# AN ATTEMPT TO POSITION MYSELF, A DESIGNER, IN THE ANTHROPOCENE: A FRAMEWORK FROM THE NONHUMAN PERSPECTIVE



Greg Orrom Swan MA Information Experience Design 2017 Sarah Snaith 7135 words

# AN ATTEMPT TO POSITION MYSELF, A DESIGNER, IN THE ANTHROPOCENE:

A FRAMEWORK FROM THE NONHUMAN PERSPECTIVE

# ACKOWLEDGEMENTS

With special thanks to Sarah Snaith, my dissertation advisor who kept me on track and held faith. To Kevin Walker my course leader and guide. And to Rose Leahy for continued conversation, criticism, and support.

# CONTENTS

List of Illustrations 5

- I INTRODUCTION 7
- 2 THE ANTHROPOS II
- 3 COMPREHENSION 17
- 4 ANTHRO|DE|CENTRIC 23
- 5 FORWARDS 33
- Notes 38
- Bibliography 44

# LIST OF ILLUSTRATIONS

- o Writers own, Lichen, 2017 cover
- I Citarum River, Indonesia 10 <http://kenh14cdn.com/2016/25-1475487238511.jpg>
- 2 Global anthropomass and zoomass, 2011 14 <https://doi.org/10.1111/j.1728-4457.2011.00450.x>
- 3 Earthworm, 2006 24 <https://upload.wikimedia.org/wikipedia/commons/b/bf/ Earthworm\_dives.jpg>

#### **1** INTRODUCTION

There isn't one answer: what we do next, may have little in common with tactics used before. These are new problems, which must be answered by new means. Climate change, urbanisation with its destructive sprawl, population growth and food scarcity are, to some extent, on the public's mind (in support or denial). Some problems have answers, others are answered by more problems—they are complex and interwoven, interlinked in strange ways. Earth is a finite planet, comprised of many complex systems, and as the human population ever increases, we must do more with less.

So, planners, architects, and engineers take the initiative.<sup>2</sup>

As a both a Western consumer and designer I feel guilty every time I purchase something, or every time I design or create an object. I am surely exasperating the problems we already face, unfortunately creating more waste from by-products, using resources through processes, and creating a demand for more mining and deforestation.

But this is a rather depressing way to look at it. I see myself in a privileged position as I can influence how something is made, by what process, out of which material and by what means. So, this essay I will discuss where we are as humans and the planetary effects we have had, and the need for change, leading to a critique of recent theories addressing the need for nonhuman and multi-species importance, which will result in a critical context for myself and my future work as a designer. I plan to create a framework for where I position myself, to allow me to devise my place and position as a designer in this rapidly changing sphere.

So, I see myself as both part of the problem *and* part of the solution.



# 2 THE ANTHROPOS

The image shows a young boy sitting on the edge of a small boat on the Citarum River, Jakarta, Indonesia; he appears to be looking for, and fishing for plastic straws amongst the other plastic waste in the river. This river is one of the most polluted rivers in the world—the surface of the water is barely visible.

II

All organisms of our planet dynamically interact and use resources every day to enable them to continue to exist and reproduce; it is the basic form of existence. Plants continually use nutrients, water and carbon dioxide to photosynthesise whilst excreting oxygen; herbivorous animals eat these plants, and excrete onto the soil, whilst breathing in oxygen and respiring carbon dioxide; then carnivorous animals eat the herbivores, respire and too excrete onto to the soil, which is reworked by microbes and invertebrates.<sup>3</sup>

Some creatures of the world build homes and shelters for themselves, such as termite mounds, beehives or birds nests, others choose to burrow beneath the earth. Much of the animal kingdom also use tools, such as a monkey breaking open a nut with a stone or an elephant swatting flies with a branch. But no other species on this planet have developed as much technology\* as Homo sapiens have—engineering, machines, agriculture, and the like. In our geologically-short space of time (200,000 years<sup>4</sup>) we have become the dominant species on the planet, and have gone an impressive and unprecedented way to create shelter, food, resources, and communication networks. It is not the results that are unusual—homes/nests, fridges/ hoards—but it's the scale and the industrious nature at which we produce and consume that far exceed any other species.

We have created ecological processes such as species domestication, genetic engineering, chemical synthesis, and material exchange, that along with many petrochemicals, plastics, fibres and synthetics we use to control other species.<sup>5</sup> We have not always created these technologies to specifically control the other inhabitants of our planet, but often that is the result.

Environmental systems professor Erle C. Ellis suggests, using anthroecological theory that *Homo sapiens*' ability to develop and continue to develop technology has been enabled by our impressive and complex social structures, specialisation, and non-kin exchange which he titles "sociocultural niche construction."<sup>6</sup>

Humans began to develop agriculture around 10,000 years ago, which meant they began clearing and tilling fields, which in turn commenced a significant global transformation of the terrestrial biosphere.<sup>†</sup> This change is noticeable in soil records at least 3000 years before the present.<sup>89</sup>

The human-made technological counterpart to the biosphere is the technosphere, which was defined by environmental scientist Michel Batisse in 1973 as:

Immediately above the biosphere, and now surrounding it entirely, is a higher level of organization, which has become important only recently, and which can be called the technosphere. This is not only made up of the factories, the dams and the irrigated fields, but also the whole canvas of technological facts and features of a physical, chemical or biological nature.<sup>10</sup>

The technosphere has recently been estimated at 30 trillion tonnes of mass, which helps support a human biomass of ~5 magnitudes smaller.<sup>11</sup> The physical technosphere also includes a large, rapidly growing number of complex objects that are called trace fossils or 'technofossils', and if assessed under palaeontological criteria as normal fossils they would far exceed estimates of biological diversity and geological fossil diversity.<sup>12</sup> These technofossils are a prevalent trace of humans time on the earth, they map Homo sapiens entire existence, from stone tools to mobile phones, plastic pens, and water bottles. Our creations are marked in Earth's geology. Yet, not all shall remain—digital data will be lost as magnetic discs fade, our organic (for now) bodies will perish, and cultural practices will reform or be lost in time.

To give an example of the ubiquity of the technosphere, see figure 2, (overleaf) which shows the biomass of humans, domesticated animals, and wild animals. In terms of large living animals, the mass of the technosphere outweighs the biosphere 10:1.

So, there is a lot of us—we are everywhere, and we have created a lot of stuff; so what? In the last six decades alone via anthropogenic creations we have become the dominant force driving change to the Earth's systems and biosphere.<sup>13</sup> On 16 July 1945 in New Mexico, USA, the first nuclear bomb was detonated, and the radioactive isotopes that were scattered across the planet will remain as traces in geological history, long after the radioactivity has subsided. Some<sup>14</sup> argue that this event is the point

<sup>\*</sup> To define: technology in my eyes is machines, devices, thoughts, used for practical or other uses, developed generally, but not exclusively, from accumulated scientific knowledge.

<sup>&</sup>lt;sup>†</sup> To define: the biosphere is the sum of all biota living at any one time and their interactions with the geosphere (the atmosphere, hydrosphere, cryosphere, and lithosphere).<sup>7</sup>





in time that will signify the beginning of a new geological age: The Anthropocene.<sup>15</sup> This is because we have altered the Earth's systems so much that humans have become a geophysical force<sup>16</sup>—and this is the age we are living in. We have changed the landscape immensely, from engineering gargantuan river deltas to covering an entire corner of Spain in greenhouses for year-round crops. There was, and arguably still is, a 'Great Acceleration' of human activity since the end of the Second-World War, which correlates exactly with changes to the Earth system functions,<sup>17</sup> such a massive increase in human population, vehicles, dams, water use, and fertiliser/pesticide dependence; with simultaneous increases in ocean acidification, carbon dioxide, surface temperature, domesticated land, and tropical deforestation.<sup>18</sup> We are changing the world's systems, and that is having a huge impact on the planet, and in turn beginning to have an impact on us, and our crafted social structures.

