A research aimed at exploring the ways in which the past, and an archaeological/anthropological perspective, can help orientate us in our modern-era battle for sustainability.

Rory Granleese

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Sustainability: from the species that brought you planetary neglect

A research aimed at exploring the ways in which the past, and an archaeological/anthropological perspective, can help orientate us in our modern-era battle for sustainability.

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Table of contents

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Dyslexia: thansk for maknig this expernice truly memorible

Last, but by *no* means least, a big thank you to capitalism for my budding misanthropy, for destroying this planet, and for providing me with a thesis topic.

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In memory of May, Iso, and Fred. *Cronaím thú*.

Part 1: Introduction

Introduction

Let’s talk about sustainability

Gaia Theory: an introduction to life

1. Introduction

Roughly 4.5 billion years ago, when the solar system had settled, gas and dust were pulled together by gravity. This gas and dust pulled in more gas and dust, which would eventually solidify under its own pressure. This was the beginning of the Earth: the only known planet in existence to have ever hosted life (solarsystem.nasa.gov). Life and Earth are not wholly separate entities. Living things have influenced the geology and chemistry of this planet for eons. Life has shaped Earth, just as Earth has shaped life. This is the basis of James Lovelock's ''Gaia theory'' (Lovelock 2016), the lens through which I view our existence, but I will expand upon that later. Most scientific research suggests that life on planet Earth began around 3.7 billion years ago, however some models suggest the origins may be even further back (Nutman *et al.* 2016; Betts *et al.* 2018). Early life consisted of microorganisms: almost incomprehensibly small (one millionth of a meter) singular cells. These were the first inhabitants, products, and shapers of Earth. While it may be an oversimplification to say that these microbes eventually became human beings, that is, in essence, what happened (Betts *et al.* 2018, 1556-1557). Life has persisted, evolved, faded away and bounced back for at least 3.7 billion years.

Between 7 and 5 million years ago, the first bipedal hominids roamed the earth in modern-day Africa (Brunet *et al.* 2005, 752; Kimbel *et al.* 2014, 948). This is where the subject matter for our discipline, archaeology, begins. Humans have been around for less than 0.5% of the duration that life has existed on Earth. Our own species, *Homo Sapiens*, has been around for approximately 4.2% of that 0.5%. Temporally speaking, this ought to be a humbling fact. In reality, however, the impact that we - a single species of ape from c.300,000 years ago (Callaway 2017; Hublin *et al.* 2017, 291) - have had on the planet and its local space orbit is both terrific and terrifying (Elhacham *et al.* 2020, 443-444).

There have been at least 5 major extinction events on Earth in the last 500 million years, and yet here I am, and here you are (amnh.org; Stanley 1990, 401-403). The phenomenon of life is largely resilient and sustainable. It changes, it adapts, and it coalesces. Species rise and then fall, as new ones come to take their place. Living things live within their means by establishing a relationship with reality, or they perish. This relationship with reality is usually established through biological means, with no conscious participation from the separate entities (Birch *et al.* 2020, 796-797). A lion can only eat what the Savannah provides; it cannot dictate where the gazelle will be, nor can it dictate how

much water will be readily available in a given area. In this regard, almost all species are alike and bound by similar rules. There is, however, one outlier to this statement. Precisely one species on Earth whose pre-meditated actions can and have impacted the innate sustainability of all life on Earth. One species who can conceptually understand and deliberately provoke long term global consequences. One species with the capacity to be a conscious, self-aware, and active part of a global eco-system, and that is us: *Homo Sapiens* (Wise Man).

All life, regardless of how simple or complex, has one constant guarantee: it will end. Individuals die, genetics change, and species either evolve or fade. This is the driving force behind a great many actions in life. Animals, plants, and all living things reproduce because they will die. Their offspring ensure the genetic continuation of their species. For most living things on Earth, in fact, for all but one species, the essential stages of life are realised by actions that are stimulated exclusively through biological programming (Kotchoubey 2018, 2-3). 99% of life is, as far as we can tell, unaware of its inevitable end, not consciously considering species continuation, and is not capable of engaging with/refusing any of the standard acts it is biologically programmed to perform. For 3.7 billion years, life that was scarcely aware of its own existence has done an astounding job at diversifying and sustaining itself. As the expression goes ‘’what you don’t know can’t hurt you’’. Humanity, however, does know, and it is hurting us.

While we too are bound and influenced by the pre-written laws of nature, we have a high degree of consciousness. I do not say this with the intention of conjuring notions of human superiority, I simply wish to illustrate the opportunity that lies within the rarity of our condition. Both science and sacred narratives agree that knowledge is what sets us apart from other living things (Dawkins 1976, 192). Be it in the form of forbidden fruit, a flame from Olympus or the intricacies of brain pathways, the human mind is special. It is entirely possible, if not overwhelmingly likely, that our species will eventually fade. However, we have the capacity to consciously engage with the limitations of our existence, and the limitations of the world around us. Not only through medicine and science, but through our social constructs. As impressive and rare as this capacity might be, our achievements and our cleverness have run up an exceptionally high debt. A debt that climate science suggests our Earth system is ready to collect (Lovelock 2000). Our unchecked and carefree manner of existence acts much like an elastic band. We did not outsmart or outrun Earth, we have simply stretched it close to its limit. We must either

reduce the tension, or suffer the fatal sting of the band snapping on us.

It is wholly natural for living things to influence and be influenced by their surroundings. This usually results in some kind of specialised state wherein living entities are ideally suited for their respective environment. Simultaneously, the presence of life in a given environment alters and often improves the physical, chemical, and biological nature of said environment; at least from the perspective of the organisms that subsequently benefit from this (Dorst 1991; Lovelock 2016, 4). In doing so, a balanced relationship is established. Over the last c.300 years humanity's capacity to produce energy has catapulted our influence far beyond our localised environments, so much so that we (and countless other species) are now facing severe global consequences (Abram *et al.* 2016, 418; Lovelock 2016, 41-43; ec.europa.eu; un.org). Humans no longer have an environment; we have Earth. The impact that we have had on Earth, on the plant and animal species, and on the social/physical health of our own species, demands action. The relationship between entity and environment is no longer balanced. We need only look around us to see how Earth and all it hosts is under strain. This is not sustainable. The actions of our past, and our ability to wilfully engage with the world, compels us to distil the innate and vital sustainability found in all life and make it synonymous with human behaviour. *Homo sapiens* must truly become 'Wise Man'.

While I find both understanding and a degree of comfort in the numbers and narrative that I have written, many of the sacred narratives that influence human life would provide a very different rendition of Earth's history, our origin, and our role on Earth. This too is an important and fascinating aspect of human existence that will be revisited later. For now, whatever your understanding of how Earth and humans came to be, one thing is indisputable: *Homo sapiens* are a dominant force on this planet, with the potential to help heal it.

Thus far my discourse has painted a fairly novel challenge for us to overcome; the next hurdle in humanity's great history. However, the situation we face is truly dire, and I would be remised if I did not make that perfectly clear before moving on. Our planet is heating up. Even the more modest models anticipate the weak and the old among us dying because of this (Carnes *et al.* 2014, 1087-1088). Southern Europe faces desertification and sea-level rise threatens many nations, including our own (The Netherlands) (Audit Chamber | Sustainable use of natural resources 2012; Cohen 2019).

