-individualism, its stigmatization of compassion and solidarity, has frayed our collective bonds. It has spread, like an insidious anti-social toxin... a culture telling us to think of ourselves as consumers instead of citizens, as self-reliant instead of interdependent..." (2017).

A total rethinking of the economy with a promotion for Nature from the lowly ranks to pole position has been on the horizon for many decades. It is a huge task as what is being demanded of us now is to put distance between the Eurocentric ordering and rationalisation of the planet over the last 500 years and to open up new dialogues and considerations – inclusive of local and marginalised voices. In one sense, critical climate chaos is already dismantling the constructed sense of predictability and giving rise to unknowns. It is remystifying the natural forces as well as seeking to bring the sciences and humanities to the foreground in a participatory universe of questioning, experimentation and investigation. We may well ask "how can we be content with our lives knowing what

we have done and continue to do to the very organism that sustains all life – our Planet Ocean?” This living entity provides us with the absolute basics from every breath of air we take to every drop of water that touches our lips, and to every mouthful of food we eat: it is our universe. David Abram puts things like this, “What is climate change if not a consequence of failing to respect or even to notice the elemental medium in which we are immersed?” (cited in Oppermann 2016: 274).

Clearly, the historic inscription of metaphor and the framing of meaning onto spaces – such as the conquest of the Americas and birth of modernity – were decided by earlier voices who were not visionaries and mystics; they could not have foreseen a world infected by an “industrial/consumer orientated culture that is now being globalized, and that is overshooting the sustainable capacity of the natural systems” (Bowers 4-5). When we consider the mass presence of plastics (Novel entities) in the World Ocean, for sure this is not a Western phenomenon as China, other Asian countries and Turkey are equally some of the leading polluters today. However, the globalised model of capitalistic growth based on hyperconsumerism, marketisation and militarisation – imperial globality – brings every nation into the field of capitalised operations whether a major driver, or actively present on the sidelines. It does not engage with any world-view centred around differences, nature’s rhythms, diverse ecologies and geographies, and the realisation that other worlds and knowledges are possible (see Escobar 2004 and 2007).

When we consider that in 2015, 6.3 billion metric tonnes of plastic waste were amassed. Then, a mere nine per cent was recycled; twelve per cent was incinerated; and the rest was tossed nonchalantly into the environment – namely Nature itself like landfills, rivers, fields, roadsides, beaches, oceanfills and, finally, the World Ocean. The plastic waste comprises mostly packaging and single use items that will never be given a second thought, but have every possibility of reappearing as microscopic particles that flow through our taps as drinking water.<sup>5</sup>

X

<sup>5</sup> Figures from “Plastics: a villainous material? Or a victim of its own success?” *Science Weekly*. A 33-minute podcast giving a brief history of plastics, the consequences of their circulation in the environment, and a discussion on solutions such as the bio-based economy. Presented by Nicola Davis. Accessible here: <https://audio.guim.co.uk/2017/08/28-48000gnl.sci.170830.ms.plastics.mp3>.



Image 4

A mythical ocean-human flying fish bears marine pollution in its watery wake.

Microplastics seem set to trigger the biggest future distress ever by the very fact that they have entered all food, earth, air, glacial and water cycles. Microplastics already are circulating throughout the entire oceanic trophic levels, being consumed by humans and, therefore, part of our biology and reproductive systems. A perfect all-invasive transport vector for viruses and alien bodies.

Illustration by H  l  ne Guyot, [www.firsttrainofsummer.com](http://www.firsttrainofsummer.com)

None of us reading this can make the semiotic connections here that are necessary when both coming to terms with and translating this information into reality. We may well ask ourselves what 6.3 billion tonnes truly equates to, but it is unfeasible. Thus, lacking a workable sense of the scale of events, we then reduce this massive information into a small window onto our lives. We can begin to look at our permeable human selves and from there we can nurture a world-view.

Taking the World Ocean as the example, the international legal document *Mare Liberum* (Freedom of the seas), written by Hugo Grotius in 1609 took as its central assumption the notion that the availability of the ocean, its ecologies, services and all resources were *inexhaustible*. Grotius's claims were contested – and historians revealed that aspects of the document were self-serving on behalf of his own Dutch patrons – but it stood. In 1967, Elisabeth Mann Borgese (1918-2002), the German/Canadian

political scientist and one of the founding members of the Club of Rome and the first Convention of the Sea (1970), challenged and revaluated the premise of this colonial international legal doctrine. Borgese wrote that “every human...is a good bit of planet ocean: 71 per cent of his substance consists of salty water, just as 71 per cent of the earth is covered by the oceans” (cited in Deloughrey 2017: 34). Also in 1970 the aforementioned explorer, Heyerdahl began asking the readers of his travel books on oceanic adventures (see on), “Did we still cling to the medieval idea that the sea was infinite?” (235).

Thus, in 1967, Borgese advocated for a provision within the Law of the Sea that the high sea was to be claimed as the “common heritage of humankind.” This implies that foreign policy is interconnected and that the decision-making on the governance and exploitation of the sea is part of collective processes. Between 1958 and 1982 the United Nations Convention on the Law of the Sea (UNCLOS III) met and actually determined how to manage such freedoms.<sup>6</sup> Its successes marked a major leap forward in ocean governance and cooperation, overcoming the immense obstacles when bringing the international community together (as did the fairly recent Paris Agreement, PA 2015, and its framework convention on climate change<sup>7</sup>

Many decades have passed since the convention was initiated. The need now for a more ambitious framework to stop species losses and restore biodiversity is urgently required. In short, UNCLOS lays out the duties and rights of coastal states, their two hundred nautical miles of exclusive economic zones (EEZ), criminal jurisdiction, straits and international navigation and general provisions among many other articles. Remember that more than 70 per cent of our planet is Ocean and of that, 58 per cent remains outside of any national jurisdiction. These oceanscapes are known as the “high seas” and exist beyond the two hundred nautical mile limits (EEZ) accredited to individual coastal countries, while also marking the boundaries of their national waters. Outside of these limits, on the high seas, there are simply no effective protections in place for creatures, plants, submerged reefs or habitats. This translates as more than 40 per cent of the entire planet’s surface has no safeguarding in place for its wildlife or their habitat waters. The World Ocean is also where 97 per cent of the Earth’s water circulates.

Peace and, therefore, sustainability were at the centre of Borgese’s

6 Convention available at [http://www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf).

7 Paris, COP 21, 30 November-11 December 2015. Then, in November 2018, nearly 200 countries met again to begin implementing a new strategic plan for the United Nations Convention on Biological Diversity (CBD) with the health of the World Ocean considered a priority.

thinking when she argued that the World Ocean is totally susceptible to human activities. This change in fate has now been widely understood as being the case for at least sixty years. The misconceptions and silences that had been blindly cemented in older languages were uprooted by modern science, confirming that its fisheries are collapsing, coral reefs stressing, bleaching and dying, temperatures rising, and that acidification and unprecedented, unhealthy and unforgiveable levels of toxic wastes are prevalent throughout the water column. By the 21st century the political scientist, Peter Jacques was expressing the severity of this scenario, writing “The ocean system is deteriorating and structural elements of the ocean are changing globally. This is not just a loss of security, but a loss of meaning and identity for humanity because we are a part of the ocean - we depend on and gain life from the ocean...” (2006: 165).

This uncharted yet inspirational level of interconnectedness brought about by UNCLOS ought to have been the dawning of a superior consciousness – one where “place” is firmly located at home within a local community, but equally one that celebrates an extension of ideas and a world-view. The basis of the World Ocean becoming the *common heritage of humankind* is so honourable, so uplifting and exemplifies this thinking. To actually slow down and reflect on this fact that the beauty of the World Ocean, including its mysterious body, life, forms, shapes, colours, poetry is all something that legally is a part of me/us and something to call our own, merits immense celebration. This, alongside the notion that sustainability can only exist with ubiquitous peace, is all what Borgese taught us.

## **Semiotic Widening: Thoughts on the Refashioning of Future Language into an Ecolinguistic**

In New York City in 1941, the aforementioned author-pilot, Saint-Exupéry was confused and concerned by the direction the world was taking. He determined to bring all the wildlife and landscapes that he had encountered while flying his airmail plane over North Africa back to life on the page. Buying a box of watercolour paints he started a story about a little boy and his conversations with Earth and its inhabitants, being an unfamiliar planet he was visiting.

Said the fox, “But if you tame me, then we shall need each other. To me, you will be unique in all the world. To you, I shall be unique in all the world ...”  
 “I am beginning to understand,” said the little prince. (2014: 89)

The bonds were so imaginative and magical that even long after the little prince had departed the fox continued to listen to his voice on the wind,



brushing over the wheat fields. The fox, as imagined by *Saint-Exupéry*, was connected to the biosphere<sup>8</sup> through a shared dialogue with his human visitor. An ecological imaginary was brought to the forefront. This little prince was a time traveller and his inter-planetary journey stated as much about him as the strange and busy Blue Planet he was to encounter.

I regularly swim with turtles (*Caretta caretta*) and free them from plastics, ropes and fishing lines. My kindred vision, aside from forming an ecological consciousness, recognises that we share the World Ocean's entire history through our salty bloods, tears, sweat, movements through the water and need to surface for air. But I stop short of possessing the turtle's acute sense of navigation. I imagine their rhythms and paths over thousands of kilometres and remain amazed as to how they know exactly where they are headed within the blue body of this powerful and living planet. Of course, I read from the seabed, its features like depressions and even where certain shoals of fish species frequent, but I am very aware of my huge limitations in my readings between signs, scripts, languages and the deeper sounds of the world below. However, this does raise the potential for a biosemiotic and how materials and matter are interconnected "here" via such relationships, and none more so than the World Ocean, described by Stefan Helmreich as the "Worldwide Web of Genes" (50). Suddenly, in this light, the priority given over to digital pathways – being endlessly beamed between the stratosphere, outer space and Earth via satellites – is reversed and directed inward toward Earth, ourselves, our true origins, our genomes and the interior body mass of our Planet Ocean.

Human permeability is a further extension to this ecological condition. For example, in Alaimo's reckonings on our oceanic origins, she writes how having a "more potent marine trans-corporeality would link humans to global networks of consumption, waste, and pollution, capturing the strange agencies of the ordinary stuff of our lives" (188). This requirement of a specifically eco-tuneful and meaningful language – one as true, self-cleansing, absorbent and susceptible to the surrounding environment – can also be found in Arundhati Roy's poignant words. By describing how "Language is the skin of my thought" (in Nixon 76), Roy inspires us to reflect on how we might also fuse our words to our environments, hence our bodies, ancestors, fellow species and elements of

8 This is precisely everything that the scientific community are asking humankind to now achieve - "to reconnect to the biosphere" – as part of our individual and collective ecological responsibility. See, Folke and Hall 2014; Stockholm Resilience Centre. "Biosphere" is defined as the sphere of all land, water and air on the planet in which all life thrives; it is the very ecological system that integrates all living beings and their interdependencies.

the greater biosphere. This would certainly render us “Earthbound” in the sense that Latour employs the prefix “geo” in geostory. It is not intended as a return to Nature “but for the return of object and subject back to the ground” (16). It would make us, as individuals, completely aware of our daily actions and, importantly, of the afterlives of what we consume and put back into the environment.

Being raised here then is the notion that environmental imaginaries, corporeality and conversations with our planet are crucial as stories do matter. Leading ecocritic and blue humanities philosopher, Serpil Oppermann explained that this is “because they communicate a message of revaluing what we may lose, generating the creativity to imagine new accountabilities, more sustainable solutions, and also ethical responses. Telling stories are in fact, to quote Thom van Dooren’s wise words, as an act of response, an effort to craft better worlds with others.”<sup>9</sup> In our collective efforts to foster a world-view and learn to share more, we are only too aware of how the “shrinking of knowledge to expertise and the centralising of power – not least the power to tell – renders us unsighted” (Nixon 77). This blindness leaves us struggling to see beyond the narrative monopoly generated by globalisation. Hence, Lukacs’ aforementioned critique of the world-system as one that dictates culture and erodes path-building towards sustainable lives seems totally valid. It all has to actually be *culturally* imaginable if we are to make an alternative world beyond consumerism and neoliberalism possible. After all, survival itself is never about our existences being scaled back to the bare bones of life, but more of a state of anxiety caused by the strain present between a life of absolute necessity and the question of how to cope from the task of continuing with life itself.