#### Figure 2

Vaclav Smil, "Harvesting The Biosphere: The Human Impact", Population And Development Review, 37.4 (2011),

613-636 < https://doi.org/10.1111/j.1728-4457.2011.00450.x>.

# **3 COMPREHENSION**

Does this narrative of the Anthropocene lend itself too readily to cynicism and defeatism, becoming a self-fulfilling prophecy? Should we not find positive narratives?

Humans are unavoidably bound with the Earth, in harmony and coherence, though not all perceive this interwoven position. By this I do not mean we cannot perceive a sense of the other, or that we are not aware of things that are physically different. I mean that this recognition that we are interrelated to everything in some way, and each action we make has an effect (a small effect, but an effect nonetheless).

Take, for example, the reintroduction of wolves to the Yellowstone National Park, USA in 1995. They were initially wiped out seventy years prior due to hunting, and the deer and small mammal population exploded, destroying local trees, plants, and habitats, pushing many species to the brink of destruction, causing a knock-on effect to the other species that lived there. Yet within a couple of years after the native species of wolves were reintroduced they had hunted the deer, and the equilibrium of the ecosystem was restored. This meant the trees regrew, and the birds which once lived amongst them returned, and the roots

slowed riverbank erosion, it had a knock-on effect throughout all the trophic levels.  $\ensuremath{^{19}}$ 

Not all solutions are this simple unfortunately. Be assured, this is not a plea to return the planet to supposed pre-agricultural glory; this is merely an example of the connectedness of the planetary ecosystem we are part of, not separate from.

As described, we have affected planetary geology with technofossils, and it is affecting us now, at human-scale temporality, we are having heatwaves, desertification, and widespread coral bleaching.<sup>20</sup> Take the Great Barrier Reef in Australia as an example, the the 2016 coral bleeching event killed nearly one quarter of the corals alone; and on a worldwide scale with just a 2°C rise in temperature we will lose 95% of the worlds coral reefs, forever.<sup>21</sup>

Timothy Morton speculates whether having the uncanny realisation that our actions, although "statistically meaningless" still contribute to global warming, would we be any more likely to alter your actions?<sup>22</sup> He goes on to suggest that it is this precise thought which limits the human ability to consider their impacts on the ecological systems we are part of, because human actions, unless on a human-scale are difficult to perceive. It is these large, indiscernible, and complex systems, that he calls 'hyperobjects' (society, global warming, nuclear materials, time, etc.) and humans struggle to understanding or even recognise them. "Each political and ethical decision is made on the inside of a hyper-object"<sup>23</sup> these 'hyperobjects' are so massively distributed in space and time that human beings have little hope in comprehending them as a single entity, as they are vast and intricate—being made up of millions of tiny constituent parts.<sup>24</sup>

Technocultural professor Douglas Kahn offers the thought that when human activities are scaled up to what he calls 'Earth magnitude', those 'statistically meaningless' but deliberate and conscious actions at the human-scale, when amplified by many thousands of humans, have a resulting unconscious outcome that was not intentional, so go ignored or unnoticed at the human-scale.<sup>25</sup> This inability to perceive and therefore comprehend the impact that individuals have on large systems means that humans can deeply affect hugely complicated systems without realising the potential harm. As Naomi Klein points out, "Climate change is slow, and we are fast. When you are racing through a rural landscape on a bullet train, it looks as if everything you are passing is standing still: people, tractors, cars on country roads. They aren't, of course. They are moving, but at a speed so slow compared with the train that they appear static."<sup>26</sup>

This puts temporal perception into the equation—the temporality of a specific space, place, or super massive 'hyper-object', which further isolates and alienates the human observer from their (often) unconscious resulting actions. When consequences from human actions are not immediate, or when the consequence is not immediately perceptible due to scale, temporality, or situation, this can mean that responsibility is not taken. Whether conscious relinquishing of responsibility or sheer unawareness, the individual is often not to blame, it is only within a context of many other similar actions that slow change happens.

Christian Schwägerl suggests that many view the world from a perspective described as 'Holocene thinking' which rests on the idea that there is an "inexhaustible alien space out there that we call the environment."<sup>27</sup> This notion is critical of the destructive pathway that humanity took over the past/current inter-glacial epoch, the Holocene. The idea of 'peak oil' perpetuates this—"all the easy oil and gas in the world has pretty much been found. Now comes the harder work in finding and producing oil from more challenging environments and work areas,"<sup>28</sup> an intriguing business-as-usual rhetoric from William J. Cummings, of Exxon-Mobil in 2005.

Donna Haraway describes this as careless, not to be damning but to be critical of those who surrender consideration of their effects in this time of urgency—"The world does not matter in ordinary thoughtlessness."<sup>29</sup> As Morton suggests, we are in a period of "reflexive consumption", some may be aware that continuing to consume may be bad for the ecology of the planet, but we do nothing about it—consumerism for its own sake.

Could it be to do with the individual's perception of space, as suggested by the Umwelt theory of Jakob von Uexküll, as described by Alexei Sharov: "Most biologists think that space exists independently from organisms that inhabit it. Uexküll viewed it differently: animals construct their own space by establishing relationships between meaning-carriers (i.e., signs)."<sup>30</sup> Here he offers the bio-semiotic thought that humans and animals not only are different beings but they also occupy and perceive different psychological spaces, meaning the interaction between organisms is the same in physicality, but the perception of the interaction is different.

As I have described, we have changed our planet to an almost unbelievable degree. So something must be done, right? But what if we have changed it so much that we need more agency, more action, more thought, and not less, maybe we need to continue to guide the planet in whatever direction the now 'God-like'<sup>31</sup> humans have in plan. Or maybe there is an ultimate plan to have a perfected, bespoke, planet crafted to our every need with somehow having the advised amount of 'nature' left to keep us sane. The porridge was just right.

I suggest that Jacques Lacan's theory 'Objet petit a'<sup>32</sup> (the object of unattainable desire) could be used to describe the thoughtful desire for an over-idealised hypothetical future world? And would we be actually happy if we created ourselves a future without the problems and dilemmas of current living? Or is it a paradox, as Zizek describes,<sup>33</sup> when you assess the idealised view of a world without capitalism, consumerism, or Donald Trump, we would not find perfection, we would find a different, and all together perhaps worse situation to be dissatisfied with. To be clear—I am not suggesting that we carry on as we are, I am suggesting change, but not in the hope for a fairy-tale future with genetically-altered unicorns or lab grown zero-agriculture food capsules.

### 4 ANTHRO|DE|CENTRIC

"Nobody lives everywhere; everybody lives somewhere. Nothing is connected to everything; everything is connected to something"<sup>34</sup> — Donna J. Haraway, via van Dooren

To be non- or anti-anthropocentric is unrealistic, but to be less anthropocentric, perhaps anthro*de*centric; or have a considered approach to other species in our existence, could help bring us to a less hubristic pathway. So, as Yuval Noah Harari states, "Organisms are algorithms,"<sup>35</sup> but as the paths in front are not fixed, thinking more may help.

I will discuss theories from Jane Bennett, Félix Guattari, and Donna Haraway, with an ecological emphasis, to help guide my thinking as a designer, and in this time where, I argue, more agency is needed to aid the continuation of our and other species, along with alternative ways of framing work, concepts, design, and political decisions.