The Earth's climate is not a sliding scale that we can easily control, it is a chair being rocked back and forth, wobbling between stability and landing flat on its back. Once we push past the tipping point, there is no turning back. This has happened before, during one of the five major extinction events I mentioned above. During the Permian mass extinction, research points to a catastrophic series of feedback loops triggering reactions that eventually sequestered the oxygen reservoirs held in the ocean. During the Permian extinction event, 90%+ of life of Earth died (Kump *et al.* 2005, 397-398). If humanity refuses to change enough, or quickly enough, global heating will become irreversible and the Earth System that has supported life for nearly a quarter the age of the universe, will die (de Coninck *et al.* 2018). Make no mistake, romantic notions of lovingly nurturing a damaged planet back to health should be left at the door. We are passing the *Kintsugi* stage; if we do not act, we will enter a stage that will see us scarpering to hold Earth together with duct tape and chewing gum as opposed to golden glue. While we may never truly re-establish the world as we think of it today, we can mitigate the damage and avoid catastrophe if our species behaves more sustainably. I believe that is our obligation, as humans, and I argue that archaeology, as the study of the human story, can help us succeed in this ambition. Through practical examples, context, best practices, warnings, and philosophical considerations, I argue that archaeology and an archaeological mindset can (and should) help orientate humanity in our modern-era battle for sustainability.

1.1 Sustainability in this context

The most universal and overarching definition for sustainability is being able to maintain something at a certain level (oed.com). I will expand upon this more in the following section; however, if for now we can accept this simple explanation, it would strongly suggest that most of what we do as a species is not (and has not been) sustainable.

Our societies are rife with both qualitative and quantitative examples of inequality, we destroy the biosphere to support capitalist gain, we breed excessive amounts of livestock, we have arguably overpopulated the planet, and our economies are still largely based on the extraction, sale, and combustion of finite and polluting fuel sources. Some of these things are unsustainable because their core elements will run out, some because they cause harm to the Earth system that allows us to live, and some because they lead to social instability and we are, after all, social creatures. I think it is fair to say that in general, human beings, particularly those of the last 300 years (beginning of

the industrial era) have confused the 'plentiful and resilient' nature of Earth and humanity with 'wholly renewable and invulnerable'. In that regard, perhaps the most unsustainable thing we do as a species is the perpetuation of (wilful) ignorance on just how severe our impact is and how important we are in reducing it.

Today it is hard to hear the word ''sustainability'' without immediately thinking of ''green renewable energy sources''. Despite the on-going debate regarding the validity of renewable energy as a feasible short-term solution to fossil fuel burning, 'green technology' that utilises renewable energy grows more popular. In Leiden alone you do not need to walk far before encountering wind turbines, solar panels, or fully electric busses. In fact, the Netherlands' national train service runs entirely on 'green energy' (ns.nl). In addition to these technologies, there is also the controversial topic of nuclear energy. That is a rather lengthy and unpleasant discussion (albeit an interesting one) that I will largely avoid during this paper. At any rate, beyond the scope of green energy and the rather volatile nuclear debate, I strongly suggest that we make use of another highly abundant and (for all intents and purposes) renewable resource; namely the human past.

Our lives today are nothing more or less than the most recent chapter in human existence and life on Earth. As individuals and as groups we are not only creating our own subject matter for archaeology; we are determining the future of Earth. While pre-modern-era humanity may not have had the capacity to cause so much harm, or indeed so much good, as we do today, the urge, struggle, and necessity to live sustainably is something that every human being has experienced. We have burned forests for food and land, we have hunted animals to extinction, starved cities and spread diseases (Gray and Milne 2018; Vlok *et al.* 2020). At the same time, we have survived, adapted, and changed. We have transitioned through various economic models, community sizes and ways of life. Not every solution or piece of advice need instantly and entirely remedy a global issue that has accumulated over hundreds of years, but in our c.300,000 years on this planet, we have learned much and can learn from it once more.

As such, I intend to use this thesis as a form of exploratory orientation and investigation. I want to know how an understanding of our human past, and how thinking critically like an archaeologist can contribute to our current battle for sustainability. I truly believe that it can, as long as we (archaeologists and society) are willing to do something with it.

1.2 Thesis direction, aims and explanation

In a broad sense, with this thesis I want to explore the present (and potential futures) by examining the past. I want to create a flowing-narrative comprised of academic considerations and explorations; veering slightly away from the traditional approach to a thesis document, while maintaining the core elements that are required to fulfil my academic obligation. The following two pages consist of relevant personal context, as a student and former member of staff at the Faculty of Archaeology (FdA) in Leiden, to help explain my somewhat unorthodox approach to a Research Master thesis.

I have been a student for nearly six years at FdA in Leiden. During this time I have completed a Bachelor's degree and (pending this thesis) a Research Master's degree. I have represented students in the Education Committee, and chaired the study association L.A.S. Terra. I have tackled topics ranging from heterotopia to biological programming. I have partaken in visitation panels that (re)accredit archaeology programmes in The Netherlands, I was employed by the faculty as an ambassador for outreach programmes, and by Leiden University to work at FdA as a portfolio-holder, and thus help manage and direct the institution. I am by no means an expert in anything, but I do have considerable experience in archaeology at Europe's only dedicated faculty.

To anyone reading this thesis, I do not need to clarify how wonderful and exhilarating this discipline is; you are either reading it as a favour to me, or you have made archaeology your primary source of employment (and reading this is part of your job). However, in addition to enthusiasm, I have observed a great deal of contention over the last six years. This typically occurs in the form of specialisation bias. I have heard working with indigenous communities described as ''an anecdotal and limited proxy for understanding the world'', the theory and philosophy of this discipline described as ''over-dinner talk, to be considered with a glass of wine, but not during the working day and certainly not for students'' and the hard-sciences described as ''maths and microscopes, with no soul or passion for humanity''. It goes without saying that these statements are inaccurate, and best chalked up to frustrated remarks from talented individuals on their bad days. However, a diluted form of this territorial behaviour is also observable in students. Often without any real intention, aspiring professionals mirror the attitudes of their successful peers in our very competitive discipline. The discipline, as such, is fragmented.

I have had the great fortune of meeting many (aspiring) professionals and have heard many interpretations of what archaeology is, or should be. When we talk to people outside of our discipline, almost without fail, we describe it as ''studying the past to understand the present''. I have seen this statement made, and made it myself, countless times. It is a statement I believe in, but one that is hard to defend. Most of the time professionals are rewarded for writing specialised articles for an educated and often specialised audience of select individuals. Students are, although encouraged to strive for interdisciplinary mindsets, more-often-than-not rewarded for emulating this same approach in their studies. The weaving together of our contributions into something meaningful for the present (and for non-archaeologists) is often left to others, who publish books like ''Sapiens'' by Yuval Noah Harari, while we (archaeologists) criticize from a safe distance. I believe that this 'weaving' is hugely important, and something that too many of us overlook. The number of archaeologists who actively seek to engage their research and knowledge with the world beyond the discipline is limited, but thankfully growing. This trend also changes per specialisation. As such, the pioneering work of the minority should in no way be tainted or undermined by my observational remarks.