Image 5



Image 6

9 Private email correspondence written by Serpil Oppermann. Received 19 September 2017.

A balloon says “Happy Birthday” and has travelled through underground wastewater systems where it now meets the Mediterranean Sea in Kaş, Turkey – a habitat of the loggerhead turtles (*Caretta caretta*). These turtles mistake balloons for jellyfish, which are their staple diet. In Kaş, this turtle is the town’s major marine attraction, being promoted by the local council, diving schools, the free diving world championship events, tourist agencies, boat touring companies, hotels and marina. If children could better sense the suffering such frivolous items cause marine life, they surely would want alternative decorations for their special day. Photos taken by the author.

Thus, language becomes a tool of possibility as well as a process that signifies a greater eco-achievement. The process requires not only a dialogue between ourselves and our worldly ethics, but equally responsive actions as means through which to craft better worlds with humans, non-humans and our very planet. Clearly though, concepts centred around the Anthropocene and the very words “climate change” need challenging also. What is occurring today across the world is so much more than a new geological époque and a mere change in climate. Lukacs reminds us that “the counsel we hear on climate change could scarcely be more out of sync with the nature of the crisis...These pervasive exhortations to individual action – in corporate ads, school textbooks, and the campaigns of mainstream environmental groups, especially in the west – seem as natural as the air we breathe. But we could hardly be worse-served” (2017).

Thus, the New Human Condition being put forward is fundamentally ecological, permeable and pacific (see Holm *et al.* 2015). It needs to go beyond modernity’s tireless history of violence and exploitation that subordinates Nature and alternative peoples as the Other. “To grasp the world of today,” wrote Saint Exupéry in 1939 “we are using a language made for the world of yesterday... truly we are emigrants, still to find our homeland” (2000: 30-31). A universal sense of homeland promotes a collective and individual responsibility towards planetary biosphere stewardship, while respecting diversity (bio and climatic) as well as the varying timescales of different communities as they learn from and adapt to their specific geological foundations. Colonialism’s premise, therefore, that one model fits all was entirely erroneous from the outset. The message is now one of collaboration, returning to conversations, stories and shared knowledges between community spokespeople, academics, policymakers, producers, educators, the wider public and so forth. Perhaps this language of hyper, mega – and even global – is disconcerting as people are inspired by the very things that they can control, like dreams that are actually within their reaches.

“Storytelling,” writes Latour “is not just a property of human language, but one of the many consequences of being thrown in a world that is, by itself, fully articulated and active” (13). I find this insight absolutely

fascinating – our world, its geological wonders and time, inhabitants, ocean and landscapes are all continually narrating in a world of constant meanings and communications. What does an articulate world mean? And what does it demand from us in consideration of the New Human Condition? Equally, Edward Said perceived postcolonial literature as ecological – as being “a process of recovery, identification, and historical mythmaking enabled by the land” (in Deloughrey and Handley 3-4). Thus, postcolonial writers – who are, in my view, at the forefront of experimenting with semiotic widening – have embarked on a literature of healing (involving memory) to recover earlier social and environmental imaginaries and relations through a long process of decolonisation (see Medd 2015a).

Fluid watery-word poet Alice Oswald rejects landscapes that have been linguistically domesticated over many centuries, especially the Romantic gaze that in postcolonial studies became a reference for the male ego and its “all seeing I.” This gaze was to function as a means of conquering landscapes by reducing their savagery to tamed wildernesses, and by inscribing metaphors and meanings onto newly acquired lands. “I’m continually smashing down the nostalgia in my head,” Oswald says, “and I am trying to enquire of the landscape itself what it feels about itself rather than bringing in advertising skills. There’s a whole range of words that people use about landscape. Pastoral? Idyll? I can’t stand them” (2010). This form of biomythic enquiry is certainly a profound altruistic skill that surely has echoes of pagan sensibilities towards the environment. It interweaves emotions of geoempathy, biosemiotic perception and activity – and all the while with an acute awareness of the terrifying Otherness of Nature itself. It is far from a complacent position towards life but one that acknowledges the everyday and long effort to live atoned to Nature, and not its pacified renditions but its alien and unpredictable fragility, power and glory.

Certainly, we need to be more courageous in our ways of living with and seeing Nature. It is this sense of a wholeness, of being a contributing protagonist in a wonderfully complex geostory that needs developing. As participants in a polluted and deteriorating world such thinking needs prioritising and urgently introducing into school curriculums. With this in mind, I realise that a Sustainable Development Goal that could frame, give value to and permit input into the formation of a common “geostory” has been sadly omitted from the United Nations SDG 2030 Agenda. As will be shown below, a more visible ocean narrative would go a long way toward eradicating the cultural backdrop of plastic pollution that originates on land. Alaimo’s candid concept of “marine trans-corporeality” would fuse the everyday objects of our lives to our consciousness as well as to the environmental realities of consumption, waste and pollution.

The lives of Others would become important.

In summation, human semiotic activity “also involves (and is driven by) the need to produce technologies (in our case first nonverbal and then, later, verbal language) capable of more effective means of modelling the world” (Wheeler 142). This entails a world-view and has emerged in romantic poetry “which keeps the breath of body and the breath of spirit in creative and rhythmic connection” real (Ibid. 153); and in postcolonial enquiry into biomythic narratives that place “nonhuman animals as ancestors or companions species” that work as literatures of resistance to the disenchantments and fundamental greed of modernity (see Deloughrey and Handley 2011; Medd 2015a).



The Sustainable Development Goals (SDGs) of The Paris Agreement (PA, 2015-2016)<sup>10</sup> are a critical global climate accomplishment, forged by 195 nations and represents a historic undertaking. Tackling the issue of plastics are: “SDG 12. Ensure sustainable consumption and production patterns”; “SDG 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development”; “SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels”.

The author’s additional goal is centred around education and people-orientated participation, “SDG 18. A Common Geostory: Allow all peoples a multilingual voice to share their stories on the environment as ways of understanding and building collaborative solution-based networks”. For example, set aside lands to build inter-oceanic eco-routes linked by green corridors (and ocean-blue corridors) that criss-cross countries and continents, allowing wildlife and marine life to travel freely and safely. These would become invaluable natural resources for schools and scientists, creating living areas where field studies could be undertaken as part of the new ecocurriculum as well as powerful sites where new stories might be born.

Visit: <https://sustainabledevelopment.un.org/sdgs>

10 See [http://unfccc.int/paris\\_agreement/items/9485.php](http://unfccc.int/paris_agreement/items/9485.php).

## **Planetary Boundaries: Marine Plastic Pollution is the New Climate Change Contestant**

Since the beginnings of this philosophical and physical exploration in 2014, I have travelled fairly widely as a surfer, swimmer, diver and sailor. On one such occasion I worked my passage as a deckhand while sailing along Turkey's Mediterranean coastline under the captainship of Mirko Tirani. Always from the deck of a boat our imaginations responded to the waves of ideas that swelled around us, inspiring conversations about the universe, oceanscapes and the reflective qualities that rippling blues, sparkles of silver shards and blazing horizons have always had on the minds of people. Tirani then went on to sail the world and one day this email message appeared from him:

**Subject:** Mirko letter sea pollution

Dear Friends,

My name is Mirko, I am a sailor and I have been sailing for sixteen years. I would like to share my latest experience at sea with you. In the last year, I have sailed from the Indian Ocean to the Caribbean Sea and I saw amazing sights that left me astounded by the beauty of nature, but unfortunately, I also saw many crimes against our planet that traumatized me. I am seriously worried about the conditions of the sea. During my navigations, I have seen plastic or even worse, oil from cargo ships that floated for miles and miles along the waves.

The quantity of ships at sea for commercial use has increased and continues to do so; unfortunately, the sea is becoming the trash bin of the Earth, a black hole of unwanted items. People throw their unwanted items at sea, thinking they will go unnoticed. For example, recently tons of non-disposable chemical waste from the iron metal industry was found a few miles outside the departure port of Italy. This cargo had no destination other than a quick disposal at sea, in this way the cargo ship would be ready for another shipment. In the business world there is no respect for nature, because no price is too high to pay and no sacrifice is too great when it comes to making a profit. These selfish and egoistic business decisions are destroying the beauty of the sea, and the effects on the sea are now noticeable. It is our job not to turn a blind eye to this problem because it is one that affects us all, animals and people alike.

Last summer I was sailing back to the Tyrrhenian Sea after many years

of absence, and it was clear that the quality of the sea was no longer the same as it been just a few years previously. I was astonished by the amount of plastic on the surface. I didn't go one mile without seeing plastic floating along beside me. I believe that the Mediterranean Sea in its current state is in a pollution crisis. The fact that the Mediterranean Sea is a closed basin results in an accumulation of garbage and plastic that remains trapped in the area and doesn't disperse at sea. Instead, it remains as a constant reminder of our negligence. We have to do something, maybe it is too late, but we must try to preserve our planet and our sea. It is of fundamental importance to teach the new generation to take better care of the environment, and to inform people of the disastrous consequences that our carelessness has produced.

I hope that together we can be the miracle, I want to trust in human beings.

Best wishes to our Planet.

M.T.



Image 11

Timeless scenes on the Mediterranean at sunset. A local fisherman feeding out short-run nets by hand. Photo taken by author.

For a decade or more I have been teaching and stating at conferences that marine plastic pollution is the new climate change. While studying under a United Nations programme in Earth Systems in 2015, I began to voice this amongst the scientific community. So in 2017 when Jennifer Lavers of the University of Tasmania's Institute for Marine and Antarctic

Studies echoed my thoughts during an interview, I felt encouraged to finally have a scientist on my wavelength. Lavers said “For me, marine plastic pollution is the new climate change, but I would like for us to not make the same mistakes. We’ve been arguing about climate change, and whether it exists and what is changing, for the better part of 40 years ... Let’s not wait for more science. Let’s not debate it. The rate of plastic in our oceans is absolutely phenomenal, and we need to do something now” (in Hunt 2017; see also Lavers and Bond 2017; Laville and Taylor 2017).

The new climate change refers to its multifarious presence that is enmeshed in “all the driving factors” that feed into the 21st century’s pervading ecological crises; it is found in melting ice throughout the polar regions; it is piling up in the deepest points of our planet; it is now circulating throughout the entire food and water chains and flows; it is acting as a transport vector for invasive species, microorganisms and possible future pandemics; it is in our drinking water, our biology and reproductive systems as well as the biology of wild and marine life. These factors pertaining to critical thresholds signify that their accumulated global effects are impeding vital Earth-system processes. The term Earth System refers to the suite of interacting “physical, chemical and biological global-scale cycles and energy fluxes that provide the life-support system for life at the surface of the planet” (Steffen, Crutzen and McNeill 615).

For sure a warming planet is sparking major concerns too. It needs to be made clear that the Earth System has never exceeded two degrees Celsius warming over the last three million years as the biosphere system has been perfectly self-regulating. Within a minuscule period of approximately 150 years, humanity is forcing the geological climate clock back to conditions that were prevalent during the Miocene époque of ten million years ago, and with four+ degrees of warming. Our future is better understood, therefore, as becoming a planetary past and is now referred to as the “Miocene Future.” This will have resulted from humanity having crossed tipping points within the Earth System’s self-regulatory mechanisms. The very recent *IPCC Ocean and Cryosphere Report*<sup>11</sup> (24 September 2019) outlined cascading effects such as the collapse of the western Antarctic ice shelf – now irreversible and to raise global ocean levels by 3 metres.

11 The “cryosphere” is defined as the components of the Earth System at and below the land and ocean surface that are frozen, including snow cover, glaciers, ice sheets, ice shelves, icebergs, sea ice, lake ice, river ice, permafrost, and seasonally frozen ground. Report available here, <https://www.ipcc.ch/srocc>.