Jane Bennett is a political theorist who speaks about ontological ideas and the need for a more horizontal way of interacting between humans and things; she calls this 'vital materialism'. What she means by this is that "the story will enhance receptivity to the impersonal life that surrounds and infuses us, will generate a more subtle awareness of the complicated web of dissonant connections between bodies, and will enable wiser interventions into that ecology."<sup>36</sup> Her argument is that all things—this so called 'vibrant matter' (food, rats, drains, systems, storms, metals etc.)—act as "quasi agents or forces with trajectories, propensities, or tendencies of their own"<sup>37</sup> Recognition of this self-organising, lively, fully vibrant matter allows an attentiveness to the heterogeneous composition of the human body, and all that surrounds it, thus inspiring "a greater sense of the extent to which all bodies are kin in the sense of inextricably enmeshed in a dense network of relations."<sup>38</sup> She speaks of the need to be open about non-human vitality and the out-side, or a sense of the other, referencing Theodor Adorno's suggestion to those who want to know more "must think more, not less."<sup>39</sup>





I will now unpack a little more of Bennett's theoretical framework. She speaks of Charles Darwin's research into worms as an exemplar of the need for appreciation of the non-human, as they are useful and somehow 'like' us. Bennett states, Darwin observed in 1881<sup>40</sup> that "worms do not intend to enable human culture, but worms do"<sup>41</sup> worms do this by creating topsoil—they digest detritus, and excrete vegetable mould, thus

converting dirt into nutrient-rich soil, a layer of humus, which allows nutrients to transfer to plants, and then in turn to humans, enabling existence, and ultimately culture. What I find fascinating about this, and as stated by Timothy Morton in the previous chapter, is that statistically meaningless actions, when accumulated, create lasting and massive effects on large systems. Or as Darwin puts it, worms' actions are one of many "small agencies" that add up to having quite big effect-creating soil. These small agencies should not be undervalued because they are not designed by humans.42 Worms "participate in heterogeneous assemblages" in which no single agent, or actant,\* has the ultimate goal of creating soil-there is no mastermind, no engineer, no plan-but the result regardless, enables terrestrial life.43 Writer and sustainability advisor John Thackara talks about the need for small, iterative changes in human social environments to aid a more sustainable future, claiming that just because everyday changes and "actions are small does not diminish their significance. Change bubbling up from the bottom is how complex systems change-and cities are no exception."44

However, this appears to bring up hierarchy—the small lowly effects of the worm all add up and create effects that we as humans, the supposed higher beings, feel and benefit from. Do the worms want to do this? Are they working for, or with us? They serve a crucial purpose, that has lasting waves that are much more complex than they are aware, so they should be more valued. We must 'horizontalise' the way we think. We have an affinity with things, with worms, the soil, the wind, we must "challenge [the] uniqueness of humanity"<sup>45</sup> by examining the variations between humans and nonhumans, not to show differences (although these will be exposed too), but to show the inter-involvements, the interdependencies, the connectedness. Just like the worms and us.

Yet we must be aware of our human bias, the anthropomorphising, the often unconcerned, naturalised blassé reference to something at

<sup>\* &#</sup>x27;Actant' is Bruno Latour's term, where he means it as a source of action that can come form a human or nonhuman, it can *do* things. See: *Latour, Politics of Nature: How to Bring the Sciences into Democracy, pp. 237* 

the human-scale, for human need, or in relation to human culture. Additionally, I would argue that, even if only on a subconscious, level most people do appreciate the nonhuman to an extent. As John Berger notes, contemporary humans live in highly fashioned homes "decorated or furnished with mementoes from the outside world, which is such a distinguishing feature of consumer societies."<sup>46</sup> Suggesting that we bring things from the outside into our intimate domesticated spaces, and do this often with little thought, other than maybe 'it will look nice', or 'brighten up the place', or maybe even 'add some life'. By claiming this thing from the exterior, take the houseplant for example, and bringing it within the home, the person accepts its vitality—its alive! It brightens the space up!—and we accept some of its agentic transformative capacity, without speech and without (to anthropomorphise) *doing* anything.

Philosopher Bruno Latour notes this too, suggesting that, on one hand, the modern urban self feels more removed from nature, as farming is ever increasingly mechanised, fuel and resources are dragged from the earth, with the end user understanding little about the extraction, and life cycles of other living things are altered and sanitised. Yet on the other hand he claims, the modern self is ever increasingly entangled— cosmically, biotechnologically, medically—with nonhuman nature. Latour notes that this has become of late harder to ignore: "Whereas at the time of ploughs we could only scratch the surface of the soil, we can now begin to fold ourselves into the molecular machinery of soil bacteria."<sup>47 48</sup>

Bennett claims the aim for the vital materialist is to change the differences between muted objects and speaking subjects set into "differential tendencies and variable capacities."<sup>49</sup> This ultimately increases our acceptance that we are enmeshed amongst a web of different assemblages, ecologies, and political networks; both human and nonhuman. She muses that making decisions based solely around "for humans only" will seem as archaic as women not having the vote does now.<sup>50</sup>

There is a kinship we have with nonhumans, aware or no, even in the immediate, obvious self—we are ourselves an array of bacteria and tiny organisms, that makes up our microbiota; estimates suggest there are three times the amount of living microorganisms that reside in us, compared to human cells.<sup>51</sup> Bennett considers this thought and wonders whether "if we were more attentive to the indispensable foreignness that we are, would we continue to produce and consume in the same violently reckless ways?"<sup>52</sup> We might not. Maybe it would frighten, or scare people to be aware, or maybe it indeed would bring about some paradigm shift in our perception or subjectivity. But these are grand thoughts. Do we really need a new iPhone every year or two, do we really *need* to use thousands of plastic cups because we don't want to wash them up? These may seem to be trivial questions but what I am really suggesting is that we are evolving, growing, shifting, changing. But evolving towards what? In which way and what manner? Is the destructive path of the Anthropocene the route in which we must tread?

Félix Guattari thinks not, and in his 1989 book 'The Three Ecologies' he calls for the mass realisation that now "more than ever, nature cannot be separated from culture; in order to comprehend the interactions between ecosystems, the mechanosphere and the social and individual Universe of reference, we must learn to think 'transversally'."53 He argues that the three complementary ecologies come under an ecosophy: social ecology, mental ecology, and environmental ecology, naming the group the Integrated World Capital (IWC).54 The relationship between these is extremely close, and they are not really distinct sections, but rather "interchangeable lenses or points of view"55 and we need these different views to be able to apprehend the world in a more 'transverse' way. I think what he is calling for here is an approach to realising that we as humans are entangled and wound within circles and cycles with or without objectives, and that the nonhuman elements of any of the three ecologies is an unavoidable. To use our 'transverse' way of thinking we would have to learn to think three-in-one. What Jane Bennet's finds most intriguing in Guatrarri's text the statement that "humans are both 'in' and 'of' nature, both are and are not the outside."56 So when making decisions we must be aware that nonhuman nature is above, around, inside, outside, and yet still simultaneously part of and separate from us, the humans.

Give up the futile attempt to disentangle the human from the nonhuman<sup>57</sup>

As I have described, Jane Bennett has created a non-human framework for discussion about materialism when approaching decision-making. She more specifically targets political theory, but I believe her vital materialist thinking could be mapped to many other tasks—namely design. It could be used as a methodology to approach the way we design systems, agendas, objects, or indeed even nonhuman tools. It can help broaden and transform the human view in relation to other things, other matter and provoke a democratic way of looking at us as part of something rather than separate from. She calls on us to consider a so-called 'parliament of things'.