The faculty (rightly) has guidelines and requirements in order to safeguard the final output of the degrees it offers. This thesis is my attempt at achieving these guidelines, while weaving the contributions of archaeology myself, and writing in a style that is largely accessible to a wider audience than those fortunate enough to receive higher education, or those who have specialised. I want to examine the human story as a whole, selecting relevant highlights and lessons that transcend specialisations, and see if archaeology can indeed be the study of the past to understand the present. I aim to apply the fundamental principles of what archaeology is, and our understanding of the human story, to better orientate myself as an archaeologist and a member of society in our species' current battle for sustainability. A non-specialised, and yet highly important approach to archaeology. I will isolate a number of solid, practical examples, and a number of (in my opinion) equally important philosophical considerations. I will pay no particular mind to a specific time period or region, and, as I have said, I will treat this as an academic exploration. In many ways, this thesis is written in the style of a larger, argumentative essay, wherein I use facts, theories and thought processes to explore my hypothesis (stated below).

Traditionally, thesis projects are bound by leading questions that shape the authors research and the reader's expectations. The nature of this research and the narrative I hope to craft does not lend itself particularly well to a rigid question or set of questions. As such I have opted to succinctly state my thesis or hypothesis (my belief based on observation) and my ambition below:

I argue that archaeology is a profoundly useful tool that can offer both practical and philosophical perspectives to help orientate humanity in our modern-era battle for sustainability. Throughout the remainder or this document, I will create, deduce, or explore some of these archaeological and anthropological perspectives with you, the reader. I intend to provide a narrative that helps contribute towards a better understanding of humanity - the subject matter of our discipline -, contextualises the importance of humanity becoming more sustainable, and to reinforce the notion that the past and the disciplines that study the past, like archaeology, have an innate potential and obligation to help orientate humanity.

2. Let's talk about sustainability

First and foremost, I would like to establish and discuss a working definition for sustainability. This is hugely important when discussing any topic, but for a term as widely spread and overused as sustainability it is essential. In order to do this, I will rely upon the familiarity and accessibility of the Oxford English dictionary. Following this, I will briefly explore the versatility of the term sustainability, and how it changes depending on where/when it is being used. Finally, for context's sake, I will outline how society in general comes to terms with human interpretations of concepts like sustainability and address the overuse of the term in today's rather unsustainable world. That accounts for the next five pages of this document. Following this, each subsection of this larger chapter will have its own short introduction and conclusion.

2.1 Defining sustainability: standard definition.

Sustainability is somewhat of an elusive term: its popularity is inescapable, and yet its definition is inconsistent and not universally applicable. It is safe to say that most people have a vague notion of what sustainability means (White 2013, 213-14). At the very least, they relate it to actions and behaviours that help, or are less damaging to, the environment. A classic example that most of us are familiar with is the energy-saving lightbulb. Few of us truly understand how one lightbulb (albeit one that takes 3 seconds to light up) can be better for the environment than another, but we accept it and eventually strive for it.

There are countless definitions and nuances for sustainability, ranging from philosophical to biological to economic, but in the spirit of transparency, relevance, and accessibility, we will lead with the Oxford English Dictionary (OED) definition (2019):

> Sustainability: ''*The property of being environmentally sustainable; the degree to which a process or enterprise is able to be maintained or continued while avoiding the long-term depletion of natural resources''.*
>
> Sustainable: ''*Having the quality being continuable at a certain rate, and capable of being upheld/defended as valid, correct, or true''.*
>
> Sustain: ''*To support, maintain, uphold in good working order''.*

The OED definition of sustainability is strong. It captures the essence of the term, and is applicable in virtually every use of the word. However, by virtue of including one specific characteristic (the depletion of natural resources) it could be taken to imply that other aspects, such as the consequences of resource use (pollution), are not related to sustainability; at least not enough to include in the definition. While this may seem like a semantic point, I argue that it is an important one, and thus this definition alone is not fully sufficient. While the argument can be made that having a longer, fuller description would resolve this issue, I am not in favour of this either. It becomes too rigid, too cumbersome, and for the current/future aspects of sustainability that are inevitably not included in the definition, it would only strengthen the notion of redundancy. Some academics argue that a more generic definition, as given for ''sustainable'' and ''sustain'' by the OED, is more beneficial (Ramsey 2015). They argue that generic and abstract concepts can be understood through 'meaning-as-use', which in essence means that a term is understood by performing actions that embody the term. I think there is something to be said for this approach; the example of the energy-saving bulb at the beginning of this section is a testimony to its effectiveness. While most people may not be able to fully distil or explain sustainability in its entirety, we do (almost instinctively) come to terms with what it means through practice.

There is, however, a direct risk with this kind of approach, wherein the understanding of terms like sustainability are dictated by massive corporations who stand to gain more from maintaining the status quo than by changing it. Such corporations hold huge influence over our world and function comparably to 'elites'. Their ability to influence our behaviour through consumer-based trends and misinformation campaigns, as we have seen in the past (Keane 2020; greenpeace.org) is a realistic threat. That being said, the contemporary status quo, and particularly the status quo enjoyed by large capitalist companies, is very slowly beginning to buckle under the weight of environmental change and international social change. Take the recent Dutch ruling on Shell's emission cuts by 2030, for example (BBC 2021).

In order for something like 'meaning-as-use' to become effective, there needs to be a generic and solid understanding of a term or concept; a jumping-off point, as it were. In that regard, the OED definitions provide a solid, 'common sense' foundation that can act as a social reference point. For academic purposes, and for the sake of this thesis, I am also in favour of a philosophical foundation that acts as an anchor for this discourse and

exploration. Ideally the two should be relatable, couplable and develop through 'meaning-as-use'.

2.2 Defining sustainability: discourse definition

When we reduce sustainability to its core principles and step away from lightbulbs and fossil fuels, what we see is nature itself striving for balance. My definition and the OED definition are similar and yet subtly different. They are connected in much the same way an apple is connected to the trunk of the apple tree: both crucial elements of the same entity, but serving slightly different purposes. I view sustainability as: *things existing and performing actions in a way that does not jeopardise the future potential for things to exist and perform actions*. I propose this as the philosophical base for how we view sustainability throughout the rest of this exploration.

While archaeology and philosophy are saturated with definitions and interpretations of the word 'thing' (Hodder 2011; Olsen 2012; Wylie *et al.* 2002), and while they can be divisive, distracting, and arguably quite boring, I use the term primarily in this section to create a neutral definition.

Distilled, deliberate sustainability will always fall upon humanity, and while this may seem like a self-evident statement, it is an important point to make. More often than not, the issues we need to address were caused by our own hand. Coal is not inherently unsustainable. Coal is a sedimentary rock, comprised of organic matter consisting mostly of carbon. Human actions are the problem. Combusting coal, and particularly at the level we do so today, is unsustainable (Dayalu 2012). The 'fault' is not with coal, but with our use of coal. In line with my definition, our use of coal involves us existing and preforming actions that are jeopardising the future potential for us and many other living things to exist and preform actions.

A few points of notice on this definition of sustainability:

1) As existing itself is inherently active, the existence of one thing could in theory be inherently compromising or beneficial to the sustainability of another thing. While this leads directly into discussions about inescapable natures, and while it paints a rather drastic view on existence, I would ask the reader to simply keep it in the back of their mind. I will not discuss it explicitly again in this thesis, but it is

a useful check to have in place when discussing groups of humanity; particularly those that myself and others may paint overtly harmoniously.