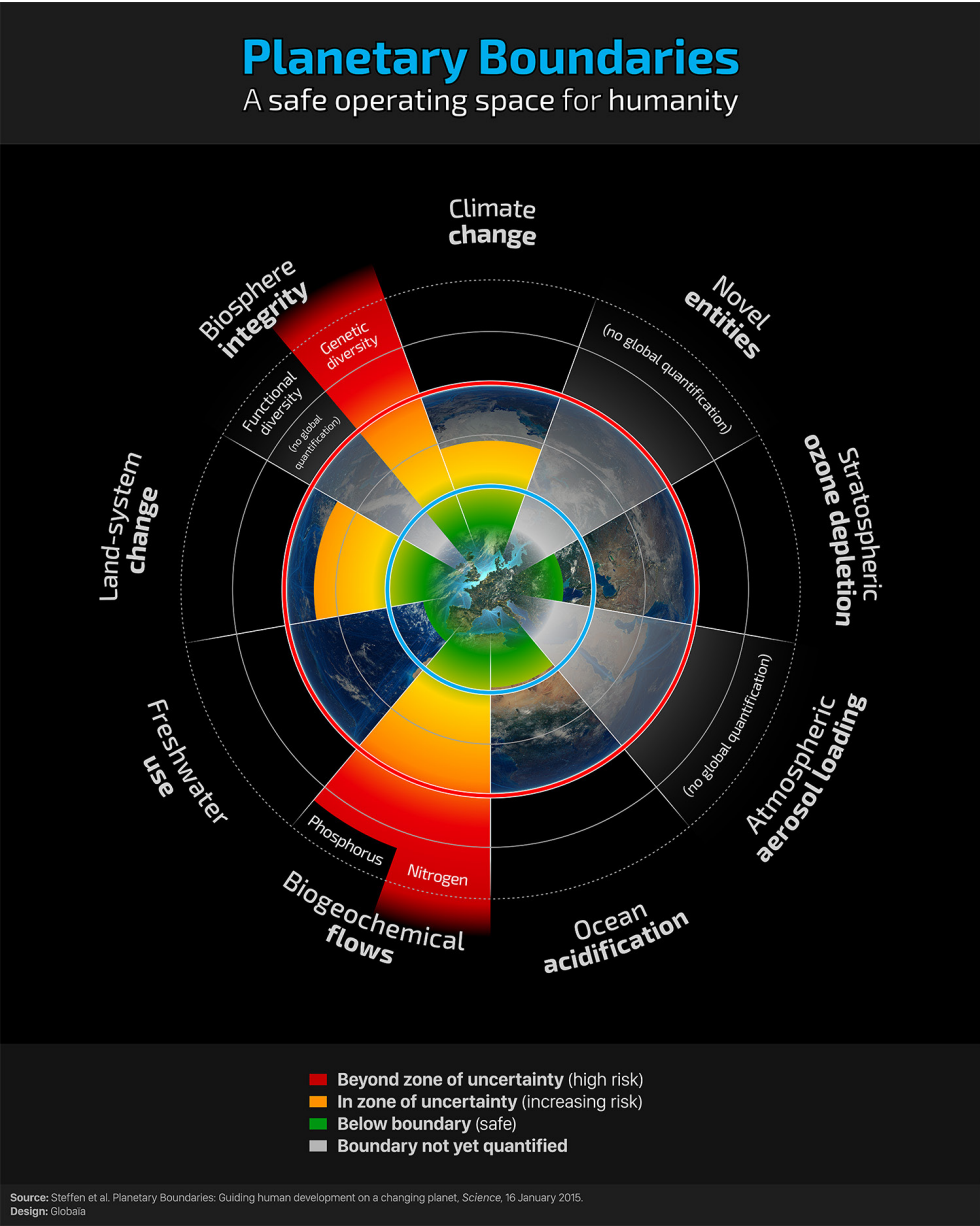


Image 11

Source: Steffen *et al.* SRC. 2015. Illustration by F. Pharand-Deschênes/Globalia and used with permission.<sup>12</sup>

The influential “Planetary Boundaries Framework” – as set out in the illustration above – was theorised by an international and interdisciplinary

<sup>12</sup> To watch the “Reflections on the Planetary Boundaries framework” conference presentations, see <https://stockholmresilience.org/research/research-news/2019-10-14-reflections-on-the-planetary-boundaries-framework.html>.

group of scientists in 2009 and revised in 2014, and mostly informed by those researching at the Stockholm Resilience Centre (SRC). In their words “The planetary boundaries concept presents a set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come. The planetary boundaries approach is not intended as a replacement for ecosystem management approaches but a complement that takes Earth system considerations into consideration” (Various 2018).

Unified, the boundaries form a synthesis of the intrinsic biophysical processes that regulate the stability of Earth. In turn, this acknowledges that Earth is a single complex and integrated system, functioning through interdependencies. Importantly, it is equally a measure of ecosystem health throughout these biophysical boundaries. Those that are now moving into the yellow are zones of “uncertainty,” whilst those already in the red have transgressed “safe operating spaces” where a stable planetary ecosystem can no longer be assumed or sustained.

In January 2015, an update was published in *Science* revealing that an additional boundary had been breached – Land-System Change, consequently leaving four out of the nine borders in a worrying/perilous state. So, Land-System Change (deforestation/agriculture/damming/concreting); Biosphere Integrity (biodiversity losses and extinctions); Biogeochemical Flows (industrial and agricultural processes/fertiliser usage); and Ocean Acidification (carbon dioxide uptake/industrial run-off and seepage of nitrogen and phosphorus/pollution) are all today close to, or have reached high-risk levels and together they feed into the equally critical and accumulative effects of the Climate Change boundary.

In 2018, in a co-authored paper titled “Marine Plastic Pollution as a Planetary Boundary Threat: The Drifting Piece in the Sustainability Puzzle,” the article’s leading researcher, Patricia Villarrubia-Gómez stated that:

A remaining question to be answered is if the concentration of plastic in the ocean, today or in the future, will reach levels above a critical threshold leading to global effects in vital Earth-system processes, thus granting the consideration of marine plastic pollution as a key component of the planetary boundary threat associated with chemical pollutants... The irreversibility and global ubiquity of marine plastic pollution mean that two essential conditions for a planetary boundary threat are already met. (2018)

We do not know the full consequences of transgressing tipping points but we can assume that their effects will be long-lasting, irreparable and, consequently serious at both ecological and social scales. I am going beyond Villarrubia-Gómez’s assertions on the effects of plastic pollution in marine ecosystems and how they tie in closely to the core planetary

boundaries of biosphere integrity and climate change. I am claiming that, yes, ocean plastic pollution is part of a chemical pollution planetary boundary and also that it has the potential to be more serious than climate change itself due to the sheer amounts of mismanaged waste, the rapidity of its escalating permanence and its capability to drive species to extinction. It possibly has the potential to affect the natural forces of circulation of the geostrophic currents.

In private communications with Villarrubia-Gómez on this issue, she wrote that:

due to the complexity of this material's interaction with the environment and the great lack of scientific-based information we could not state that marine plastic pollution ought to be included within the planetary boundaries framework. That does not mean that we should not keep pushing it forward... If research on this topic continues and someone manages to get the inclusion of plastics as a quantitative planetary boundary (as a sub-boundary within the boundary of "Novel Entities"), it will already be significant which, in my opinion is more feasible than making it a whole boundary by itself. Including plastic pollution under the "umbrella" boundary of Novel Entities is necessary because, in fact, plastic is a human-made entity (a novel one which was not present during the Holocene state of the Earth system). A quantified sub-boundary would have equal weight and applications and importance as any other boundary, as the Nitrogen and Phosphorus aspects of the Biogeochemical flows' boundary show.<sup>13</sup>

It should be understood here that every piece and particle of plastic ever manufactured is still somewhere in the environment. This gives a stark

<sup>13</sup> Private email correspondence between the author and Patricia Villarrubia-Gómez. Friday 12 January 2018, for which the author is truly grateful for such expertise and insights. Regarding making plastic pollution a boundary unto itself, Villarrubia-Gómez also writes "we have had this conversation many times here at the centre (Stockholm Research Centre), and with other experts. You have every right to argue for it, it won't make plastic pollution more notorious or important for future policies or any application." In terms of the claim that "every piece and particle of plastic ever manufactured is still somewhere in the environment," Villarrubia-Gómez adds to the discussion, stating "I would also include that: All the plastic produced, except the ones that have been recycled and/or incinerated, are still in the environment. I received the correction myself during the paper's peer-review process because it was not clear enough, according to the reviewer. This is a very important point, because, for example, countries like Sweden incinerates most of its plastic waste to create energy from it. I am not saying that I agree with the "solution" towards plastic pollution, but it is a fact indeed. And one that is planned to increase now that China is not accepting waste imports from other countries." Even so, incinerated plastics and their by-products that are reused for energy do not seem to eliminate plastics from the environment to my mind.

reflection on the meaning here of “irreversibility.”

Thus, in terms of the forthcoming production figures for plastics and human demographics over the coming decades (see on), and all the while supported by the poor cultural attitudes toward our planet, plastic pollution will outweigh and become more serious than the other factors feeding back into the pivotal boundary of Climate Change. Clearly, when creating boundaries both sides of the division must be accounted for, therefore, domino effects incorporate the social consequences of reaching tipping points within Earth systems, raising further the issue of oceanic and human health.

## **From Microorganisms to Whales: The Whereabouts, Reach and Effects of Plastics Once Discarded**



Image 13



Image 13

Day trippers in Kaş, Turkey. Everything they consume, sit on and use as floor coverings are made from plastics. For the ocean, the planet and all wildlife this nightmare continues forever. Photographs taken by the author.

In 1907, Leo Hendrik Baekeland (Belgium 1863-1944 USA) created Bakelite working from a laboratory in New York City, which he patented in 1909. Bakelite is a polymeric plastic of phenol and formaldehyde. Baekeland retired in 1939 while the world production of his Bakelite plastic had topped 175,000 tonnes. Ironically, he took to sailing his yacht! Unconsidered at that time, the discarded plastic items had begun to fill up the World Ocean. Thereafter, chemists experimented further, breaking down hydrocarbon chains in crude petroleum, and plastics rapidly emerged as the most basic infrastructure of modern consumer society. To give an example, single-use plastic bags appeared in the USA in 1957 and in British supermarkets in the late 1960s. By 2017, over a billion such bags are being given out daily and free of charge. For sure, the historical beginnings of

the Plastic Age (Plastocene) and equally of the Pope’s “legacy of filth” truly begin inside Bakelite’s laboratory.

We may ask why is plastic the most basic infrastructural material of modern consumerist societies? The answers are the very reasons why it is also an extremely damaging and harmful product. Its uses can be hugely beneficial for the good of all humankind such as in the provision of clean water services, hospitals and in health products, to list but a few. However, by far the highest proportion of plastics manufactured yearly comprise disposable packaging (80 million tonnes in 2011), as well as a wide selection of short-lived items. In Western Europe, a single-use shopping bag has a practical life expectancy of fifteen minutes whereas once in the environment it breaks down into ever decreasing sizes, becoming part of the food chain. Industry is literally wrapping society and the planet’s biosphere in toxic plastics.

The versatility of plastic has undoubtedly altered our lives in fields such as communications and technological advances. The unique properties of plastics are: low production costs, strong, lightweight, corrosion resistant, durable and they act as electrical and thermal insulators. As such, plastics have contributed to energy reductions in industry, such as heavy transport costs. Once seaborne though it is these very advantages of plastics that inflict harm, suffering and mortality to all marine life. More than seven hundred species forcibly encounter plastics in the marine environment. By being lightweight, durable and toxic, plastics, by default, are a major environmental hazard.