#### Bennett ends her text with a litany:

I believe in one matter-energy, the maker of things seen and unseen. I believe that this pluriverse is traversed by heterogeneities that are continually doing things. I believe it is wrong to deny vitality to nonhuman bodies, forces, and forms, and that a careful course of anthropomorphization can help reveal that vitality, even though it resists full translation and exceeds my comprehensive grasp. I believe that encounters with lively matter can chasten my fantasies of human mastery, highlight the common materiality of all that is, expose a wider distribution of agency, and reshape the self and its interests.<sup>58</sup>

Donna Haraway, a science and technologies scholar, and prominent writer about multi-species thinking, writes about need for a new, philosophical way of looking at the world and all the inhabitants within it. As I have discussed using Jane Bennett's theories of vital materialism, which stresses the need for appreciating all the vibrant matter, living and nonliving that surrounds us, I will use Haraway's theoretical discourse to stress the need for the creation of new narratives about all the matter that surrounds us.

Haraway has a lyrical, poetic way of writing, often repeating for effect, at times opaque—it is wound upon itself, woven almost, with new phases and alternate ways of understanding words, lurid and with many cultural references, yet it fits her argument: humans must find a way to exhibit collective thinking, between species, between things "in multispecies muddles."<sup>59</sup> She calls for new narratives and new stories to be written, to be told and heard, "we *must* change the story; the story *must* change"<sup>60</sup> these stories should be messy and earthbound, unfinished and anthro*de*centric.

She shows us an example of the type of stories she hopes might be told, in the form of 'speculative fabulation', titled the Camille Stories. They are a set of stories set in immediate and long term futures which suggest a multispecies collection of beings living in the Post-Anthropocene. In this scenario, humans are combined and linked genetically with endangered nonhuman species that "grew from the sense that healing and ongoingness... requires making kin in innovative ways,"61 each new child has many parents and kin, the communities lived in smaller groups which allowed them reduce human populations significantly. This in turn allowed the newly-remembered kinship humans have with other species, and forged many "multispecies partnerships of many kinds [which] contributed to building a habitable earth in sustained troubled times."62 Although this is not a clear example of a current-world application, I do see that having the emphasis on something else other than ordinary human affairs helps build a "common livable world [that] must be composed, bit by bit, or not at all."63

Haraway also notes Bruno Latour's passion for the story of human/ nonhuman to change, to think outside this destructive capacity of humans, calling for "Gaia stories" to be told, or if 'Gaia' is too loaded, "geostories" is perhaps better than geohistory. Suggesting that these stories should exist and become regardless of humans' lordly presence we must find "a form of narration inside which all the former props and passive agents have become active without, for that, being part of a giant plot written by some overseeing entity."<sup>64</sup>

She uses the analogy of 'tentacularity' or 'tentacular thinking' (many limbs, points, members, parts, heads, etc.) to attempt to use another way of viewing the planet we share with all the other 'critters' and lively matter. She uses a multi-faceted, multi-legged creature-like analogy to attempt to show the connectedness of it all, as the tentacles can be in multiple places at once, so thinking must be done between things and between species, showing that all things live life along lines and threads, not points<sup>65</sup>— "everything is connected to something"<sup>66</sup>

This 'tentacular thinking' is a method practiced when she argues for an alternative to the naming of the (current) epoch, 'the Anthropocene' (or arguably other contestable terms such as capitalocene or planetocene), Haraway proposes it being called 'the Chthulucene'. The wording comes from (characteristically Haraway) many different sources: Cthonic comes from Greek meaning of the earth, or earth; an arachnid named Pimoa cthulhu; and an H.P. Lovecraft science fiction story about an elder god named Cthulhu; along with a myriad of other references and notes.67 68 In essence she calls for the naming of an epoch that "does not close in on itself"69 that unlike the Anthropocene "human beings are not the only important actors in the Chthulucene, with all other beings able to simply to react"7°. This means that the order is reknitted: "humans are with and of the earth, and the biotic and abiotic powers of the earth are the main story."71 What I find influential about this, and about most of Donna Haraway's work is the emphasis on the fact that humans are not the most important player in the world, we are part of it, both 'in and of' our planet, "It matters what thoughts think thoughts."72

She proposes a slogan for the Chthulucene—"Make Kin Not Babies!"<sup>73</sup> as making kin is the most urgent and most difficult part of the Chthulucene. These are not human kin (although they can be) they are multispecies kin—of all genealogies, of all species, kin that unravels the boundaries constructed by our culture—aiming to make the word 'kin' mean something other than "entities tied by ancestry or geneaology."<sup>74</sup> Proposing that kin spoken of in this way is as an assembling sort of word; a time to practice "kinds-as-assemblages,"<sup>75</sup> not one species at a time.

Haraway's writing at times can seem ambiguous but what is powerful is the feeling she offers—a poetic discourse and direction for a multispecies ideology. Her work is ultimately (in my eyes) about alignment—its about how we as a species align ourselves to other things, beings, creatures, matter, and as a friend said: the writing is not *about* or *for* species, but *with* species.<sup>76</sup> Haraway contrasts *alignment* with *decision*, stating *alignment* does not carry tones of modernist liberal discourse,<sup>77</sup> maintaining that alignment is meshed-in with the states of living and dying—things are very much entangled and connected, so *decisions* cannot easily implemented from the top down. This culminates in the asking of things to be viewed, or created in a 'sympoietic' way, as opposed to an autopoietic way. Sympoietic systems lack boundaries, evolve within systems, and are unpredictable, examples being ecosystems or cultural systems; whereas autopoietic systems have self-produced boundries, evolve between systems, and have predictable tendencies, examples being cells and organisms.<sup>78</sup> This is where her argument has its crux—living in the newly named Chluthlucene it is about the idiom (I'd argue maxim) *making-with*, as no earthling acts alone—and nothing makes itself.<sup>79</sup>

Is Donna Haraway's beautifully proposed alternate future of a conversation between different species a realistic one? I hope so, as there is much beauty in the world, and as Nik Sawe suggests in his neuroeconomics of environmental decisions studies at Stanford University, the more exposure to the living world a person has, the more disposition one has to protect, or care about the environment that surrounds them.<sup>80 81</sup> So, I think that although Haraway's writings can seem a little left-field, both her and Jane Bennet's texts are part of a greater field of work, a fragment of which is listed in the 2015 book titled the 'Nonhuman Turn'. The editor Richard Grusin describes it well: "To turn toward the nonhuman is not only to confront the nonhuman but to lose the traditional way of the human, to move aside so that other nonhumans-animate and less animate-can make their way, turn toward movement themselves."82 We must "make room for the outlooks, rhythms, and trajectories of a greater number of actants, to, that is, get a better sense of the "operating system" upon which we humans rely."83 This is to form an appreciation and realisation of the problems that everyone appears to be part of and yet no single person in particular. This thought is where I would like to position myself as a designer-when designing to consider your impacts to all things, nonhuman, human alike.

# 5 FORWARDS

"Progress means: humanity emerges from its spellbound state no longer under the spell of progress as well, itself nature, by becoming aware of its own indigenousness to nature and by halting the mastery over nature through which nature continues its mastery."<sup>84</sup>

— Theodor Adorno

I don't wish to be romantic or over-sentimentalised about nature, natural life, and the living world—as beautiful it might be—but I have aligned myself with theories and a way of thinking that incorporates other things apart from narratives that only favour the ever-dominant Homo sapiens. The vibrancy of all matter, both living and nonliving; a multispecies approach to storytelling, a nonhuman turn.