2) I have chosen the word ''*thing*'' because it encompasses living organisms in the biological kingdom, but also ethereal concepts or systems that are subject to sustainability. Consider religion and culture: both things that exist thanks to action but are not action themselves. Furthermore, they are things that have the potential to impact other things and actions, simply by existing. This relates to point one, that the existence of physical or ethereal 'things' may be inherently impactful to another thing's sustainability. The terms environment and eco-system fall under this category as well, with the obvious distinction that environments and eco-systems are standardly defined as: being comprised of several living (biotic) and non-living (a-biotic) factors (Allaby 2020; Jones 2019).
3) The scope of my definition includes actions that: impact the *thing* existing, impact an environment, and impact other *things* that are existing.
4) Points 1, 2 and 3 lead me to view all systems on earth as explicitly and implicitly connected. This is known as Gaia Theory (Lovelock 2000), which I will expand upon in an upcoming section. Gaia theory is the active and passive framework through which I have viewed humanity and all life on Earth in the writing of this thesis. The impact of this lens is observable in the discussion section.

2.3 The implementation of terms: sustainability in society

In a societal sense, I believe a combination of all OED definitions is ideal. For something to be sustainable it must be *supportable, maintainable and upholdable at a certain rate while being defendable as correct or valid*. This is both concrete enough to be understandable and relatable, while leaving enough room and flexibility for embellishment and implementation across a broad spectrum. For example, when we apply the OED combined definition of sustainability to different scenarios, time periods, actions, or things, it will naturally change to better suit the discourse.

If, for example, we were to talk about the sustainability of seal hunting then terms and phrases tied to this phenomenon would become relevant. We would discuss the local environment, the local ecosystems, local communities, and local economies, and they would become essential in the shaping of laws, policies and social understandings of what sustainability means in that specific context. The terms and embellishments used for discussing energy-saving lightbulbs, on the other hand, would likely be rather different

than those used in the seal hunting example. That being said, they would both orbit the same key concept: sustainability. The focused applications of terms and embellishments create relatable ways for people to learn through 'meaning-as-use'. Despite the huge difference in the topics or implementations of sustainability, we are always looking at a combination of the philosophical and practical definitions. We are looking at the manners in which, existing/actions are interacting with the ability of things to exist and act, and we are looking at whether or not actions and attitudes are supportable, maintainable and upholdable at a certain rate while being defendable as correct or valid.

2.4 The overuse of the term sustainability

In 2021, as we proceed to use more energy than ever before, everything is marketable as sustainable (iea.org). Sustainable -farming, -fishing, -development, -management, -city planning, -shopping, -fashion, -production, -energy, and so on. Everything in our highly unsustainable world is now sustainable. While the core elements of sustainability may be present in each of its marketing uses, applying the term 'sustainable' to industries and practices that people generally recognise as wholly unsustainable breeds distrust and irritation. While it is of course fantastic that billions of people around the world are constantly confronted with a term that in essence means 'help the planet', sustainability has become a consumer trend that is in many cases little more than smoke-and-mirrors: 'Dolphin-safe tuna' that provides virtually no qualitative or quantitative methods for determining its validity (Brown 2005, 39-41). Ordering small consumer goods that arrive in excessively large packages made from 'recycled cardboard'. Becoming a vegetarian, while your taxes still aid in subsidising the meat industry. Our banks and pensions investing the money we place into them with companies that are likely to perform well, which for many years meant fossil fuel companies. Sustainability is essential, but it is also confusing, overwhelming, corruptible and at times disheartening. It can feel like we make personal sacrifices or attempts to improve ourselves, all in the pursuit of a better future, only to find out that we had, in fact, been doing it wrong all along. All things considered; this makes unified progress quite difficult. As Mark White said in their paper titled *Sustainability: I know it when I see it* "how can we hope to achieve a shared vision when we're not certain what vision we are sharing?" (White 2013, 213). We will explore more issues with sustainability in the upcoming pages, but for now, I would like to offer a small, mildly-optimistic view on our use of language.

I view the ‘corruption’ of the word sustainability in much the same way I view the term ‘renewable energy’. Calling energy ‘renewable’ is, scientifically speaking, inaccurate. Energy, according to the laws of thermodynamics, cannot be created nor can it be destroyed. As such, it is also impossible for energy to be ‘renewed’ (Dincer 2018, 265). For most of us this is a technical detail that prompts an eyeroll, but it is important to note. The lack of accuracy does not mean renewable energy, as we understand and use the term, is not a valid or useful form of electricity production. What it does illustrate, however, is that just like with sustainability, the words we use have a tendency to get away from us. Sustainability is a difficult word, and one that is often misused, but that need not distract or deter us from using it and striving for its key principles.

2.5 Why sustainability matters

It is incredibly challenging to clearly demonstrate the significance of sustainability; not because it is elusive, but because it is so glaringly obvious. It feels a little bit like discussing the importance of holding your breath underwater, or not doing that when on land. It is harder still to discuss it without inadvertently resorting to doomsday speech, but that is what I have attempted to do below.

Human beings, and perhaps none more so than our own species H*omo sapiens*, are strongly dependant on three pillars: the environment, our economies, and our societies (Giddings *et al.* 2002, 188-195). There is considerable nuance in each of these pillars, and there are arguably far more sub-pillars or additional criteria that could be used, but in essence, we need an environment, we need each other, and we need some manner of exchanging goods, tools, and knowledge. I have expanded upon these pillars below:

Environment: *Homo sapiens* are animals. Without a habitable and reliable environment, the species will ultimately die. Beyond that, the continued unsustainable use of global environments would cause untold damage to all six taxonomic kingdoms of life. A sustainable environment is pivotal for all current life on earth.

Society: *Homo sapiens* are also *human beings*, and have with varying degrees of intentionality created *humanity*. Without social justice and protection, while the animal species *Homo sapiens* may continue, many members of humanity would continue living lives that are burdened and cut short by inequal opportunities and fairness. Should the society pillar falter, *Homo sapiens* would likely continue for a time, but 'humanity' as we know it would cease to be.

Economy: The systems in place that permit *Homo sapiens* and *humanity* to prosper, design, innovate and grow must themselves be sustainable and sculpted with both peace and prosperity in mind. Our economies play a massive role in shaping society and the environment. Economies play a huge role in international relations and all forms of sustainability.

Archaeology has highlighted much of the human story, and we now have a fairly comprehensive sketch of how hominins have physically and socially evolved throughout time (Foley and Gamble, 2009; Gowlett *et al*. 2012; Renfrew and Bahn 2016, 167-175; Shultz *et al.* 2014). To that end, the last 300 years of human existence have not only

deviated profoundly from our past and how we evolved to survive, but it has seen *Homo sapiens* wreak unquantifiable degrees of damage on this planet and destabilase each of the three pillars to varying degrees. Of course, a majority of this damage is not of direct or immediate consequence to people. Polluting the ocean and the sky will neither break your leg nor will it cause your car to stop functioning. In fact, it might not even truly impact you as an individual during your lifetime. At least, that claim would have been true a few decades ago, to people already in their 60's. However, most predictions suggest that humans today will begin to see the impacts of environmental abuse and negligence within the next 20 years (weforum.org; Hébert *et al.* 2021, 1105-1107). *Homo sapiens* have done more large scale and lasting damage to this planet and the living things within it than any other species of animal to have ever lived. We have polluted the soils, the oceans, and the atmosphere, we have killed off many species of animal and plants (IPBES 2019, 238-241), we have drastically impacted the self-regulating climate of earth, we have created social disparities amongst our own species that structurally we do very little about, and we have based a majority of our economies on the extraction and use of unclean and limited fuel sources (Ceballos *et al.* 2015, 1-5; Cook *et al.* 2016; Sahney *et al.* 2010, 544-546). Some of these occurrences were accidental, some we didn't even realise we had done until years later, but all of them are the very real consequences of unsustainable behaviour and development. In simple terms, sustainability matters because it keeps the three pillars of human existence intact.