Plastic Class		Products and typical origin
Low-density polyethylene	LDPE & LLDPE	Plastic bags, six-pack rings, bottles, netting, drinking straws, toothbrushes
High-density polyethylene	HDPE	Milk and juice jugs
Polypropylene	PP	Rope, bottle caps, netting
Polystyrene	PS	Plastic utensils, food containers
Foamed Polystyrene		Floats, bait boxes, foam cups, fish containers
Nylon	PA	Netting and traps
Thermoplastic Polyester	PET	Plastic beverage bottles
Poly (vinyl chloride)	PVC	Plastic film, bottles, cups
Cellulose Acetate	CA	Cigarette filters

**Table 1.** Commonly encountered classes of plastics in the marine environment.

In the 1970s, scientific academies in the United States made estimates of 45,000 tonnes of plastic entering the World Ocean per year – what equated to 0.1 per cent of the total global production and a mere one per cent of our general waste. In 1974, the British Plastics Federation claimed that “plastic litter is a very small proportion of all litter and causes no harm to the environment except as an eyesore” (Derraik 2002: 842). From 0.5 million tonnes per year in the 1950s, plastic production has increased to a staggering 300 million by 2016. This situation can no longer be considered an “eyesore” but a life-threatening material that qualifies as a Novel Entity within the Planetary Boundaries framework. This fact comes with the appalling knowledge that over the forthcoming decade there will be more plastic products manufactured than what equates to the entire history of plastic production since the 1950s. Of note, curbing consumerism is a target set by the Paris Agreement: “SDG 12. Responsible consumption and Production.”<sup>14</sup>



Image 15

The binned rubbish from day trippers to the Los Lances Beach, Tarifa, Spain, 2019. Full recycling banks are a mere 50 metres away. If the famous “Levante” wind starts then within minutes this will all be carried out into the Atlantic Ocean. The gross figures for actual plastics which have been recycled or incinerated are low. The majority by far – 80 per cent – has been hidden away from sight in landfills, or swept away by winds to begin their oceanic journey.<sup>15</sup> Photograph taken by the author.

14 Most of the statistics come from the following journals: *Marine Pollution Bulletin*; *Water Air Soil Pollut*; *Ecology and Society*; *Environment. Science and Policy for Sustainable Development*; *Nature*; and *Environmental Research Letters*.

15 To learn more of the journey of a plastic bag once discarded into the environment, see Konner 2010.



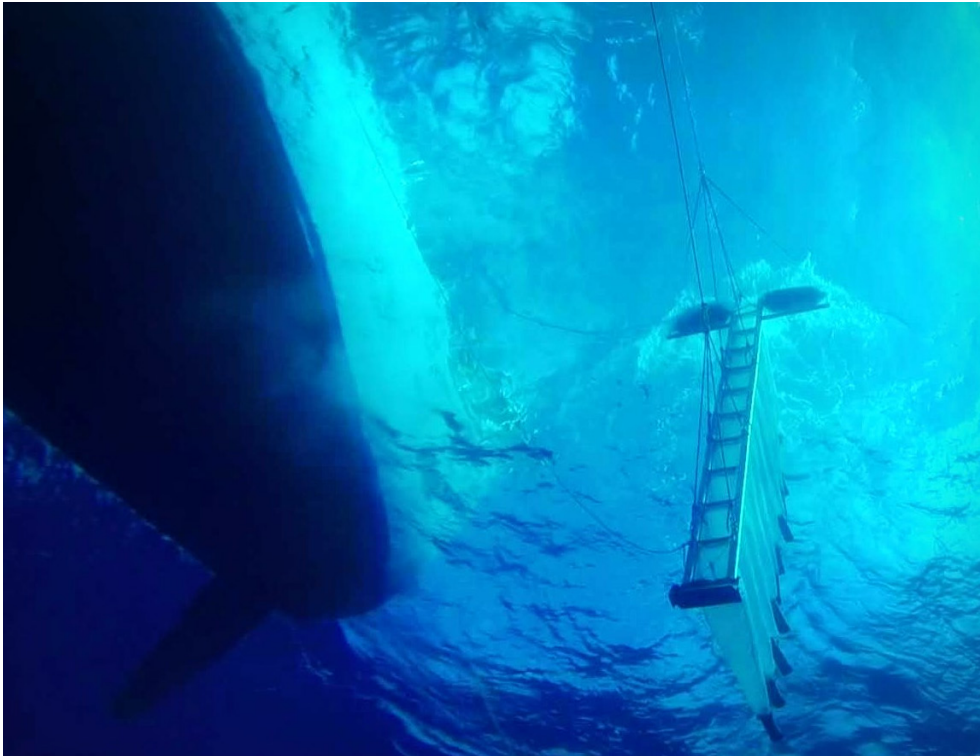


Image 16

A multi-level trawl for vertical distribution research. The scientific assessment on how much plastic is now floating in the World Ocean is accepted to be 100 million+ tonnes (5 trillion pieces). Studying the quantities and their effects often involves strenuous research, being conducted on the high seas, isolated littorals and in the extreme climates of the polar regions. A typical process involves an expedition aboard a crewed ship, GDP drifters, manta trawls, specific capture nets, collection bags, rinsing sieves, collecting trays, microscopes and computers to calculate and store data. The individual pieces of plastic are then sorted depending on whether they are fragments, polystyrene pieces, pellets, polypropylene / monofilament lines and films.

Photo used with permission. Source: [www.theoceancleanup.com](http://www.theoceancleanup.com).

Nothing in life is as it so often appears to be on the surface! Even so, a significant proportion of the worldwide distribution of plastics *is on the surface* of beaches, waterways and the open ocean. The latter is accumulating within the convergence zones of each of the five subtropical gyres – see onwards, and in the included diagram. However, the study by Andrés Cózar *et al* in 2013 exposed a major gap “in the size distribution of floating plastic debris as well as a global surface load of plastic well below that expected from production and input rates... these findings provide strong support to the hypothesis of substantial losses of plastic

from the ocean surface” (10241). In other words, the amount of plastics known to be floating on or near to the ocean’s surface falls well short of the total volume that is entering the World Ocean. The central questions now are: where is it? Is it settling on the ocean bed? What does this mean for the World Ocean and the planet?

We can recall that in February 2017 scientists discovered unbelievably high levels of toxic pollution in the Mariana Trench, being the deepest known point in our ocean at 10,994 meters (36,070 feet) below sea level (with an estimated accuracy of  $\pm 40$  meters. Mount Everest is 8,848m high). The Mariana Trench is situated in the western Pacific Ocean, east of the Mariana Islands and this discovery confirms that plastic waste is spreading industrial pollutants to the remotest and most inaccessible places on our planet. In 2018, the reporting clarified actual quantities, and later published in *the journal Geochemical Perspectives Letters*, where researchers “found that the concentration of microplastics increased as the sample sites descended the trench. At the bottom, they reached a maximum of 2,200 pieces per litre in sediments and 13 pieces per litre in water” (Carrington 2018a).



Image 17

A fishing buoy is wrapped around the pectoral fin of a Blue Shark.

Photo supplied by ORCA. Used with permission. For further information see <http://www.orcaweb.org.uk>.



This doleful scenario gets steadily more complex as plastics are more often than not mixed with additives and filler products during manufacture, or actually acquired from seawater itself through processes referred to as sorption. This alters their composition making them denser than the specific gravity of sea water which is  $\sim 1.025 \text{ kg/m}^3$  (depending on water temperature and salinity). Nylon is one such plastic that hovers at lower depths in the water column while many actually steadily sink and finally settle on the “coastal” sediment. There are then the actual forces that break plastic down into smaller particles to consider, and substances with an affinity for organic matter that attach themselves more adeptly to buoyant plastic particles (persistent organic pollutants, POPs). These POPs then hitch rides to the remotest regions by ocean currents and introduce “invasive species.” This also occurs via cargo ships that use seawater ballast that is emptied and refilled at international harbours.

We would think that once biofouled fragments (microorganisms, algae, plants or marine life that attach themselves to host surfaces) obtain the density of seawater they would then enter the water column and begin to drift neutrally, or sink steadily until settling on the deep ocean floor. This is the case in shallower, coastal and nutrient-rich areas as fragments are being recovered in the sediments. However, because seawater density gradually increases the deeper one goes, plastics find their equilibrium accordingly and remain suspended at multiple depths in the water column. These are termed “plastic sinks” and may account for a substantial amount of the missing quantities. Furthermore, there is a circular pattern in the form of “natural release” that field experiments have uncovered: biofouled plastic debris rapidly defouls when submerged, thus becoming lighter and returning toward the surface. In deep water this can be prompted due to the dissolution of carbonates and opal owing to acidic conditions.

Scientists have proposed four main scenarios to account for the missing quantities of plastics:

1. Nano-fragmentation which refers to minute plastic particles generally less than 100 nanometres in size.
2. Shoreline deposition.
3. Biofouling.
4. Ingestion, the most worryingly and likely.

Invisible to the eye from the outset and, therefore, extremely difficult to study by using spectroscopy, nanoplastics are also compositional ingredients in a wide range of cosmetics, creams and soaps that just wash down our drains in huge quantities. Clearly this is worrying as coastal areas are now home to the majority of the world's population – a trend

which is intensifying – and where the ocean dead zones are forming due to ocean suffocation. The same circumstances apply to our roads where tyre fragments get washed into drains and windblown plastics from landfill sites make considerable journeys toward the ocean. Of note, what is happening in the World Ocean is also occurring in the Great Lakes of North America.

As the global production of plastics will have soon topped 33 billion tonnes what we realise is that our plastic pollution is migrating faster and in huger numbers than ourselves. It seems that an open call for a high-level conference on the travel and reach of our pollution will be insightful and a step closer towards instigating industry and societal changes. As shown in the world map below, plastic originates from land and sea-based centres and then the majority gravitates toward subtropical gyres, becoming a dense mass of macro and microplastics. These gyres are created by a combination of currents and their deflection due to Earth's rotation. The Ekman transport (induced by easterly winds in the tropics approximately  $0^{\circ}$  to  $30^{\circ}$  latitude; and westerly winds in the mid-latitudes,  $30^{\circ}$  to  $60^{\circ}$  latitude), is driven by regional winds and geostrophic currents that form the balance between sea levels and the Coriolis force (see Eriksen *et al.* 71). They total five and are located in the North Pacific, North Atlantic, South Pacific, South Atlantic and the Indian Ocean.



Image 18

The circulating currents of the World Ocean forming gyres caused by the Coriolis effect, or deflection of currents due to Earth's rotation and surface winds. Collage created by the author. Ocean image was taken while sailing on the Mediterranean Sea; the plastics were collected from the Playa de Merón beach, San Vicente de la Barquera, Cantabria, Spain.

While writing this, a scientific paper titled “The Arctic Ocean as a Dead End for Floating Plastics in the North Atlantic Branch of the Thermohaline Circulation,” was published, in which the authors identified a sixth plastic convergence zone forming within the Arctic Polar Circle. Their findings provide research evidence based on field data and surface circulation models. As the human population north of 60° is fairly low and the fragments are aged debris that show long exposure times in the environment, it is understood that the plastics are travelling towards the Arctic from other more densely populated latitudes. In effect, the oceanic route and its subsurface waters pass via Scotland and Iceland. This transect is a major gateway for the passage of plastics where they accumulate in the Greenland and Barents seas. Once here the plastic mass is forced to stop due to the polar ice cap and actual landmass that together act as physical barriers to flows. Scientists now believe that the naturally downward flowing transport systems are also resulting in the seafloor beneath the Arctic becoming a sizeable sink for plastic fragments. Ocean circulation models have predicted that “the formation of a plastic accumulation zone within the Arctic Polar Circle would require a few decades” (Cózar *et al* 2017). It is no kept secret that plastics entering en masse such a unique and rich ecosystem will have deleterious ecological implications that will equal – if not surpass – the already evident effects of climate change occurring so rampantly throughout this victimised region.

The truly distressing face of this globalisation of indifference toward our planet is the physical breadth of our filth. It has migrated before we have toward geographical zones that remain too hostile for human occupation. It is already affecting the serenity, balance and quality of life of the wildlife that – until very recently – inhabited pristine environments free from any notable forms of contamination. In 2010, beyond the 66° 34' northern latitude in an immensely beautiful and sophisticated region such as the Arctic, the estimated mass of plastics carried to the region topped 2 million tonnes per year. In 2014, researchers uncovered a further plastic sink in the Arctic sea ice itself that was much denser than the already contaminated surface waters. Whereas, at the opposite pole, in a survey of waters near Antarctica “plastic pollution was the only type of marine debris found south of 63° S” (Barnes, Walters and Gonçalves 250–252). Since those figures for 2010 were made public, and as I write this nearly a decade later, we are already looking at 15+ million tonnes of plastic debris in Arctic waters – which will come to outsize and physically replace the melting mass of year-round sea ice in coming decades.