This is in hope to become a better designer, influencing and making more conscientious decisions when making, communicating, disseminating. What I am *not* advocating is being a 1970s-style environmentalist (although I agree with them), but positioning myself as a designer whose approach when creating anthropocentric things is to consider things other than the human. As Donna Haraway would say, we must 'stay with the trouble', and I intend to, troublesome as it might be.

As described in the introduction, I am both part of this solution as a designer, and a part of the problem, yet looking forwards, I wish to highlight my place within that and all future work will be examined it against the effects (positive and negative) on the nonhumans, as well as the effects on our species.

My ultimate point is, and the reason I am not describing many real-world examples, is because I believe that this approach should be the basis and underpinning of *all* stories, narratives, design, artwork, etc. Therefore, I feel this consideration of the other should be simply a part of the daily decision-making process we go through in our lives. But as I, *am* a designer and I can influence and make decisions about the process in which something is printed, or which materials are used when designing a tool, and by what method a chair is manufactured into existence. Design choices that facilitates this responsible thinking, but not explicitly, it doesn't shout 'I am eco, buy me' it just has been made with the sensitive awareness of the other living/non-living inhabitants of the planet.

Not wishing to overstate the power of design by saying design thinking or design approaches can solve the many world problems, but as this paper is essentially is about how *I* will make henceforth, as a methodology, having this newly garnered knowledge will allow me to be a more considerate designer. Additionally, this understanding of the importance of other matter will enable me to make informed decisions about the thing I have most agency over—myself.

Inevitably there will be contradictions, hypocrisy, and surely my statement that I am both part of the solution *and* problem is exemplary to this almost paradoxical frame we all sit in. There are only systems. We as a species want to continue to exist, so we must register our effects on the planet, and more agency and decisions need to be made with forethought. Not business-as-usual, and not trying to return to an industrial economy—with head in the sand denial—as the current president of the USA is practicing by pulling out of the 2015 Paris Climate agreement, which aims to keep the world temperature rise well-below 2°C.<sup>85</sup>

This piece of writing does not intend to answer the many problems that we experience in this contemporary world, but it *is* a small single part of a mass-guided answer by many moving people, things, and ideas that seem to be heading in diverse directions, yet towards the same goal. It will be these small changes that we as designers, consumers, citizens, as multispecies thinkers, that will reduce the everyday thoughtlessness, the hubris of human—we are *not* the only important thing.

Jane Bennett advocates the vibrancy of all matter that demands our attention, and the need for decisions to be made in a way that respects, takes on and is made acutely aware of the way materiality—inert or not influences us. Haraway's compelling and impassioned call for making-kin through/by making-with the other species that we inhabit our beloved planet with, is powerful because it proposes a way to gently inspire change through poetics, reframing, and reconsidering. She hopes to use one of the most fundamental, intrinsic, and greatest gifts of humanity storytelling.

It is these small iterative changes, collective thinking, thinkingwith others, and the cumulated effects will add, aid, and in some way, transform (if only slightly) the complex, interdependent world we all (nonhuman/human) are part of.

Purposefully I have not set out an all-encompassing set of manifesto rules, but a framework, a methodology in which to design within, it is simply about *thinking-with* when I am designing about the impacts the process or result may have. It isn't rigid, as things, systems, cycles all evolve and change with time, patterns, and movements.

It is purposefully temporal to now and where we as humans are in *this* moment, on *this* planet, with *my* current knowledge, and in *this* current epoch (Anthropocene, Chthulucene, Capitalcene, etc.) Purposefully adaptable and reasonable—to be aware and take-action with this awareness.

The quality that we call beauty, however, must always grow from the realities of life, and our ancestors, forced to live in dark rooms presently came to discover beauty in shadows.<sup>86</sup>

This quote by Japanese aesthetics scholar Junichiro Tanizaki offers a rather nice thought that when we find acceptance in the intrinsic qualities of a space, a world, a thing, we find beauty. But, I feel this can be horizontalised slightly. It is not that the shadows have gone (artificial light); they are still there, beautiful as ever, just they cannot be seen until we turn out the lights once again. Might this be analogous to where we are with the affinities we have with the other species? Can we perhaps, in this age of so much technology, turn out the lights (metaphorically or literally) to enable us to see the beauty? To appreciate the inert, yet vibrant, the nonhuman, yet vital other matters that makes up our planet?

As designer Daisy Ginsberg suggests, when thinking about new futures or about sustainability, any impact, or change for the 'better' (perhaps for supposed more 'sustainable' reasons) the designer/policy-maker/etc. must assess and consider who is this 'better' for?<sup>87</sup>

What she means by this is that when an alternative to the current approach is suggested, or implemented, the act of change can overshadow the actual effect its execution has had.

Take for example almonds. Each almond produced for human consumption uses four litres of water.<sup>88</sup> An average bag from the supermarket contains anything between 60 and 100. So, when somebody (with good intentions) chooses to no longer consume dairy products, and drink almond milk as an alternative, they would be increasing the need for more almonds, thus increasing the water demand in somewhere like California (with 80% of the market<sup>89</sup>) where water is already a precious resource. However, they would be saving on the methane emitted by cows, the increase of antibiotic resistance, and a whole host of other intentional and unintentional effects. I am not suggesting that either is better or worse, but that every decision has effects and, as Ginsberg states "the sugar still has to come from somewhere", so when ecological impacts are considered, it is a complicated and enmeshed affair. We must think.

Some design methodologies do this already: cradle-to-cradle design, for example, looks at life cycles rather than life-spans; metadesign which looks at the synergies between of things and designs for them; systems thinking aims for holistic thinking and efficiency at all stages. Thackara discusses the New Belgium Brewing Company in Colorado, USA, that uses 40% less energy than commercial breweries, by using efficient methods and the reuse of waste.<sup>90</sup> Brewing produces a lot of waste materials—malted barley, and boiled hops mainly—and some people are using the barley to make bread<sup>91</sup> and others have been using hops as a fertiliser for nearly 100 years.<sup>92</sup> Reverse methods have been employed too, with beer being brewed with left-over bread.<sup>93</sup>

Similar to the theoretical and philosophical writings discussed earlier, I am not separate from, but adding to, these design approaches, a humble but proactive approach to creation of artefacts—a considerate approach.

I will end with an extract from an Ursula Le Guin novel, as I feel it appropriately communicates the woven nature and the inextricably knotted mixture of things that we call our planet. It is *this* epoch, by whatever name, which is both dusk and dawn, both changed and will change more, by us, by others—it is ever in flux, and how we as individuals and collectives weave our paths into it is our own judgement. This is mine.