Economic instability and disparities, war, system collapse, societal collapse and ultimately species collapse are not only in our future, but in our present and our past. Sustainability is not a negotiable attitude that *Homo sapiens* can opt in and out of. Eventually the limits that we push and ignore will snap back and we will be forced to be sustainable, probably due to one of the aforementioned collapses. In that regard, the question shouldn't really be why does sustainability matter, but instead, at what population size will humanity decide to be sustainable? Seven billion, but of our own accord, or a number far less after we have triggered a series of events that render life on Earth much harder?

Sustainability matters because human beings have made themselves the central governing force on Earth, attempting to rival the natural balances developed by millions of years of careful evolution. Earth has undergone several mass extinction events, and transformations and life has always bounced back. Life may persist if we do not become more sustainable, but *Homo sapiens* stand to fall. While it might be poetic to think that

humanity disappearing from the face of the Earth may restore harmony to the planet and be the best possible outcome, I do not agree. I will expand more upon this in my discussion centring around Gaia theory.

To examine the question from a more positive, human frame of mind, there is much to be gained by recognising the importance of sustainability. Economic prosperity, species continuation, better and equal qualities of life, a mutually beneficial relationship with the global ecosystems and cycles. These are just a handful of outcomes that are achievable if our species opts for a more sustainable approach to life and development. We ensure future generations a fair and unburdened chance of existing and writing their own future, as opposed to living within the limitations that we set for them today. This 'intergenerational loyalty' is also something I discuss in a later chapter (hunter-gatherer education) of this thesis. It is not often that issues are presented so clearly in black and white, but sustainable behaviour offers a better present and future to more people than unsustainable behaviour does. Sustainability is important because it helps ensure the continuation and prosperity of life. Sadly, however, importance does not equate to simplicity. In the following segments I will explore some of the inherent difficulties with sustainability, before moving on to discuss a number of archaeological examples and perspectives that I believe can help orientate humanity towards a more sustainable future.

2.6 Sustainability: Subjectivity, Success, and Short-sightedness

In addition to being an overused and at times confusing term, sustainability is also highly subjective and hard to quantify. Below I will briefly discuss the subjective nature of sustainability, and illustrate how our ideals of success, a term closely related to sustainability, are also highly subjective.

To begin with an anecdote: imagine a pond surrounded by five houses. You live in one of these houses. The pond contains fish, and this is how you and the other inhabitants of the five houses survive. One day you notice that the pond is beginning to show signs that the overall number of fish is decreasing. So, what next? Do you tell your neighbours about this? Do you care about the fish decrease? Assuming you do, do you feel responsible for the decrease? Do your neighbours feel the same responsibility? Do you change your behaviour because of this? Do you trust the other houses to change their behaviours? Do you talk it out and risk slowly growing hungry together, or do you claim all the fish for yourself?

Sustainability impacts today and tomorrow, and depending on how you look at it, it can take an infinite number of forms that appeal to some, one or none of us. Sustainability is inherent to life, but not universal in its interpretation. Taking all of the fish for yourself offers a short to medium-term success and sense of sustainability. You can continue your life in much the same way that you did before you noticed the fish reduction. However, the other houses, your neighbours, are now in an incredibly difficult position; they have no food, and they had very little to do with that conundrum. You have sustained yourself, but you have not contributed to a sustainable neighbourhood, or a sustainable humanity. Moreover, eventually your fish will also run out. With no fish left in the pond, and none left in your pantry, you now have no food. Suddenly your decision does not feel particularly successful or sustainable.

It is easy to confuse success with sustainability. After all, any sustainable species is successful, and any successful species must be sustainable. However, we need only look to industrial gain at the expenses of the rainforests to see how inaccurate this is. In order to further display the lack of correlation between success and sustainability, and the lack of consistency in the term ‘success’, I have explored species duration and species number as metrics to measure success as a proxy for sustainability.

On the one hand, it is hard to depict *Homo sapiens* as anything but a species success story. After all, with no biological weapons or significant means of evasion we are still here. We control almost every inch of this planet, and, of course, a large percentage of *Homo sapiens* adhere to one of various sacred narratives that place our species as the rightful inheritors of the world, and the favourite creation of a god. If that does not warrant a gold medal in success, then surely nothing does. However, if we suspend that suspension of disbelief and just examine the evidence that we have, *Homo sapiens* success is rather fragile.

Our species has been around for c.300,000 years (Stringer 2003, 692-693). Compared to the average human lifespan (taken at any point throughout our evolution) this is a dauntingly long period of time. Assuming you place the generational divide at 16 years old, then 300,000 years accounts for around 18750 generations. That is your mother's, mother's, mother's, mother's mother 3750 times over. Undeniably an impressively long time for these generations to interact with the world around them, but on the other hand, almost every other species of the genus *Homo*, that is to say almost every other variation of human that has existed on this planet, had been around for considerably longer (Stringer 2003, 695; Hublin 2001, 99-100; Rightmire 2001, 129-130). *Homo erectus* was around for just shy of 2 million years. 2 million years is a staggeringly long time for a bipedal hominin with no natural defences to have survived, and it accounts for more mother's mothers than I would care to count. *Homo habilis* and *Homo rudolfensis* also left a longer timestamp behind them than *Homo sapiens* have thus far (Leakey 1973; Spoor *et al.* 2015, 83-85; Wood and Collard 1999, 195-197). As such, the time argument is not really applicable in meriting success, nor sustainability. The other *Homo* species, by virtue of existing for any given period of time, were successful and sustainable to some degree, and then they stopped existing. Moreover, if we examine just how much damage our species has done to the planetary eco-system in the short amount of time we have been around, and the even shorter period of time that we have been industrialised, the word 'failure' seems far more applicable than 'success' if we are discussing holistic, all-around sustainability.

Perhaps then it is more accurate to measure success in terms of biology and genetics? *Homo sapiens* measure 7.6 billion strong in 2021 and by 2050 it is estimated that c.113 billion of our species will have ever existed (Kaneda and Haub, 2021). Genetically this is a