In essence, it is known that the overall figures and actual whereabouts of all the plastics entering the World Ocean do not tally. It is believed that a large amount of the missing quantities of plastics are ingested by marine mammals, marine life, invertebrates such as molluscs and

crustaceans, birds and reptiles – becoming pollutant vectors that travel directly into and across the entire food chain. *Any form of petroleum finding its way into the marine environment is classed as a pollutant.* Plastic enters the ocean by winds, rains, rivers, beaches, agriculture, aquaculture, industry, roads, household grey waters, tourism and marine activities such as shipping and fishing. Huge quantities are also the result of illegal dumping – see subheading below, The Commercial Fishing Industry. The scientific terms are numerous such as anthropogenic marine debris (AMD), as are the categorisation of the classes, composition and sizes of plastics. The actions that break plastics down when once seaborne are:

UV/photo degradation	action of sunlight
Biodegradation	action of living organisms such as microbes
Hydrolysis	reaction with water producing other compounds
Mechanical abrasion	natural elements, motorboat engines

**Table 2.** Showing the elemental forces and actions that embrittle plastics – processes that continually reduce their composite strengths and sizes.

These actions all cause plastics to lose their pliancy resulting in surface embrittlement and microcracking. When reaching this point, plastics are a serious environmental hazard, breaking down into smaller particles and much aided by wind, tides, currents and waves.

<1.00 nm	(nanoplastics, invisible to the eye)
0.33–1.00 mm	(small microplastics)
1.01–4.75 mm	(large microplastics)
4.76–200 mm	(mesoplastic)
>200 mm	(macroplastic)

**Table 3.** Categorising the break up of plastics by sizes and defining them accordingly.

In 2016, the United Nations Environment Programme (UNEP) published figures on the death toll caused by plastics. In summation, plastic is killing millions of seabirds a year and 100,000+ marine mammals and turtles. Commonly found items in the stomachs of dead seabirds and turtles are combs, cigarette lighters, plastic bags, latex balloons, bottle caps, toys, tampon applicators, cotton bud shafts, toothbrushes and medical equipment. For example, a study of fulmar carcasses that washed up on North



Sea coastlines found that 95 per cent had plastic in their stomachs – an average of 45 pieces per bird (UNEP 2016); 80 per cent of the loggerhead turtles captured illegally by fishermen in the western Mediterranean contained plastics in their gastrointestinal tracts; researchers and local inhabitants in the Arctic have sighted the creamy white cetacean, the beluga whale along with narwals and migrating humpback whales trailing discarded fishing gear, buoys, lobster and crayfish pots as well as long-lines wrapped around their flukes, fins and tails. As natural conversationalists and moving in pods, what would such a crippling impediment for a beluga whale compare to?



Image 19

Humpback whale with its fluke entangled in ghost fishing gear. Photo used with permission. Source: CWRT/IFAW. Stacy Alaimo asks whether “evolutionary origin stories that emphasize how human bodies descend from marine ancestors can provoke an environmentalist ethos toward the oceans?” (2014: 188)

The figures of this destruction seem to spiral in ever increasing circles. In *Nature* it was reported that a discarded fishing net weighing 11.5 tonnes was removed from a marine reserve in Hawaii (Cressey 263-264), while Professor Callum Roberts at the University of York said that most “Marine Protected Areas are no more than paper parks that offer no sanctuary at all to wildlife in the sea...We have been fooling ourselves that there are cost-free protected areas where we can have it all” (Carrington 2018b; for more on environmental lawlessness, see Medd 2015b and 2020).

Plastics now interact with the ocean’s microorganisms, moving increasingly up the food chain. The ocean’s trophic levels begin with phytoplankton as they occupy the base of the aquatic food web. Phytoplankton are primary producers capable of transforming inorganic carbon into protoplasm. In a healthy ecosystem, phytoplankton provide food for a wide range of sea creatures including whales, shrimp, jellyfish and snails. They function in a similar way to terrestrial plants as they contain chlorophyll and only sunlight gives them life. Therefore, most are buoyant and found in the surface layers of the ocean where sunlight penetrates.

Zooplanktons<sup>16</sup> are equally as important, occupying the second trophic level, as are the Pacific Krill that occupy the third; together they eat the staple phytoplankton and are, in turn, a source of energy for crustaceans at the third level. Both molluscs and crustaceans are especially sensitive to the organic contaminants that sorb and amass on plastics hindering their reproduction and growth. The fourth level comprises carnivorous fish that eat crustaceans, while the fifth and sixth are carnivorous consumers such as seals, dolphins, sharks and other animals and birds that eat fish. The more trophic levels present, the less energy is conserved at higher trophic levels. In some parts of the world as I write, microplastics in the World Ocean are outdoing surface zooplankton. One of the world’s leading marine toxicologists, Canadian Peter Ross discovered that it is not only “zooplankton that are consuming microplastics, but also mussels, herring, cod, haddock and sharks, among others. In other words, the plastics reach from one end of the marine food web to the other” (cited in Mitchell 64). The sheer reach and volume of plastics has actually shocked the global scientific community.

The blue, green, white and clear pieces of microplastics and nanoparticles are the same colours as plankton and fall within their size ranges. Plastics, therefore, have equally been transfigured to find their place at the very “base” of the food chain. Their durability and ease of transportation means that plastics travel across the entire ocean basins, transferring toxins up the food chain to include everything from the shorelines, the

16 Globally, these microorganisms, phytoplankton and zooplanktons produce half of the planet’s oxygen. They also form the basis of the entire marine food web.

water column and to pristine environments where human presence is yet to be established. This includes the deepest depths of the World Ocean, places where deep-sea submersibles have recorded white plastic shopping bags hovering in the dark at some 2,000 metres “looking like an assembly of ghosts” (Editorial 2010: 1).

The science should have the last say here and endocytosis – the process by which plastics are taken up by living micro- or nanofauna also results in an adverse toxic finale: “As plankton species constitute the very foundation of the marine food web, any threat to these can have serious and far-reaching effects in the world oceans” (Andrady 1603). This research shows that the “impacts of plastic on the ocean environment and human health is likely to conclude the problem is worse than currently understood” (Editorial 2010: 3).

Putting the plethora of scientific research into plastic pollution aside, surely it is basic knowledge that no good will ever come from jettisoning and amassing billions of tonnes of toxic waste within the body of the World Ocean? Half a century has passed since Heyerdahl first noted oil and plastics amassing in bulk across the mid-Atlantic, taking him three to four days to sail clear of the debris. In his aforementioned travel account, he wrote how “We must make an outcry about this to everyone who would listen. What was the good of East and West fighting over social reforms on land, as long as every nation allowed our common artery, the ocean, to become a common sewer for oil slush and chemical waste?” (234-235). And what became of the intervening 50 years since Arne Næss (1912-2009) and the deep ecologist movement encouraged us all to act benevolently toward Nature?<sup>17</sup> Or the Humboldtian thinking of the unity of all the forces and agencies – “a reflex of the whole,” developed thereafter by Henry David Thoreau, George Perkins Marsh, John Muir, Rachel Carson, James E. Lovelock, Lynn Margulis, Róger Rumrill, Pierre de Zutter, Val Plumwood, to name but a few?

We know our World Ocean is the “space” that gave “meaning” to our “place,” confirming the origins of all life on the planet. Without doubt, the level of importance subscribed to the World Ocean varies according to social groups. For example, for an Inuit, the ocean carries meanings assigned to it by him or her: a hunting ground, a transportation corridor, a spiritual environment, a memoryscape, a common geostory and so on (for further reading see Sejersen 2004; Hovelsrud *et al.* 2011; Jones 2004). Whereas, for someone who has never seen the ocean, it will have less significance. However, the ocean brings meaning of place into all our lives to some degree by the very fact that our planet is predominantly oceanic with most of the world’s burgeoning cities and their cultures

17 See Næss 2010; Lovelock and Margulis 1973; Lovelock 2006.



having been built along the coast.

## **The Commercial Fishing Industry: A Clear Example of a Cultural Low**

In a supporting context, this discussion exemplifies the wasted opportunities being played out by poor cultural outlooks in the structure of wild capitalism as it is practised on the High Seas. It casts a net of hope that this whole social and economic approach could be turned around through a biosemiotic; a sense of the dynamics of hunting; a fundamental acceptance of ocean narratives; of the lives of companion species; of the value of eco-oceanic education; as well implementing a colossal clean-up operation in place of fishing subsidies.

I have watched local fishermen on the coasts of Turkey and Greece discarding their rubbish and old engine oil into the Mediterranean Sea. All marine and wildlife throughout the lawless high seas faces an existential threat from fishing, shipping and the military. Trawlers often drag fishing lines that are more than 75 miles long, each bristling with hooks. Tens of thousands of sea turtles get snagged on these and drown every year. This carnage goes unchecked because outside of the national waters there is no protection at all for species, endangered or otherwise. This includes fish and seabirds, plus fragile ecosystems such as deep-sea corals. It is beyond tragic (see McKie 2018).

The concept of hunting has been utterly lost to the fiscal benefits of mega modernity's capitalism. Hunting really becomes a way for the human to engage in a wordless dialogue and one that, according to Sigfrid Kjeldaas holds the power to draw the hunter into "life-worlds shared with other creatures and... Because these relationship patterns are simultaneously ecological and social, they represent for the individual in question ecological dependencies as well as patterns of meaningful social engagement with environmental Others..." (77). In this light, the actual taking of fish from the ocean should become an expression of the fisherman's physical and cultural engagement with the oceanic environment as well as their long and shared histories (see Operman 2013 for introduction).

Clearly, then, a distinction must also be made here between the working lives and relations with the World Ocean by individual fishermen and the army-like crews of industrial transnational fleets. I would equally like to stress the importance of the terms "meaningful" and "relationship." Our troubled and unsettling entry into the Anthropocene (and its

transnationalised practices and agencies) does not have this depth of thinking, cooperation or altruism. My main point then is that the ecological dialogue that is so necessary here recognises and responds to the environmental Other – all the while being part of the overarching relational patterns of life-worlds shared, of renewal, life cycles, caution and respect. This is the word-less, perhaps even ecospiritual dialogue that draws the hunter into the life-worlds shared with other creatures.

In Frank Sejersén's analysis on cultural environments, he explains that continuing "meaningful dialogue with the landscape and to be able to pursue strategies towards a future of diverse and rewarding potentials is perhaps what sustainability is all about" (84). Forming intimacy between humans and our environments ultimately equates to enriching our lives with deeper and alternative knowledges, sensibilities and with the satisfaction that we are looking ahead – to the impending rights of all future life. This line of enquiry is equally what Oppermann explores in postmodern fictions; she brings "the word" and wider understandings of coexistence forward once again as forces for change:

In the present crisis of sustainability, the postmodern interrogation of the divide between word and world, the rift between human and nonhuman realities, and the fundamental essence of binary thinking prompt readers to reconsider their existence in the world as not only shaped and defined by language but also by interconnected relations to entire biotic communities. If their existence continues to be threatened, so is ours (249-250).

In terms of fishing on the wild seas, this dialogue (biosemiotic/ecolinguistic) is rooted in a feeling of being in an open, clean, pure, energetic and astoundingly powerful oceanscape that is not only teeming with immense life and diversity, but also a living natural body that has thousands of years of human culture inscribed into and across it. Indeed, maritime anthropology has investigated in depth the coastal lifeways of the Inuit, South American and Pacifika peoples, drawing on their relations, mythologies, cultural imaginaries, spiritualities, economies and so on. Obviously, hurling dynamite into the ocean above coral reefs; removing entire shoals of valuable fish – big and small – by use of satellite tracking capabilities and water dyes; assisted by industrial-sized netting and hydraulic haulage to perform huge catch-grabs; murdering protected and docile creatures like whale sharks for their large dorsal fins which serve as menu and billboards outside restaurants across Asia to advertise shark fin soup; and reducing this beautiful Blue Ocean to a huge garbage site for dumping unwanted lifeless catch, equipment and packaging is not a dialogue. It is physical abuse at every level.



Image 20

The fishing fleets have returned, their catch is unloaded. A change of engine oil results in the old sump being dumped overboard and later washing onto the shores. In place of being revered, this is a form of voluntary polluting of the World Ocean – what is the very life-source that constitutes people's histories as well as the livelihoods of families throughout fishing communities. Photograph taken by the author.