- But we, insofar as we have power over the world and over one another, we must learn to do what the leaf and the whale and the wind do of their own nature. We must learn to keep the balance.
- Having intelligence, we must not act in ignorance. Having choice, we must not act without responsibility.<sup>94</sup>

### NOTES

- Isabelle Stengers, Vinciane Despret and April Knutson, Women Who Make A Fuss (Minneapolis: University of Minnesota Press, 2015).
- 2. R. Buckminster Fuller, Operating Manual For Spaceship Earth (Zurich: Lars Muller Publishers, 2008).
- J. Zalasiewicz and others, "Scale And Diversity Of The Physical Technosphere: A Geological Perspective", The Anthropocene Review, 2016 < https://doi. org/10.1177/2053019616677743>.
- http://www.annualreviews.org/doi/10.1146/annurev.anthro.34.030905.154913 (accessed 26 January 2017).
- Brian J Alloway and David C Ayres, Chemical Principles Of Environmental Pollution (London: Blackie Academic & Professional, 1997).
- Erle C. Ellis, "Ecology In An Anthropogenic Biosphere", Ecological Monographs, 85.3 (2015), 287-331 < https://doi.org/10.1890/14-2274.1>.
- Owen Gaffney and Will Steffen, "The Anthropocene Equation", The Anthropocene Review, 2017, 205301961668802 < https://doi. org/10.1177/2053019616688022>.
- 8. Bruce D. Smith and Melinda A. Zeder, "The Onset Of The Anthropocene", Anthropocene, 4 (2013), 8-13 < https://doi.org/10.1016/j.ancene.2013.05.001>.
- Erle C. Ellis and others, "Dating The Anthropocene: Towards An Empirical Global History Of Human Transformation Of The Terrestrial Biosphere", Elementa: Science Of The Anthropocene, 1 (2013), 000018 < https://doi. org/10.12952/journal.elementa.000018>.
- Michel Batisse, "The Relevance Of MAB", Environmental Conservation, 7.03 (1973), 179 <a href="https://doi.org/10.1017/s0376892900007529">https://doi.org/10.1017/s0376892900007529</a>>.
- J. Zalasiewicz and others, "Scale And Diversity Of The Physical Technosphere: A Geological Perspective", The Anthropocene Review, 2016 < https://doi. org/10.1177/2053019616677743>.
- 12. ibid.
- Owen Gaffney and Will Steffen, "The Anthropocene Equation", The Anthropocene Review, 2017, 205301961668802 < https://doi. org/10.1177/2053019616688022>.
- https://www.theguardian.com/environment/2016/aug/29/declare-anthropocene-epoch-experts-urge-geological-congress-human-impact-earth (accessed 2 June 2017).

- Paul J. Crutzen, "Geology Of Mankind", Nature, 415.6867 (2002), 23-23 < https:// doi.org/10.1038/415023a>.
- Owen Gaffney and Will Steffen, "The Anthropocene Equation", The Anthropocene Review, 2017, 205301961668802 < https://doi. org/10.1177/2053019616688022>.
- Will Steffen and others, "The Trajectory Of The Anthropocene: The Great Acceleration", The Anthropocene Review, 2.1 (2015), 81-98 < https://doi. org/10.1177/2053019614564785>.
- 18. ibid.
- 19. George Monbiot, Feral (London: Allen Lane, 2013), pp. 84-6.
- <a href="https://www.theguardian.com/environment/2015/oct/08/worlds-oceans-fac-ing-biggest-coral-die-off-in-history-scientists-warn">https://www.theguardian.com/environment/2015/oct/08/worlds-oceans-fac-ing-biggest-coral-die-off-in-history-scientists-warn</a> (accessed 28 March 2017).
- https://www.theguardian.com/environment/2016/jun/07/the-great-barrierreef-a-catastrophe-laid-bare (accessed 5 June 2017).
- 22. Timothy Morton, Dark Ecology: For a Logic of Future Coexistence (New York: Columbia University Press, 2016), pp. 22.
- Timothy Morton, "Ecology Without The Present", Oxford Literary Review, 34.2 (2012), 229-238 <a href="https://doi.org/10.3366/olr.2012.0043">https://doi.org/10.3366/olr.2012.0043</a>, pp. 233.
- 24. Timothy Morton, Dark Ecology: For a Logic of Future Coexistence (New York: Columbia University Press, 2016)
- Douglas Kahn, Earth Sound Earth Signal: Energies and Earth Magnitude in the Arts (Berkley: University of California Press, 2013).
- 26. Naomi Klein, 'Climate change is the fight of our lives yet we can hardly bear to look at it', The Guardian, (23 April 2014) <https://www.theguardian.com/commentisfree/2014/apr/23/climate-change-fight-of-our-lives-naomi-klein> (accessed 8 December 2016).
- 'All Hail The Anthropocene, The End Of Holocene Thinking', New Scientist, 2015 < https://www.newscientist.com/article/dn27162-all-hail-the-anthropocene-the-end-of-holocene-thinking/> (accessed 10 March 2017).
- 28. <http://archive.boston.com/news/world/articles/2005/12/11/price\_rise\_and\_ new\_deep\_water\_technology\_opened\_up\_offshore\_drilling/> (Accessed 22 March 2017).
- 29. Jason W Moore, Donna J Haraway, Anthropocene Or Capitalocene? (Oakland, CA: PM Press/Kairos, 2016), pp. 40.
- 30. Alexei Sharov, "Umwelt-Theory And Pragmatism", Semiotica, 2001.134 (2001) <a href="https://doi.org/10.1515/semi.2001.025">https://doi.org/10.1515/semi.2001.025</a>>, (accessed 6 Dec 2016).

- 31. Yuval N Harari, Homo Deus, (London: Harvill Secker, 2016), pp. 28.
- <a href="http://csmt.uchicago.edu/glossary2004/objectpetita.htm">http://csmt.uchicago.edu/glossary2004/objectpetita.htm</a>> (Accessed 29 March 2017).
- 33. <https://www.youtube.com/watch?v=qN\_1tIipUxY> (Accessed 29 March 2017).
- Jason W Moore, Donna J Haraway, Anthropocene Or Capitalocene? (Oakland, CA: PM Press/Kairos, 2016), pp. 35.
- 35. Yuval N Harari, Homo Deus, (London: Harvill Secker, 2016), pp. 92.
- 36. Jane Bennett, Vibrant Matter: A Political Ecology of Things, (Durham & London: Duke University Press, 2010), pp. 4.
- 37. ibid. pp. viii.
- 38. ibid. pp. 13.
- 39. Theodor Adorno, Negative Dialectics (Continuum, 1981), pp. 199.
- Charles Darwin, The Formation Of Vegetable Mould Through The Action Of Worms (London, 1881).
- Jane Bennett, Vibrant Matter: A Political Ecology of Things (Durham & London: Duke University Press, 2010), pp. 96
- 42. Charles Darwin, The Formation Of Vegetable Mould Through The Action Of Worms (London, 1881), pp.2
- Jane Bennett, Vibrant Matter: A Political Ecology of Things (Durham & London: Duke University Press, 2010), pp. 4
- 44. John Thackara, "The Ecozoic City Our World", Ourworld.Unu.Edu, 2013 <https://ourworld.unu.edu/en/the-ecozoic-city> [accessed 12 March 2017].
- Jane Bennett, Vibrant Matter: A Political Ecology of Things (Durham & London: Duke University Press, 2010), pp. 104
- 46. John Berger, About Looking (London: Bloomsbury, 2009), pp. 14.
- Bruno Latour, "It's Development, Stupid!" Or: How To Modernize Modernization", Postenvironmentalism And The Anthropocene, Breakthrough Institute,, 2011, pp. 6-7.
- Jane Bennett, Vibrant Matter: A Political Ecology of Things (Durham & London: Duke University Press, 2010), pp. 115.
- 49. ibid., pp 108.
- 50. ibid., pp 109.
- <http://www.asmscience.org/content/journal/microbe/10.1128/microbe.9.47.20> (accessed 3 June 2017).
- Jane Bennett, Vibrant Matter: A Political Ecology of Things (Durham & London: Duke University Press, 2010), pp. 113.