huge success. Of course, when you compare this to any class of bacteria it becomes less impressive, but instead let's look at our closest living relative the chimpanzee. They boast only somewhere between 170,000-300,000. They are much better suited to their environment than us, and they are considerably stronger than we are (janegoodall.org.uk). They are better adapted to physical life, and yet we are able to reproduce in a greater quantity. Does that place us somewhere above chimpanzees and below bacteria? And what about the c.30 billion chickens that are alive today. Chickens are more complex than bacteria, and outnumber humans by almost a 3:1 ratio (Bar-On *et al.* 2018, 6508; Gorman 2018). Granted, they are farmed and kept by humans, but by the volume of their genetic code on Earth, chickens are far more successful than humans. However, given the condition that most chickens will endure from life to death, a drastically short period of time mind you, the word 'success' seems overzealous. And by that standard, if quality of life and wellbeing are factors that are necessary for success, statistically at least 1 billion people could either not be considered successful, or part of a successful species (unstats.un.org[a]). More than 1 in 7 humans live in poverty, more than 1 in 7 humans are exposed to untreated sewage water in their environment, just under 1 in 7 humans are illiterate and more than 2 in 7 humans do not have access to 'improved sanitation' (unstats.un.org[b]). Assuming your family consists of two parents, two grandparents, two siblings and yourself, that would mean one of those people was below the poverty line, one of them was exposed to untreated sewage water, two of them do not have access to improve sanitation and a fair chance that one of them (statistically your mother, sister, or grandmother, or yourself depending on your sex) cannot read or write. Anyone reading this will likely consider themselves as an individual with a sense of self, as part of a family, a friend, or a part of a community, or in some kind of social capacity before identifying themselves as a *Homo sapiens* (Maslow 1943, 382; Maslow 1971, 259-269). Humans are social, conscious creatures, and that surely has to factor into our success evaluation. Human success is undeniable, and yet at the same time, it is only justifiable when clear-cut, narrow parameters are established to frame the scope of consideration. If success is so intrinsically short-sighted, it cannot truly measure or replace the term sustainability.

To finalise this contextual segment on sustainability, I will briefly address two more issues: the modern sustainability paradigm, and the origins of sustainability (and why, even for an archaeologist, they ought not to matter).

2.7 The sustainability paradigm thus far

As this part of the contextual chapter has limited baring on the overall goals and discussion of this thesis, I will keep it succinct. While I wish to discuss sustainability of the future, fuelled by the past, it is important to recognise and understand the contemporary paradigm. I have generalised the modern paradigm under two main themes: technology/money, and the Millennium- and Sustainable Development Goals.

2.7.1 Technology and money: out of sight, out of mind

Thus far in our modern attempts to undo several years of industrial environmental damage we can observe a number of traits and norms that come together to form an unofficial paradigm. I think the best way to summarise this would be: ‘buy your way out of the problem’.

A simplified analysis of these characteristics goes something like this: population growth occurs thanks to technological advancements, these technological advancements occur because of human ingenuity, human ingenuity benefits from exposure to technology and other members of the species, our technological advancements and our ingenuity enable us as a species to do more with less. Our cleverness and our technology generate money, this funds more technology, which ultimately will undo our troubles by replacing or substituting the natural and finite resources that we have been destroying over the last several hundred years. Eventually this process becomes streamlined, efficiency is increased, and profit is possible. Ian Hodder's 2018 book discusses such entangled paradigms, summarising our relationship with them as the ''consequences of things and their webs of interdependence. These consequences produce contradictions, conflicts and contingencies that lead to problems that humans again deal with by using things. There is thus a continual dialectical drive towards change'' (Hodder 2018, 133).

This paradigm sounds reasonably credible, and to an extent, in certain lights at certain angles, it works as well. We were (and are) destroying the environment and making our economies vulnerable by depending on fossil fuels, but at the same time we have funded technological research into turbines and solar panels, which we used to harness wind, water, and solar energy. The problem, however, is that the streamlining process takes

time. In 2021 it is still not particularly environmentally, socially, or economically friendly to build green energy harnessing technology (Carrara *et al.* 2020, 45; National Academies of Sciences, Engineering, and Medicine, 2017; Painuly *et al.* 2021 545-549). Moreover, these technologies cannot meet our modern demands for energy and are only now starting to cross the 'breakeven' barrier for their cost/output ratio (Roser 2020). A darker aspect of this trend is that 'developed' countries often take or use resources from 'developing' countries and natural areas, therefore putting strain on the shared pool. Eventually this ends up creating a parasitic relationship, where money having nations bleed the world dry in an attempt to avoid the problems they are helping to create. On the richer end of the spectrum, this helps lead to the change Hodder talks about, and in a myopic sense it is beneficial for them. For the poorer end, and eventually on the global end, people suffer profoundly. Out of sight, out of mind. Myopic, and very dangerous.

2.7.2 Millennium Development Goals and Sustainable Development Goals

A slightly more positive aspect of the modern paradigm towards sustainability can be found in the form of the Millennium- and Sustainable Development Goals. While sustainability is baked into existence, most people today will likely associate a wide, international stride towards sustainability as being connected to either the Millennium Development Goals (MDGs), or their successor, the Sustainable Development Goals (SDGs). I have briefly outlined both of these programmes in order to provide some context as to how we view sustainability in our modern era (the last 25 years).

MDGs

The MDGs were designed to spearhead issues in traditionally less developed or 'poorer' nations. They strove to reduce income-based poverty, provide access to clean water and sanitation, lower child mortality rates, improve maternal health during and post pregnancy, tackle the spread of treatable or confinable diseases such as HIV/AIDS, malaria, and tuberculosis, improve education, focus on gender equality, develop global partnerships, and ensure sustainability (undp.org). Since 1990, more than one billion people have transitioned from below the poverty line to above or on it, child mortality has been halved, child dropout rates from lower education have halved and since 2000 HIV/AIDS infections have dropped by c. 40% (UN DESA, 2015). These are of course huge

accomplishments; however, as we discussed earlier, success is subjective, and project success is different from positive outcomes.

While strides were made in all of these areas, the goals themselves (the international agreed upon targets) were generally not met. The Secretary-General of the United Nations at that time blamed ''unmet commitments, inadequate resources, lack of focus, and accountability" for the failure (United Nations 2010). Others blamed the formulation process of the goals. Success, failure, and sustainability are incredibly subjective.

SDGs

The SDGs are described by the United Nations as a ''bold commitment to finish what we started [with the MDGs], and tackle some of the more pressing challenges facing the world today'' (undp.org). The 17 goals include: no poverty, no hunger, improved health, quality education, gender equality, access to water/sanitation, clean energy, economic growth, solid infrastructures, reducing inequalities, sustainable cities, responsible consumption and production, climate action, marine life focus, terrestrial life focus, peace and justice and partnerships (undp.org). Bold indeed. The SDGs are much broader than the MDGs, and therefore ideally more applicable to all 193 participant countries. The Sustainable Development Goals are intended as a "blueprint to achieve a better and more sustainable future for all" (un.org). Sadly, the COVID-19 pandemic has placed the achievement of the SGDs by 2030 out of reasonable reach (Nature 2020). However, it has also demonstrated how flexible and prone to change nations are. A failure of the goals does not negate positive outcomes, and a lack of 'total sustainability' should not distract from a shift towards sustainability.

The MDGs/SDGs offered a collective and semi-unified approach to understanding and tackling sustainability. These efforts focused primarily on the social aspects of sustainability, whereas this thesis is concerned largely with the environmental aspects. Be that as it may, the three pillars of human existence (environment, society, and economy) are deeply intertwined, and so the strength of one is the strength of all.

2.8 The origins of sustainability, and why they are redundant

This small section of text briefly addresses the archaeological tendency to search for origins. Origins and beginnings are not only fascinating, but they can prove to be highly important. However, now-and-again, they are also impossible to find and irrelevant to know. Sometimes we cannot find them because we simply lack the data as archaeologists, but sometimes it is because we are trying to project an attribute or trait inherent to life itself unto human beings. It is an easy mistake to make, but one that severely obscures our vision. This is why, at least for the scope of this thesis, I considered the 'origins' of sustainability to be redundant. I have illustrated this below in a small discourse that poses the question: how would we attribute the origin of sustainability to any given species of human?