Wild capitalism was given credence through modernity's manufacturing and throwaway sets of policies and mindsets – which the fishing industry typifies. New Zealand's Department of Conservation published figures back in 1975 that accused the world's fishing fleets of jettisoning 135,400 tonnes of plastic fishing gear and a further 23,600 tonnes of synthetic packaging material into the ocean! The actual gear itself is extremely wasteful due to its inefficiency and massive spread across whole tracks of open ocean. "Whether by long lines, trawling, or huge drift nets," writes Alaimo "industrial fisheries destroy most of the catch as "bycatch" – living creatures cast back as lifeless garbage" (186). This criminal industry promotes a scouring of emotion while camouflaging its ecological violence by using the World Ocean as a huge veil of invisibility and unaccountability. In other words, the industrial fishing industry rides and hides on the waves, employing the phrase "out of sight, out of mind." In the neo-liberalisation of the World Ocean there is a counterpoint, a message that states that we erode the base of our humanity by

devastating a cosmically unique life system like the World Ocean.

The 1978 Protocol to the International Convention for the Prevention of Pollution from Ships – shortened to MARPOL – became an important legislation to address this issue. Coming into effect in 1988 was Annex V, banning at sea the “discharge of garbage... disposal of plastics and other synthetic materials such as ropes, fishing nets, and plastic garbage bags with limited exceptions.” In a familiar and depressing pattern, these laws for the World Ocean read like the terrestrial laws on deforestation and the protection of bio-reserves – weak, mostly disregarded and totally unenforceable due to limited manpower and authority, resulting also in personal fear. Annex V is widely ignored by the general fishing industry and back in 1997 ships were found to have jettisoned in excess of 7 million tonnes of plastic into the World Ocean (see Derraik 2002).<sup>18</sup>

Today, all the global fishing fleets are equipped with plastic fishing gear and packaging – mostly polyolefins and nylons due to their ease of availability, cost-effectiveness, lightness, durability and mass production. Consequently, this voluminous gear is all too often readily abandoned on the high seas, being literally tossed overboard. This becomes a floating plastic mass of nets and lines that can stretch tens of kilometres – hundreds even when they converge. It is known as “ghost fishing” because they are eerie death traps that float through the currents without any operator, entrapping and killing marine life for extended periods of time. Ghost fishing comprises a huge proportion of the total volume of marine plastic.

These salvaged nets have been transformed into ghost net sculptures by Pormpuraaw Indigenous communities. Their works give the ocean's passive victims ghostly voices, thus bringing awareness to a wider public. Their exhibition made international news in 2017 and, in interview, Paul Jakubowski, the manager of the Pormpuraaw Art and Culture Centre said “It's a particularly vile form of pollution... Three hundred and ninety by-species are killed in the nets, including things like sea turtles, and dolphins and whales. You're affecting a traditional food source and a very important current food source” (Sebag-Montefiore 2017).

The following images were taken along an isolated beach on El Hierro, the most westerly of the Canary Islands. Overpowered by the dynamics and intriguing geography of black volcanoes and the omnipresent Atlantic, this island has a small population of 4000 people. Without a house or road in sight, here I found contaminated beaches strewn with discarded fishing nets, boxing, ropes, single-use items and dead wildlife.

18 Captain Mirko and the author have witnessed massive container ships dumping oil on the high seas, leaving slicks as far as the eye can see. “During my navigations, I have seen...oil from cargo ships that floated for miles and miles along the waves.” See letter from Captain Mirko above.





Image 21



Image 22

El Hierro, Canary Islands, showing the density of plastics littering an isolated and otherwise immensely beautiful volcanic beach. It mostly comprises discarded fishing gear.



Image 23



Image 24

Daily household items – none of which should ever be manufactured from plastics – and dead wildlife. Photographs taken by the author.

On the global scale, the plastics polluting our ocean from the fishing industry equate to a significant 20-25 percent-one quarter. Whereas in some regional waters, case studies have confirmed such gear as comprising the absolute majority of marine litter. For example, researchers assessing the daily accumulation rates of marine debris on sub-Antarctic beaches found discarded fishing gear to be the dominant grouping with the most common items being ropes, bait box straps, squid jigs, floats, netting, buoys, crayfish pots, monofilament lines, hook blocks. Debris consistent with illegal fishing techniques such as the long-line method for toothfish has been recovered now for many years. In the remotest Alaskan waters ghost fishing gear is greater than 50 per cent of all plastics recovered. Between

1996 and 2006, NOAA<sup>19</sup> recovered “511 tonnes of fishing gear from the reefs of the Northwest Hawaiian Marine National Monument” (Editorial 2010: 1).



Image 25

Dutch Harbour, Unalaska. In the once pristine ocean and melt waters of Alaska, ghost fishing gear today is greater than 50 per cent of all plastics recovered. Photo taken and permission given by Philip Hurst.

19 National Oceanic and Atmospheric Administration, see <http://www.noaa.gov>.



Image 26

The unbelievable amounts of discarded fishing gear now circulating throughout the World Ocean is referred to as “ghost fishing” because it drifts in a deathly mass, entangling and killing fish, birds and mammals over long periods of time – decades. It comprises a huge proportion of the total volume of marine plastics, and these nets and lines can stretch out over many, many kilometres.

Photo used with permission. Source: [www.theoceancleanup.com](http://www.theoceancleanup.com).



## Concluding Conversational Thoughts: Planet Ocean is One, But Earth is Not

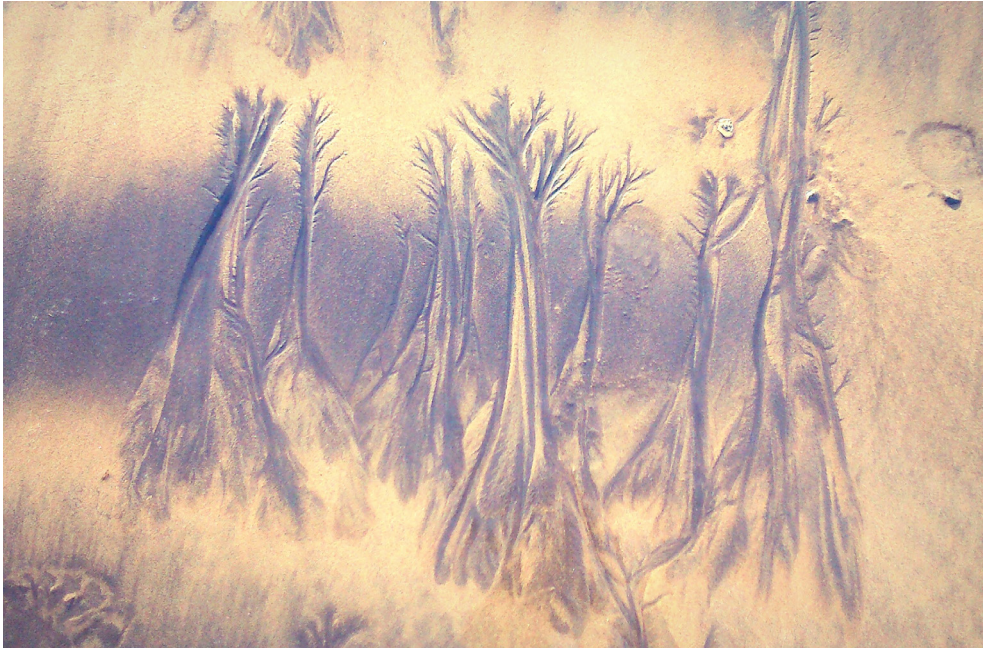


Image 27

The sheer artistic elegance of golden-black volcanic sands, carved and left naturally by the retreating tides – truly magical stories, patterns and dialogues waiting to be observed, explored, imagined and shared. Photo taken by the author.

It has been discussed how modernity as a world-system has failed to enable sustainable worlds and, crucially, how its seepage into every aspect of our lives has also strived to make it culturally impossible until now for us to imagine alternative world-views, lifestyles and attitudes. Its language has equally failed to convey any meaningful understanding of the scale of the environmental crisis that now underpins all our lives. Due to its interconnectedness, modernity's processes have assured humankind that together with the Earth's motions and emotions, everything now shares the same shape-changing destiny as we begin to negotiate the Anthropocene. A future of unprecedented negotiations, cooperation, action, navigation, love, respect and altruism seems an important conclusion to draw.

The notion of a biosemiotic that fundamentally puts distance between the history of a Nature/culture divide was raised, and to speak again with

Wheeler, this suggests that *culture is emergent in nature... It puts us back... into a natural and cultural worldly state*. As discussed throughout, it is the absence of a sense of the current tragedy and of that very dialogue that nourishes ecological dependencies between companion species that has resulted in an absolute ignorance of life's complexities. A worldly-view, environmental imaginary and trans-corporeality would counteract attitudes of indifference by asking us to reimagine our relationships with plastic and with the ocean and, ultimately, the planet. In Oppermann's and Iovino's thinking, the historical neoliberal framing of social and ecological relationships drives a logic of Othering that subjugates humans, sentient animals and anything else in Nature that is exploitable, forming a "hyperseparation" (5) that counteracts ethics and peace.

The realisation that human consciousness centres around an ecological whole has always been the root reality for many alternative cultures, but today it is evident to us all – the science, reportage and demonstrations happening across the world are testimony to this. Most notable have been the multiethnic voices of Indigenous peoples, activists and school children. There is also a sense of urgency swelling in the air; the conclusions drawn recently by the United Nations (2020) that the Sustainable Development Goals/IPCC of The Paris Agreement are largely off-track have also coincided with the publication of the *Global Biodiversity Outlook 5* (Convention on Biological Diversity, 2020), that is highlighting mass extinctions of species. Overall, it appears that as much as this is now a fight for Nature, it is equally one for change on all fronts; especially for peace in the forms of basic human rights and a fairer living world for all – humans and our companion species alike. To revisit Arturo Escobar's premise, modernity has failed to articulate the histories of Nature and people save through the capitalization of nature and labour.

The fusing of language to the body sensory and consciousness that was explored in Arundhati Roy's perceptions is also echoed in Stacy Alaimo's call for a marine trans-corporeality. This extends to any other material shapes and forms that are entangled with meanings and narratives. As plastic particles are now part of our biology this means that we might well pause for a moment and consider the lives of Others that are affected all the way down the ecological line by our daily patterns of consumption, waste and planetary pollution. Many discussions shared throughout this oceanic journey have focused on humankind developing a deeper ecosensibility – an ecocosmopolitanism and a biosemiotic – that ties us more strongly to the wider world through multidirectional dialogues. A united confrontation with the outdated mindset and values under modernity resounds in Latour whose same shape-changing destiny, he informs us, is a future path that *cannot be followed, documented, told, and represented by using any of the older traits*. Indeed, the point of

being in the Anthropocene requires structural revisions associated with subjectivity and objectivity alike. “They say the sea has been emptied in the social sciences - emptied of significance. But maybe the vocabulary is just empty of the right words. Maybe our images are just devoid of the right pictures” (Peters and Brown 6). May be, then, the World Ocean is not simply an ocean at all, but the body and guiding language of our planet, comprising an incomparable marvel that one will never fully know within the limits of one’s lifetime.

As a case example, the lawlessness of commercial fishing – all supported by criminal government subsidies – was highlighted as needing monumental reforms. Without posing impossible legislation, crews of fishing fleets could attend courses that not only engaged them in studies on marine ecology and science, but also with the literature on the World Ocean. This approach embraces the current findings on marine pollution, its effects and whereabouts, while also drawing on ocean historiography, poetry, mythology and prose. The overarching idea is to revert today’s oceanscapes from being “infinite” spaces for dumping waste, industrial scale massacres of species, by-catch and extinctions into places of respect, abundant life, fish, fishing, recreation and conversations. It would signal a “Return of the World Ocean,” crafted consciously by biographically meaningful stories of seafaring and ocean pride.<sup>20</sup>

Since the quest for El Dorado and what became *the worst journey in the world*<sup>21</sup> for America’s Indigenous peoples, the ensuing butterfly effect has assured that this juncture has also become our own ordeal. All humanity now stands together and also strangely apart as castaways on the polluted geological shores of the Anthropocene. Our entrance is defined by the transgressing of Planetary Boundaries; we are running to stand still, striving to give peace a chance, a place, finally somehow. Without doubt, the violation of Earth’s ecological capabilities brings tremendous uncertainties and pending insecurities. I have been keen to assert that marine plastic pollution is the new climate change and should, therefore, also be incorporated into the Planetary Boundary framework within Novel Entities. If plastic production was halted tomorrow, the planet would be dealing with its environmental consequences for unimaginable periods of deep time. On the ocean’s bed where an estimated 70 per cent of marine plastic debris ends up, the timeframe equates to tens of thousands of years.