- 53. Félix Guattari, The Three Ecologies (London: The Athlone Press, 2000), pp. 29. [emphasis added]
- 54. ibid., pp. 28.
- 55. ibid.
- Jane Bennett, Vibrant Matter: A Political Ecology of Things (Durham & London: Duke University Press, 2010), pp. 114.
- 57. ibid., pp. 116.
- 58. ibid., pp. 122.
- 59. Donna J. Haraway, Staying With The Trouble (Durham: Duke University Press, 2016), pp. 31.
- 60. ibid., pp. 40.
- 61. ibid., pp. 138.
- 62. ibid., 143.
- 63. ibid., pp. 40.
- Bruno Latour, "Facing Gaia Six Lectures On The Political Theology of Nature", 2013. [transcript] pp. 72.
- Donna J. Haraway, Staying With The Trouble (Durham: Duke University Press, 2016), pp. 32.
- 66. Thom van Dooren, Flight Ways (New York: Columbia Univ Press, 2014), pp. 60.
- Donna J. Haraway, Staying With The Trouble (Durham: Duke University Press, 2016), pp. 32, 173–174.
- Jason W Moore, Donna J Haraway, Anthropocene Or Capitalocene? (Oakland, CA: PM Press/Kairos, 2016), pp. 61–63.
- Donna J. Haraway, Staying With The Trouble (Durham: Duke University Press, 2016), pp. 33.
- 70. ibid., pp. 55.
- 71. ibid. [emphasis added]
- 72. ibid., pp. 57.
- Donna J. Haraway, "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin", Environmental Humanities, 6.1 (2015), 159-165 < https:// doi.org/10.1215/22011919-3615934>, pp. 161.
- 74. ibid.
- 75. ibid. pp. 162.
- 76. In conversation with Rose Leahy, (Royal College of Art, London, June 2017).
- 77. Donna J. Haraway, Staying With The Trouble (Durham: Duke University Press, 2016), pp. 42.

- 78. Jason W Moore, Donna J Haraway, Anthropocene Or Capitalocene? (Oakland, CA: PM Press/Kairos, 2016), pp. 65.
- Donna J. Haraway, Staying With The Trouble (Durham: Duke University Press, 2016), pp. 58
- 80. Nik Sawe, "A Penny For Your Thoughts", National Parks Conservation Association, 2017 < https://www.npca.org/articles/1161-a-penny-for-your-thoughts#sm.0012yvvyqpmkfdx11il2dhhvacf11> (accessed 8 March 2017).
- Nik Sawe, TEDx, Your Brain, The Environment And Our Decisions, 2015
  <a href="https://www.youtube.com/watch?v=Nko5QFUb4cY>">https://www.youtube.com/watch?v=Nko5QFUb4cY></a> (accessed 8 March 2017).
- Richard A Grusin, The Nonhuman Turn, (Minneapolis: University of Minnesota Press, 2015), pp. xxi.
- 83. ibid., via Timothy Morton, pp. 231.
- 84. Theodor Adorno, "Progress," The Philosophical Forum 15.1–2 (Fall–Winter 1983–1984), 55–70 (61–63; 62).
- <a href="http://www.bbc.co.uk/news/world-us-canada-40128431">http://www.bbc.co.uk/news/world-us-canada-40128431</a>, (accessed 2 June 2017).
- 86. Junichiro Tanizaki, In Praise of Shadows (Rutland, Vt.: Tuttle Publ., 2008), pp. 29.
- 87. Daisy Ginsberg, "Better?", 2017.
- M. M. Mekonnen and A. Y. Hoekstra, "The Green, Blue And Grey Water Footprint Of Crops And Derived Crop Products", Hydrology And Earth System Sciences, 15.5 (2010), 1577-1600 < https://doi.org/10.5194/hess-15-1577-2011>.
- 89. http://uk.businessinsider.com/the-65-billion-almond-crop-is-driving-thesharp-debate-about-california-water-use-2015-4?r=US&IR=T (accessed 5 June 2017).
- 90. John Thackara, How To Thrive In The Next Economy, (London: Thames & Hudson, 2017) pp. 77
- 91. https://www.homebrewersassociation.org/how-to-brew/bread-from-beergrains/ (accessed 13 June 2017)
- 92. http://gsrpdf.lib.msu.edu/ticpdf.py?file=/1920s/1925/2511257.pdf (accessed 13 June 2017)
- 93. http://www.toastale.com (accessed 13 June 2017)
- 94. Ursula K. Le Guin, The Farthest Shore (London: Puffin Books, 1974).

#### BIBLIOGRAPHY

Adorno, Theodor, "Progress," The Philosophical Forum 15.1–2 (Fall–Winter 1983–1984),

55-70 (61-63; 62)

- -----. Negative Dialectics (Continuum, 1981), p. 199
- Alloway, Brian J, and David C Ayres, Chemical Principles Of Environmental
  - Pollution (London: Blackie Academic & Professional, 1997)
- Anderson, Kayla, "Ethics, Ecology, And The Future: Art And Design Face The
- Anthropocene", Leonardo, 48 (2015), 338-347 https://doi.org/10.1162/leon\_a\_01087
- Batisse, Michel, "The Relevance Of MAB", Environmental Conservation, 7 (1973), 179 <a href="https://doi.org/10.1017/s0376892900007529">https://doi.org/10.1017/s0376892900007529</a>

Bennett, Jane, Vibrant Matter, (Durham: Duke University Press, 2010)

- Berger, John, About Looking (London: Bloomsbury, 2009)
- Crutzen, Paul J., "Geology Of Mankind", Nature, 415 (2002), 23-23 https://doi. org/10.1038/415023a
- Crutzen, PJ, and J Lelieveld, "Human Impacts On Atmospheric Chemistry", Annual Review Of Earth And Planetary Sciences, 29 (2001), 17-45 https://doi.org/10.1146/ annurev.earth.29.1.17
- Darwin, Charles, The Formation Of Vegetable Mould Through The Action Of Worms (London, 1881)
- Ellis, Erle C., "Ecology In An Anthropogenic Biosphere", Ecological Monographs, 85 (2015), 287-331 https://doi.org/10.1890/14-2274.1
- Ellis, Erle C., Dorian Q. Fuller, Jed O. Kaplan, and Wayne G. Lutters, "Dating The Anthropocene: Towards An Empirical Global History Of Human Transformation Of The Terrestrial Biosphere", Elementa: Science Of The Anthropocene, 1 (2013), 000018 https://doi.org/10.12952/journal.elementa.000018
- Fisher, Mark, Capitalist Realism, (Lanham: John Hunt Publishing, 2009)
- Fuller, R. Buckminster, *Operating Manual For Spaceship Earth*, (Zurich: Lars Muller Publishers, 2008)
- Gaffney, Owen, and Will Steffen, "The Anthropocene Equation", The Anthropocene Review, 2017, 205301961668802 https://doi.org/10.1177/2053019616688022 Ginsberg, Daisy, "Better?", 2017
- Grusin, Richard A, *The Nonhuman Turn*, (Minneapolis: University of Minnesota Press, 2015)

Guattari, Félix, The Three Ecologies (London: The Athlone Press, 2000)