Long before this planet hosted conscious primates, there was sustainability. In fact, the only reason that life as we know it exists today is because earth and its systems are fundamentally sustainable. There is more grass than gazelle and more gazelle than lion. A simple example, perhaps, but true, nonetheless. The living and non-living things on this planet have a rather unique relationship, and one that many people misconstrue. Life on earth is not simply a reaction to non-life. To this day, living organisms actively participate in the evolution and restructuring of earth (Lovelock and Margulis 1974, 2-4). An obvious and arguably sad example of this is humanity, but it is just as true for countless other species: big and small. The oceans and the atmosphere have evolved to be what they are today because of living organisms. The soils and sediments of this planet are fertilised and take form essentially because of living things. Living, dying, breathing, reproducing, all of these contribute to almost all of the cycles and systems of earth. Carbon and water move between living things and the atmosphere. Plant growth and ice formation cool the planet, cold-tolerant life persists and eventually consumes the plants, the atmosphere warms, ice melts and so on. Life is an active phenomenon that impacts living and non-living things. It regulates and balances itself. To quote Jurassic Park: "life finds a way". This is common knowledge to most people, and hardly a revolutionary point to make, but it is essential in understanding why sustainability cannot and should not be attributed to humanity. Sustainability enables prolonged existence. Sustainability is like time. Human beings defined and shaped the concept of time, and yet it existed long before our definition and it will exist long after we have gone. Time, much like sustainability, is a binding factor for existence. We have no idea (nor could we) when time or sustainability

was first consciously considered. To illustrate how problematic the search for origin can be, I have laid out the following hypothetical: assuming for a moment that we are arrogant enough as a species to actually try and credit hominins with the birth of sustainability, who would it be?

Homo sapiens formed hunter-gatherer groups and would move from area to area, living off the land and what it could provide. They would take what they needed with them and find what they couldn't take. Eventually they developed agriculture, settled, and cultivated societies that spread across the planet (Pinhasi *et al.* 2005, 2045-2046, 2056-2057; Renfrew and Bahn 2016, 169-171; Rowley-Conwy 2011, 431-433; Sokal *et al.* 1991). Can we credit them with the birth of sustainability? What about an earlier rendition of *Homo*? *Neanderthalensis* perhaps? We know for a fact their species lasted longer than our own has and we know they were passing down tool making knowledge and social customs for thousands of years, not to mentioned they were mending broken bones and caring for the sick (Spikins *et al.* 2019, 98-101). This too seems sustainable in nature. Still, perhaps a little unfair, *Homo habilis* was around long before that and also did considerably well (Leakey *et al.* 1965, 8-9). Why should the credit not go to them? Or what about one of the *Australopithecus* species? It is impossible and illogical to determine. Even as archaeologists, sometimes we must admit: the origin of a phenomenon need not be the focus of what we study. More importantly, we must recognise that hominins are not pivotal to the intricacies of the universe. That is not to say we are not important, essential even in some contexts, I simply mean to highlight that even the human past, arguably the most human centric story there is, need not place humans at the very epicentre of every phenomenon we see in the world.

Sustainability, as we have just started to explore, is a quality inherent to life. It is more than a marketing term or a clothing choice. The manners in which our societies attempt to behave sustainably is simply a modern, humanistic implementation of a foundational characteristic of existence. It is impossible, illogical, and unfair to attribute any species of human with the birth of sustainability. A subtle reminder that we, as clever and capable as we are, work within the laws of nature. Our intelligence is impressive, but we cannot claim ownership over every phenomenon. A life-centric approach to certain phenomena can result in a much more profound and beneficial understanding of them than a human-centric one. In fact, the next part of this thesis will discuss how humanity is simply a

conscious component of a multibillion year old, ever-changing eco-system, that self-regulates and helps promote the continuation of life on this planet. Next, we discuss Gaia.

3. Gaia theory: an introduction to life

As we touched upon earlier, Earth and Life are not wholly separate entities. In fact, the two have co-defined one another for billions of years. ''Gaia theory'' suggests that all living and non-living things, which are part of various and interlocked systems on planet Earth, form a singular overarching entity. This entity essentially behaves like one large system, and adapts over time so as best to aid in the continuation and perpetuation of life on the planet. Much like a patchwork quilt it represents diverse, different, and yet related elements that are bound together, thus creating something more substantial than the sum of their parts. As such, planet Earth behaves like a reactive, self-regulating, living thing, with the atmosphere being an extension of the biosphere (Lovelock 2003, 768-769; Lovelock 2000, 7-11). The conceptualist behind Gaia theory defines it as ''a complex entity involving the Earth's biosphere, atmosphere, oceans and soil; the totality constituting a feedback or cybernetic system which seeks an optimal physical and chemical environment for life.'' (Lovelock 2000, 10). In short, a 'living' Earth.

Gaia theory is a collision of insight and imagination that came about when James Lovelock (an English chemist, inventor, engineer, and author) was contracted by NASA (the National Aeronautics and Space Administration) to determine whether or not life on Mars was a possibility. Lovelock suggested the best means by which we can identify the presence of life is by looking for a reduction of entropy. Entropy is the second law of thermodynamics, but in simple English entropy can be defined as a lack of perceivable order in energy movements (on an atomic level). As such, entropy is a measurement of a systems (thermal) energy that has no ordered molecular motion. By virtue of existing (consumption, breathing, imbibing etc.), living things reduce entropy by reducing randomness and ordering molecular energy movement (Schneider and Sagan 2005, 15). By this logic, a planet that hosts life should have an atmosphere that shows some degree of entropy reduction; a reduction in wholly random structures. As we saw above, the atmosphere is an extension of the biosphere, created by and for living/non-living parts of a system. Lovelock's theory was later embellished by Dian Hitchcock, Sidney Epton and most so by Lynn Margulis (Lovelock 2016, 2-3). Coincidentally, at the exact time of writing this text, I see that NASA have successfully produced breathable oxygen in a controlled environment on the planet Mars; enough to let a human breathe for 10 minutes (nasa.gov). Gaia's atmosphere on Mars: the story comes full circle.

Lovelock considered other names briefly for this theory, for example, the ''Biocybernetics Universal System Tendency'' (Lovelock 2016, 10). Not as poetic perhaps, but it is hard to imagine a name like that conjuring up as much scepticism and controversy as ''Gaia'' did upon its conception (Lovelock 2004, 1). However, as I will discuss later, the selective manner by which human beings construct and word our narratives and realities has been fundamental in shaping our species. In fact, it will probably still have an important part to play as we battle for sustainability. The philosophy and core understandings that Gaia theory proposed are now commonly found under slightly different titles, for example, in the form of Earth System Science and other comparable disciplines/studies (Lovelock 2004, 1-4). While these titles may provide a more sober terminology, or disengage some readers from immediate prejudice, I find the term ''Gaia theory'' more fitting for this thesis. From now on, I will use Gaia or the Gaia system interchangeably with Earth and Earth systems. The term Gaia permits just enough creative imagination, which is both grounded in and vital to scientific reasoning, to conclude that after nearly 3.7 billion years of evolution and perseverance, life on Earth has created an emotional, intelligent, and interactive part of itself. Not something above itself, not a plague to be dealt with, not something infallible or conversely something cursed, simply a part of itself. A self-governing, conscious, and impactful species of ape that like all living things must take and give back. Humanity is an integral part of a multi-billion-year-old eco-system that helps ensure the continuation of life. As humanity has the greatest degree of consciousness and influence on the stability of this eco-system, I believe that it is our biological and social obligation to behave more sustainably. Even when considering sustainability as a bio-centric phenomenon, the ultimate burden and blame falls upon humanity.