20 An example of such a course is run by the United Nations “Sustainable Development Solutions Network” and titled “One Planet – One Ocean,” exploring topics such as “The Ocean – Our Future”; “Ocean Circulation and Physics”; “Drivers of Life in the Ocean”; “Ocean Ecosystems”; “Human – Ocean Interactions”; “Ocean Governance and Sustainability.”

21 *The worst ourney in the world* was the title of Apsley Cherry-Garrard’s brilliant book of endurance and survival during Captain Robert Falcon Scott’s disastrous attempt to reach the South Pole, Antarctica in 1912.

Much of the science presented here portrays this problem as being so acute that prevention is now key. Social change on the scale required today can only come from lead-by-example government policies and green business sectors that can act as catalysers. Thus, a cultural-political series of organic movements that were left to run their own transformative courses would be far too slow to take the immediate effect that is being stressed here. Such courses would require generations and the research into climate change is not even allowing us a decade as a workable time-frame. The amount of plastics that will be manufactured under today's scenario will reach 33 billion tonnes by 2050.<sup>22</sup> The consensus on the two main approaches toward ridding Nature of the affliction of plastics are source reduction in the manufacturing and design stages, and nothing short of planetary land and ocean clean-up operations.

Again on World Oceans Day 2018, Erik Solheim gave the global audience a stark message that resonates deeply with the many ideas that have been discussed here. In a short timescale of just five years while researching and preparing this work, I now see how my thinking on this topic is becoming increasingly acknowledged by environmental agencies, activists, departments, organisations, editors and people. "Those who say there are more important environmental crises to tackle are mistaken," writes Solheim. "In today's world, protecting our environment is not about choosing one issue above another. The deeply interconnected systems that make up the natural world defy such a narrow-minded approach. Beating plastic pollution will preserve precious ecosystems, mitigate climate change, protect biodiversity, and indeed human health. Confronting this crisis of convenience is a fundamental battle that must be fought today as part of the broader struggle for a sustainable tomorrow" (2018). As tomorrow came around only too soon, notably in terms of threats to human health, in 2020 we found ourselves in the midst of our unified struggle against a pandemic that is itself strongly linked to losses in biodiversity integrity and planetary pollution. I have hinted at how our plastic pandemic could yet become the perfect all-invasive transport vector of the near future.



Image 28

What the Whales Would Tell Us. Humpback Whales feature on The Australian Antarctic Territory stamp. Used with Permission.

<sup>22</sup> For a brief overview on the very latest reporting on the threats and urgency of climate change and rising temperatures by the authors of the United Nations Intergovernmental Panel on Climate Change (IPCC), see Watts 2018; also Various Authors 2020, *Global Biodiversity Outlook* 5.

Jonathan Steinwand's quirky essay, titled "What the Whales Would Tell Us" reminds us that there is no "magical return to nature without commitment or responsibility." Yet, the magic will always remain out there by "listening for the local values of relating to the extra-human world that are expressed in the myths and the songs... What we may never be able to understand in the songs of the whales...should remind us that the environment exceeds our grasp..." (190). And here lies the beauty in ecological thinking, in my mind. It is somewhere present within the mystery of knowing that storytelling, to listen again to Latour, is not just *a property of human language, but one of the many consequences of being thrown in a world that is, by itself, fully articulated and active*. With such vibrancy still to tap into, an additional SDG goal comprising shared dialogues and storytelling has been proposed, namely "SDG 18. A Common Geostory: Allow all peoples a multilingual voice to share their stories on the environment as ways of understanding and building collaborative solution-based networks." With more developed environmental imaginations we could feel life and our Blue Planet differently by truly understanding as well as respecting our greatest personal gift – the "common heritage of humankind."

Without doubt, the twenty-first century is now overshadowed by the greatest social, political, economic and environmental upheavals humankind has ever had to confront, namely the protection of the entire system Earth through a co-evolution of natural and social systems at a planetary scale. Does such a graphic reality justify attitudes that amount to a "globalisation of indifference"? If we fail to adhere to the science and bring about this rapid cultural transformation, it just might be something as supposedly inconsequential to our daily lives, that most have never heard of, such as the very smallest of microorganisms – the oxygen-producing phytoplankton and zooplanktons for example – that seal our fates irrespective of whether we land a few more people on the Moon again.



Image 29

A sand arrow left by retreating tides on golden-black volcanic sands.

## A Note on Solutions

Due to lack of space it has not been possible to publish the list of suggestions for action and change that the author has developed while in conversation.. The avenues for exploration are wide-reaching, being educational, people-centred, technological and enforceable. They range from colossal clean-up operations; source reductions in the manufacturing and design stages; controlled disposals; catchments at rivers and waterways; ecological roles for NATO and the world's naval war fleets; creation of more extensive marine reserves and migration corridors; deployments of low-cost underwater "Slocum Gliders" to detect large plastics, ghost nets and to map commercial fishing fleets; sophisticated upgrading of harbour controls that have the capacity to man their waters, track vessels, identify the types of craft and details of ships' inventories; immediate freezing of all government subsidies that renders unprofitable fishing profitable...

Should you wish to receive such a detailed analysis on solutions then please contact the author directly.

## List of Further Courses, Documentaries and Studies that Inform this Research

"One Planet – One Ocean," massive open online course, United Nations Sustainable Development Solutions Network. Enrol free here, <https://www.oceanmooc.org/en/index.php>.

United Nations Conference to Support the Implementation of Sustainable Development Goal No. 14, New York, 5-9 June 2017. "Our Ocean, Our Future: Call for Action," available at <https://oceanconference.un.org/callforaction>. Short educational videos of "Our Ocean, Our Future," visit <https://vimeo.com/220289475>.

*World Ocean Review 5, Living with the Oceans. Coasts, a Vital Habitat Under Pressure.* 2017. Jan Lehmköster (Project Manager). Hamburg: Maribus gGmbH.

"Plastics: A Villainous Material? Or a Victim of its Own Success?" *Science Weekly*. A 33-minute podcast giving a brief history of plastics, the consequences of their circulation in the environment, and a discussion on solutions such as the bio-based economy. Presented by Nicola Davis. Accessible at <https://audio.guim.co.uk/2017/08/28-48000-gnl.sci.170830.ms.plastics.mp3>.

GESAMP. Joint group of experts on the scientific aspects of Marine Environmental Protection. 2015. "Sources, Fate and Effects of Microplastics in the Marine Environment: A Global Assessment." International Maritime Organization. No. 90. Visit [http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/GESAMP\\_microplastics%20ofull%20study.pdf](http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/GESAMP_microplastics%20ofull%20study.pdf).

*The Oceans Solutions Report* by SDSN Northern Europe. This compilation of innovative solutions toward achieving SDG No. 14, "Life Below Water" focuses on four key areas: litter, energy, aquaculture, and pollution. The diverse range of ideas presented demonstrates that sustainable use of our ocean is achievable with both policy and cultural changes. Full publication available here, [http://www.unsdsn-ne.org/wp-content/uploads/2017/05/Oceans-Solutions-Report\\_Pages\\_Web.pdf](http://www.unsdsn-ne.org/wp-content/uploads/2017/05/Oceans-Solutions-Report_Pages_Web.pdf) (2017).

The following scientific journals: *Marine Pollution Bulletin*; *Water Air Soil Pollut*; *Ecology and Society*; *Environment. Science and Policy for Sustainable Development*; *Nature*; and *Environmental Research Letters*.

The International Fund for Animal Welfare at <http://www.ifaw.org>.

Potsdam Institute for Climate Impact Research, visit <https://www.pik-potsdam.de>.

*A Plastic Ocean* – a documentary film that brings to light the consequences of our global disposable lifestyles. Headed by Jo Ruxton, the film was released in January 2017, visit <https://www.plasticoceans.org/film>. If you wish to host an educational and awareness-building film screening of this documentary, then contact <https://www.plasticoceans.org/host-a-screening-form>.

## Works Cited

Alaimo, Stacy. "Oceanic Origins, Plastic Activism, and New Materialism at Sea." In *Material Ecocriticism*. Eds. Serenella Iovino and Serpil Oppermann. Indiana: Indiana University Press. 2014: 186-203.

Andrady, L. Anthony. "Microplastics in the Marine Environment." *Marine Pollution Bulletin*, Vol. 62 (2011): 1596-1605.

Barnes, D.K.A., A. Walters, and L. Gonçalves. "Macroplastics at Sea Around Antarctica." *Marine Environmental Research*, Vol. 70 (2010): 250-252.

Bowers, C. A. "Why the George Lakoff and Mark Johnson Theory of Metaphor is Inadequate for Addressing Cultural Issues Related to the Ecological Crisis." *Language and Ecology*, Vol. 2, No. 4 (2009): 1-16.

Carrington, Damian. "Plastic Pollution Discovered at Deepest Point of Ocean." *The Guardian* (Dec 20 2018a). Internet: <https://www.theguardian.com/environment/2018/dec/20/plastic-pollution-mariana-trench-deepest-point-ocean>.



- Carrington, Damian. "Marine Life Worse Off Inside Protected Areas, Analysis Reveals." *The Guardian* (Dec 20 2018b). Internet: <https://www.theguardian.com/environment/2018/dec/20/marine-life-worse-off-inside-protected-areas-analysis-reveals>.
- Chakrabarty, Dipesh. "The Climate of History: Four Theses." *Critical Enquiry*, Vol. 35, No. 2 (2009): 197-222.
- Cózar, Andrés *et al.* "The Arctic Ocean as a Dead End for Floating Plastics in the North Atlantic Branch of the Thermohaline Circulation." *Science Advances*, Vol. 3, No. 4 (2017): 1-9.
- Cózar, Andrés *et al.* "Plastic Debris in the Open Sea." *PNAS*, Vol. 3, No. 28 (2013): 10239-10244.
- Cressey, Daniel. "The Plastic Ocean." *Nature*, Vol. 536 (2016): 263-265.
- Deloughrey, Elizabeth. "Submarine Futures of the Anthropocene." *Comparative Literature ACLA Forum. Oceanic Routes*, Vol. 69, No. 1 (2017): 32-44.
- Deloughrey, Elizabeth and George B. Handley. "Introduction: Toward and Aesthetics of the Earth." In *Postcolonial Ecologies. Literatures of the Environment*. Eds Elizabeth Deloughrey and George B. Handley. New York: Oxford University Press, 2011; 3-40.
- Derraik, J. G. B. "The Pollution of the Marine Environment by Plastic Debris: A Review." *Marine Pollution Bulletin*, Vol. 44 (2002): 842-852.
- Dussel, Enrique. "Europe, Modernity, and Eurocentrism." *Nepantla. Views from South*, Vol. 1, No. 3 (2000): 465-478.
- Editorial. 2010. "Plastic Pollution: An Ocean Emergency." *Marine Turtle Newsletter*, Vol. 129 (2010): 1-4.
- Emberley, Peter. 1989. "Place and Stories: The Challenge of Technology." *Social Research*, Vol. 56, No. 3 (1989): 741-785.
- Eriksen, Marcus *et al.* "Plastic Pollution in the South Pacific Subtropical Gyre." *Marine Pollution Bulletin*, Vol. 68 (2013): 71-76.
- Escobar, Arturo. "Worlds and Knowledges Otherwise: The Latin American Modernity/Coloniality Research Program." *Cultural Studies*, Vol. 21, No. 2-3 (2007): 179-210.
- Escobar, Arturo. "Beyond the Third World: Imperial Globality, Global Coloniality and Anti-globalisation Social Movements." *Third World Quarterly*, Vol. 25, No. 1 (2004): 207-230.
- Folke, Carl and Lars Hall. *Reflection on People and the Biosphere*. Stockholm: Stockholm Research Centre, 2014.
- Global Biodiversity Outlook 5*. Montreal: Secretariat of the Convention on Biological Diversity (2020). Internet: [www.cbd.int/GBO5](http://www.cbd.int/GBO5).
- Heise, Ursula. "The Hitchhiker's Guide to Ecocriticism." *PMLA*, Vol. 121, No. 2 (2008): 503-16.
- Helmreich, Stefan. "Human Nature at Sea." *Anthropology Now*, Vol. 2, No. 3 (2010): 49-60.