45

Anthropocene Review, 1 (2014), 126-136 https://doi.org/10.1177/2053019614530575 Harari, Yuval N, Homo Deus, (London: Harvill Secker, 2016) Haraway, Donna J., "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin", Environmental Humanities, 6 (2015), 159-165 https://doi.org/10.1215/22011919-3615934 -----. Staying With The Trouble (Durham: Duke University Press, 2016) Kahn, Douglas. Earth Sound Earth Signal: Energies and Earth Magnitude in the Arts. (Berkley: University of California Press, 2013) Latour, Bruno, ""It's Development, Stupid !" Or: How To Modernize Modernization", Postenvironmentalism And The Anthropocene, Breakthrough Institute,, 2011, pp. 6-7 -----. "Facing Gaia Six Lectures On The Political Theology Of Nature", 2013 -----. 'Anthropology at the Time of the Anthropocene: A Personal View of What Is to be Studied', American Association of Anthropologists, December 2014 http://www.brunolatour.fr/sites/default/files/139-AAA-Washington.pdf (accessed 8 December 2016) Latour, Bruno, and Catherine Porter, Politics Of Nature (Cambridge: Harvard University Press, 2009) Le Guin, Ursula K, The Farthest Shore (London: Puffin Books, 1974) Mekonnen, M. M., and A. Y. Hoekstra, "The Green, Blue And Grey Water Footprint Of Crops And Derived Crop Products", Hydrology And Earth System Sciences, 15 (2011), 1577-1600 https://doi.org/10.5194/hess-15-1577-2011 Monbiot, George, Feral, 8th edn (London: Allen Lane, 2013), pp. 84–6 Moore, Jason W, and Donna J Haraway, Anthropocene Or Capitalocene?, (Oakland, CA: PM Press/Kairos, 2016), pp. 34-76 Morton, Timothy, "Ecology Without The Present", Oxford Literary Review, 34 (2012), 229-238 https://doi.org/10.3366/olr.2012.0043 -----. Dark Ecology: For a Logic of Future Coexistence (New York: Columbia University Press, 2016) Munari, Bruno, and Patrick Creagh, Design As Art, (London: Penguin, 2008) Myers, William. Bio Design: Nature. Science. Creativity. (London: Thames & Hudson Ltd, 2012) Sharov, Alexei, "Umwelt-Theory And Pragmatism", Semiotica, 2001 (2001) https://doi. org/10.1515/semi.2001.025 Smil, Vaclav, "Harvesting The Biosphere: The Human Impact", Population And Development Review, 37 (2011), 613-636 https://doi.org/10.1111/j.1728-

4457.2011.00450.x

Haff, Peter, "Humans And Technology In The Anthropocene: Six Rules", The

- Smith, Bruce D., and Melinda A. Zeder, "The Onset Of The Anthropocene", Anthropocene, 4 (2013), 8-13 https://doi.org/10.1016/j.ancene.2013.05.001 Steffen, Will, Wendy Broadgate, Lisa Deutsch, Owen Gaffney, and Cornelia Ludwig, "The Trajectory Of The Anthropocene: The Great Acceleration", The Anthropocene Review, 2 (2015), 81-98 https://doi.org/10.1177/2053019614564785 Stengers, Isabelle, Vinciane Despret, and April Knutson, Women Who Make A Fuss (Minneapolis: University of Minnesota Press, 2015) Tanizaki, Junichiro, In Praise of Shadows (Rutland, Vt.: Tuttle Publ., 2008) Thackara, John, How To Thrive In The Next Economy, 8th Edn (London: Thames & Hudson, 2017) van Dooren, Thom, Flight Ways (New York: Columbia Univ Press, 2014) Zalasiewicz, J., M. Williams, C. N. Waters, A. D. Barnosky, J. Palmesino, and A.-S. Ro nnskog and others, "Scale And Diversity Of The Physical Technosphere: A Geological Perspective", The Anthropocene Review, 2016 <https://doi. org/10.1177/2053019616677743> "All Hail The Anthropocene, The End Of Holocene Thinking", New Scientist, 2015 <a href="https://">https://</a> www.newscientist.com/article/dn27162-all-hail-the-anthropocene-the-end-ofholocene-thinking/> (accessed 10 March 2017) <a href="http://www.asmscience.org/content/journal/microbe/10.1128/microbe.9.47.20">http://www.asmscience.org/content/journal/microbe/10.1128/microbe.9.47.20</a> (accessed 3 June 2017). Sawe, Nik, "A Penny For Your Thoughts", National Parks Conservation Association, 2017 <a href="https://www.npca.org/articles/1161-a-penny-for-your-thoughts#sm.oo12yvvyqpmkfd">https://www.npca.org/articles/1161-a-penny-for-your-thoughts#sm.oo12yvvyqpmkfd</a> x11112dhhvacf11> (accessed 8 March 2017) ------. TEDx, Your Brain, The Environment And Our Decisions, 2015 <a href="https://www.youtube">https://www.youtube</a>. com/watch?v=Nko5QFUb4cY> (accessed 8 March 2017)
- Thackara, John, "The Ecozoic City Our World", *Ourworld.Unu.Edu*, 2013 <a href="https://ourworld.unu.edu/en/the-ecozoic-city">https://ourworld.unu.edu/en/the-ecozoic-city</a> (accessed 12 March 2017)
- Naomi Klein, 'Climate change is the fight of our lives yet we can hardly bear to look at it', The Guardian, 2014 <https://www.theguardian.com/commentisfree/2014/apr/23/ climate-change-fight-of-our-lives-naomi-klein> (accessed 8 December 2016)
- http://www.bbc.co.uk/news/world-us-canada-40128431 (accessed 10 June 2017)
- http://www.e-flux.com/journal/69/60586/the-anamorphic-politics-of-climate-change/ (accessed 29 March 2017)
- http://www.e-flux.com/journal/75/67125/tentacular-thinking-anthropocene-capitalocenechthulucene/ (accessed 13 March 2017)
- http://www.toastale.com (accessed 13 June 2017)

https://frankfurtschool.wordpress.com/2008/04/28/josef-konig-progress/ (accessed 2 June 2017) https://larvalsubjects.wordpress.com/2010/08/26/the-ecological-thought-a-reply-to-acritic/ (accessed 7 December 2016) https://ourworld.unu.edu/en/the-ecozoic-city (accessed 5 March 2017) https://www.homebrewersassociation.org/how-to-brew/bread-from-beer-grains/ (accessed 13 June 2017) https://www.npca.org/articles/II61-a-penny-for-your-thoughts#sm.oo12yyyygpmkfdx11il2d hhvacfii (accessed 25 March 2017) https://www.outsideonline.com/2136496/humans-screwed-environment-can-we-engineerour-way-out (accessed 17 Febuary 2017) https://www.outsideonline.com/2136496/humans-screwed-environment-can-we-engineerour-way-out (accessed 22 May 2017) https://www.ted.com/talks/james\_howard\_kunstler\_dissects\_suburbia (accessed 25 March 2017) https://www.theguardian.com/commentisfree/2016/nov/23/donald-trump-climate-changewar (accessed 4 December 2016) https://www.theguardian.com/environment/2015/oct/08/worlds-oceans-facing-biggestcoral-die-off-in-history-scientists-warn (accessed 28 March 2017) https://www.theguardian.com/environment/2016/aug/29/declare-anthropocene-epochexperts-urge-geological-congress-human-impact-earth (accessed 2 June 2017) https://www.theguardian.com/environment/2016/jun/07/the-great-barrier-reef-acatastrophe-laid-bare (accessed 5 June 2017) https://www.theguardian.com/lifeandstyle/shortcuts/2015/oct/21/almond-milk-quite-goodfor-you-very-bad-for-the-planet (accessed 5 June 2017) https://www.homebrewersassociation.org/how-to-brew/bread-from-beer-grains/ (accessed 13 June 2017) http://gsrpdf.lib.msu.edu/ticpdf.py?file=/1920s/1925/2511257.pdf (accessed 13 June 2017) http://www.toastale.com (accessed 13 June 2017)