- Heyerdahl, Thor. *The Ra Expeditions*. Trans. George Allen and Unwin. Bungay: Book Club Associates. 1972.
- Holm, Poul *et al.* "Humanities for the Environment – A Manifesto for Research and Action." *Humanities*, Vol. 4 (2015): 977–992.
- Hovelsrud, Grete K., *et al.* "Arctic Societies, Cultures, and Peoples in a Changing Cryosphere." *Ambio*, Vol. 40 (2011): 100–110.
- Hunt, Elle. "38 Million Pieces of Plastic Waste Found On Uninhabited South Pacific Island." *The Guardian* (May 16 2017). Internet: <https://www.theguardian.com/environment/2017/may/15/38-million-pieces-of-plastic-waste-found-on-uninhabited-south-pacific-island>.
- Jacques, Peter. *Globalization and the World Ocean*. Lanham: Alta Mira Press, 2006.
- Jones, H. G. "The Inuit as Geographers: The Case of Ecnoolooapik." *Études/Inuit/Studies*, Vol. 28, No. 2 (2004): 57–72.
- Kirmayer, Laurence J., Joseph P. Gone and Joshua Moses. "Rethinking Historical Trauma." *Transcultural Psychiatry*, Vol. 51, No. 3 (2014): 299–319.
- Kjeldaa, Sigfrid. "Barry Lopez's Relational Arctic." *Ecozon@*, Vol. 5, No. 2 (2014): 72–87.
- Konner, Jeremy. "The Majestic Plastic Bag – A Mockumentary." In *Heal the Bay* (Aug 14 2010). Produced by Jeremy Konner. Narrated by Jeremy Irons. Internet: <https://www.youtube.com/watch?v=GLghgh2ePYw>.
- Latour, Bruno. "Agency at the Time of the Anthropocene." *New Literary History*, Vol. 45, No. 1 (2014): 1–18.
- Lavers, Jennifer L., and Alexander L. Bond. "Exceptional and Rapid Accumulation of Anthropogenic Debris on One of the World's Most Remote and Pristine Islands." *PNAS*, Vol. 11, No. 23 (2017): 6052–6055.
- Laville, Sandra and Matthew Taylor. "A Million Bottles A Minute: World's Plastic Binge As Dangerous As Climate Change." *The Guardian* (Jun 28 2017). Internet: <https://www.theguardian.com/environment/2017/jun/28/a-million-a-minute-worlds-plastic-bottle-binge-as-dangerous-as-climate-change>.
- Liu, Joanne. "TWD 2017: MSF's Joanne Liu on a World in Denial." *OpenCanada* (Mar 8 2017). Internet: <https://www.opencanada.org/features/iwd-2017-msfs-joanne-liu-world-denial>.
- Lovelock, James. *The Revenge of Gaia. Earth's Climate Crisis and the Fate of Humanity*. New York: Basic Books. 2006.
- Lovelock, James E., and Lynn Margulis. "Atmospheric Homeostasis by and for the Biosphere: The Gaia Hypothesis." *Tellus*, Vol. 26 (1973): 1–2.
- Lukacs, Martin. "Neoliberalism Has Conned Us Into Fighting Climate Change As Individuals." *The Guardian* (Jul 17 2017). Internet: <https://www.theguardian.com/environment/true-north/2017/jul/17/neoliberalism-has-conned-us-into-fighting-climate-change-as-individuals>.
- McKie, Robin. "The Oceans' Last Chance: It Has Taken Years of

- Negotiations to Set This Up." *The Guardian* (Aug 5 2018). Internet: <https://www.theguardian.com/environment/2018/aug/05/last-chance-save-oceans-fishing-un-biodiversity-conference>.
- Medd, Rupert J. Mould. "Disobedience in Paradise: Can We Extend a Loving Frame of Mind in Time for the Amazon?" *Berghahn Books* (2020). Internet: <https://berghahnbooks.com/blog/disobedience-in-paradise-can-we-extend-a-loving-frame-of-mind-in-time-for-the-amazon>.
- Medd, Rupert J. Mould. "Wakas and Water: Julio César Tello's Spiritual Poetics of Archaeology." *Studies in Travel Writing*, Vol. 19, No. 2 (2015a): 147-168.
- Medd, Rupert J. Mould. "The Case for Global Environmental Law." *OpenCanada* (2015b). Internet: <https://www.opencanada.org/features/case-global-environmental-law>.
- Mignolo, Walter D. "Coloniality of Power and De-colonial Thinking." *Cultural Studies*, Vol. 21, No. 2 (2017): 155-67.
- Mitchell, Alanna. "Eating Microplastic Threads. What Does That Do To You? Unknown." *Canadian Geographic*, Vol. 136, No. 6 (2016): 61-65.
- Moore, Jason W. "The Capitalocene, Part 1: On the Nature and Origins of Our Ecological Crisis." *Journal of Peasant Studies*, Vol. 4, No. 3 (2017): 594-630.
- Moraña, Mabel, Enrique Dussel, and Carlos A. Jáuregui, Eds. *Coloniality at Large. Latin America and the Postcolonial Debate*. Durham: Duke University Press, 2008.
- Nadir, Christine. "Utopian Studies, Environmental Literature, and the Legacy of an Idea: Educating Desire in Miguel Abensour and Ursula K. Le Guin." *Utopian Studies*, Vol. 21, No. 1 (2010): 24-56.
- Næss, Arne. *The Ecology of Wisdom*. Berkeley: Counterpoint Press, 2010.
- Nixon, Rob. "Unimagined Communities: Developmental Refugees, Megadams and Monumental Modernity." *New Formations*, Vol. 69 (2010): 62-80.
- Opperman, Serpil and Serenella Iovino. "Introduction: The Environmental Humanities and the Challenges of the Anthropocene." In *Environmental Humanities. Voices from the Anthropocene*. Eds. Serpil Oppermann and Serenella Iovino. London, New York: Rowman & Littlefield, 2017: 1-21.
- Oppermann, Serpil. "From Material to Posthuman Ecocriticism: Hybridity, Stories, Natures." In *Handbook of Ecocriticism and Cultural Ecology*. Ed. Hubert Zapf. Berlin; Boston: DeGruyter, 2016: 273-294.
- Oppermann, Serpil. "Enchanted by Akdeniz: The Fisherman of Halicarnassus's Narratives of the Mediterranean." *Ecozon@*, Vol. 4, No. 2 (2013): 100-116.
- Oppermann, Serpil. "Seeking Environmental Awareness in Postmodern Fictions." *Critique. Studies in Contemporary Fiction*, Vol. 49, No. 3 (2008): 243-254.
- Oswald, Alice and Madeleine Bunting. "Landscape and Literature Podcast:

- Alice Oswald on the Dart River." *The Guardian Podcasts* (Jul 13 2010). Internet: [www.theguardian.com/books/audio/2012/jul/13/1](http://www.theguardian.com/books/audio/2012/jul/13/1).
- Peters, Kimberley and Mike Brown. "Writing with the Sea: Reflections on In/experienced Encounters with Ocean Space." *Cultural Geographies*, Vol 24, No. 4 (2017): 617-624.
- Plumwood, Val. "Decolonizing Relationships with Nature." In *Decolonizing Nature. Strategies for Conservation in a Post-colonial Era*. Eds. W. M. Adams and Martin Mulligan. London: Earthscan Publishing Ltd., 2003: 51-78.
- Pope Francis. "Overcome Indifference and Win Peace: Message of His Holiness Pope Francis for the Celebration of the XLIX World Day of Peace, 1 January 2016." *The Holy See* (2016). Internet: [https://www.vatican.va/content/francesco/en/messages/peace/documents/papa-francesco\\_20151208\\_messaggio-xlix-giornata-mondiale-pace-2016.html](https://www.vatican.va/content/francesco/en/messages/peace/documents/papa-francesco_20151208_messaggio-xlix-giornata-mondiale-pace-2016.html).
- Quijano, Aníbal. "Coloniality of Power." In *Coloniality at Large; Latin America and the Postcolonial Debate*. Eds Mabel Moraña, Enrique Dussel and Carlos A. Jáuregui. Durham: Duke University Press, 2008: 181-224.
- Quijano, Aníbal. "Coloniality and Modernity/Rationality." *Cultural Studies*, Vol. 21, No. 2-3 (2007). 168-178.
- Saint-Exupéry, Antoine de. *The Little Prince*. Translator's Details Not Given. Istanbul 2014.
- Saint-Exupéry, Antoine de. *Wind, Sand and Stars*. Trans. William Rees. St Ives: Penguin Classics, 2000.
- Sebag-Montefiore, Clarissa. "Ghost Nets: The Remote Town Turning Death-Trap Debris Into World-Class Art." *The Guardian* (Jul 12 2017). Internet: <https://www.theguardian.com/artanddesign/2017/jul/12/ghost-nets-the-remote-town-turning-death-trap-debris-into-world-class-art>.
- Sejersen, Frank. "Horizons of Sustainability in Greenland: Inuit Landscapes of Memory and Vision." *Arctic Anthropology*, Vol. 41, No. 1 (2004): 71-89.
- Solheim, Erik. "The Planet Is On Edge Of A Global Plastic Calamity." *The Guardian* (Jun 5 2018). Internet: <https://www.theguardian.com/environment/2018/jun/05/the-planet-is-on-edge-of-a-global-plastic-calamity>.
- Spivak, Chakravorty Gayatri. *An Aesthetic Education in the Era of Globalization*. Cambridge: Harvard University Press, 2012.
- Steffen, Will et al. "Planetary Boundaries: Guiding Human Development on a Changing Planet." *Scienceexpress* (2015). Internet: <http://www.sciencemag.org/content/early/recent>.
- Steffen, Will, Paul J. Crutzen and John R. McNeill. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Ambio*, Vol. 36, No. 8 (2007): 614-621.
- Steinwand, Jonathan. "What the Whales Would Tell Us." In *Postcolonial Ecologies. Literatures of the Environment*. Eds Elizabeth Deloughrey and George B. Handley. New York: Oxford University Press. 2011: 182-199.
- Stockholm Resilience Centre. "Planetary Boundaries: A Fundamental

- Misrepresentation of the Planetary Boundaries Framework." *Stockholm Resilience Centre Newsletter* (Jan 5 2018): Internet: <http://www.stockholm-resilience.org/research/research-news/2017-11-20-a-fundamental-misrepresentation-of-the-planetary-boundaries-framework.html>.
- Strauss-Lévi, Claude. *Tristes Tropiques*. Harmondsworth: Penguin Books. 1976.
- Szymborska, Wistawa. *Nothing Twice. Selected Poems*. Trans. Stanisław Barańczak and Clare Cavanagh. Warsaw: Fundacja Wistawy Szymborskiej, 1997.
- UNEP. "Marine Plastic Debris and Microplastics – Global Lessons and Research to Inspire Action and Guide Policy Change." *United Nations Environment Programme* (2016). Internet: <http://www.unep.org/about/sgb/Portals/50153/UNEA/Marine%20Plastic%20Debris%20and%20Microplastic%20Technical%20Report%20Advance%20Copy.pdf>.
- Vermeulen, Pieter. "The Sea, Not the Ocean: Anthropocene Fiction and the Memory of (Non)human Life." *Genre*, Vol. 50, No. 2 (2017): 181-200.
- Villarrubia-Gómez, Patricia *et al.* "Marine Plastic Pollution as a Planetary Boundary Threat: The Drifting Piece in the Sustainability Puzzle." *Marine Policy* (2018). Internet: <https://doi.org/10.1016/j.marpol.2017.11.035>.
- Wallerstein, Immanuel. "World-Systems Analysis." In *Social Theory Today*. Eds A. Giddens and J. H. Turner. Cambridge: Polity Press. (1987). 309-324.
- Watts, Jonathan. "We Have 12 Years to Limit Climate Change Catastrophe, Warns UN." *The Guardian* (Oct 8 2018). Internet: <https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report>.
- Wheeler, Wendy. "Postscript on Biosemiotics: Reading Beyond Words – and Ecocriticism." *New Formations*, Vol. 64, No. 1 (2008): 137-154.
- Zimmerman, Michael E. *Contesting Earth's Future. Radical Ecology and Postmodernity*. Berkeley: University of California Press. 1994.