For the ancient Greeks, Gaia was the personification of Earth who birthed the sky, the sea, and titans. Allowing for some romantic liberties, the sacred interpretation and the scientific interpretation do not diverge greatly from one another. Whether we find our understanding in the form of science or of sacred narratives, it is hard to refute the vision of our kind as an enlightened child of a fantastical, primordial force.

For all its talk of entropy and dynamic systems, Gaia theory is an astonishingly simple observation: life on this planet is connected. It does not simply borrow atmosphere, it generates it. It does not simply take its heat and light from the sun; it amplifies or restricts it. This is old knowledge, knowledge that anyone working in the countryside or with nature already understands, and knowledge that, as we will see shortly, likely formed the basis of the cosmologies and belief systems that accompanied human (social) evolution

across time and space. I argue that it is essential for our species to re-embed this knowledge and understanding into our life-ways once more; but more on that later.

Gaia theory will appear periodically throughout the examples that we will discuss in the upcoming chapters, where I outline a number of archaeological examples and perspectives that can help orientate us in our modern-era battle for sustainability. It will appear in greater force in the discussion of this text, as its basic philosophies are central to how I have viewed all life, and particularly human life, while writing this paper. For now, we will move on to part two of this thesis, and I will begin by discussing an ancient cave network in southwestern France, filled with palaeolithic rock art, and how the reaction to modern-era activity damaging the cave's atmosphere and the safety of the site can act as a useful parable for our approach to the meat and fossil fuel industry today. Up next: Lascaux.

Part 2: Using the past in the present (case studies)

Lascaux: an Upper Palaeolithic cave system

Cosmology: animism, and relationships with reality

Domesticates, agriculture and our connection to the past

Living in the Material World: the past, present and the future

Hunter-gatherer and indigenous education

4. Lascaux: an Upper Palaeolithic cave system

In 1940, Marcel Ravidate was walking his dog in Southwest France, when suddenly it disappeared down into a hole. While chasing after his dog, Marcel discovered that the hole was in fact a small entrance to a previously forgotten cave system, now called Lascaux (archeologie.culture.fr; Cannon 2006, 569). Marcel would later return with three of his friends and discover arguably one of the most captivating prehistoric finds ever recorded. The inner walls of the cave system were intentionally decorated with hand marks and paintings of animals, plants, and anthropomorphic figures (Breuil 1941, 12-13). This cave art dates back to somewhere during the Upper Palaeolithic era (c. 19,000 years ago) which makes it nearly four times as old as the great pyramids of Egypt (Ducasse and Langlais 2019 130-131, 137; lascaux.fr). To this day, it remains one of the most important and influential pieces of cultural archaeology we have for this time period.

There are many interpretations as to what the purpose or function of this art was. As they are not entirely relevant to this thesis, I will not go into great detail. Unsurprisingly, however, the common consensus amongst archaeologists is that it served some sort of ceremonial or ritualistic purpose (Commins *et al.* 2020, 918). Ritual or otherwise, the Lascaux cave system is a beautiful and rare insight into the minds and lives of our ancestors.

The paintings in Lascaux drew attention from far and wide. From 1948 onwards, hundreds of fascinated and well-intentioned visitors flooded the cave system each day and marvelled at the work of their ancestors. By 1963, less than 20 years after being opened to the public, the cave was closed. The influx of visitors had destabilised the atmosphere inside the cave. Heat, carbon dioxide and moisture had damaged the artwork and prompted the growth of lichen and fungi, which hastened the deterioration of the walls (Martin-Sanchez *et al.* 2015, 282-285). In less than 20 years, we had unwittingly managed to undo something that had survived for more than 17,000 years (Saiz-Kimenez *et al.* 2012, 2331). While the innocent participation of the public and poor management/oversight from governing bodies is already a poignant metaphor for 21st century sustainability, there are other important lessons to be learned.

After the cave system was closed to the public, a number of replicas were established. A piece-by-piece replica of the two main cave sections (Great Hall of the Bulls and the Painted Gallery) were created and displayed in the *Grand Palais* in Paris. By 1983, this replica was moved and displayed within 300m of the original cave, and originally

served as the only means for the public to view the site (archeologie.culture.fr; Martin-Sanchez *et al.* 2015, 285). The high quality and close proximity made this replica extremely attractive. It is known as Lascaux II. A few kilometres away from both the original and its replica, the centre of Prehistoric Art has also reproduced the over 900 instances of art from the original cave, using iron oxide, charcoal, and ochre; materials that were available and likely used during the Upper Palaeolithic (lascaux-ii.fr). There is also a Lascaux III and Lascaux IV. The former consists of five replicated cave segments that travel the world, and the latter uses traditional and digital painting techniques to create arguably the most accurate re-creation of the site available (archeologie.culture.fr; lascaux.fr; James 2017, 1367-1370). Lascaux (and Lascaux II, III, and IV) offer not only an exciting glimpse into our past, but a lesson as to how we could act in our present to create a stable future.

4.1 Lessons from Lascaux

As beautiful and intricate as Lascaux is, humans have come a long way from painting caves. Once upon a time our impact on this Earth could only be remembered by wonderful paintings in forgotten caves, but that is no longer the case. It is by no means an exaggeration to say that today humans have a consistent impact on every corner of Earth, and every aspect of Gaia. Where *we* wonder at the material fragments of our past, it is entirely possible that those who will look back on us will instead marvel at the little grottos and forgotten corners of the world that do not contain microplastics and pollution; should any of those still exist. Less optimistically, perhaps they will look back on ruined cities and collapsed societies. That is assuming there is anyone left to look back. For a species as impactful and far reaching as we are, sometimes, if even only temporarily, the most sustainable thing we can do is to simply stop doing something. Just like Lascaux, sometimes shutting the doors and authentic replacements are the best policy. While stopping ways of life, or consumerist norms, are vastly different than closing a cave, when we examine the sentiment of the follow-up actions there are parallels to be drawn.

Lascaux represented something beyond paint on rock: Lascaux was a connection with our past, a sense of wonderment, a piece of a puzzle, a scientific curiosity, a fun day out, and so on. It is very rare that things in life, be it past, present, or future, are unidimensional. Closing the cave to the public will have undoubtably had impacts beyond the intention of the plan. The degradation to the rock art was halted, but simultaneously, the fun day out was cancelled, tourism to the local area will have been impacted and the connection with the past was placed just beyond reach. But the rock art *was* protected.

Many of the buzzwords for sustainability today may seem unidimensional, but are not: Halt industrial fishing, disband the meat industry, cease fossil fuel usage and so on. We know these activities are damaging Gaia, and science and morality (almost instinctively) compel us to act. However, these industries remain. Immediately disrupting these norms would undeniably have consequences, as these are not small practices, and it is common knowledge that a great number of governments around the world subsidise at least one of them. However, the continuation of such practices is also out of the question. Upon closing Lascaux, alternatives were sought after. Authentic replications were installed, which simultaneously appeased the public and protected the rock art. We need to appease the public while protecting Gaia. Fortunately, we can already see trickles of this mentality within our own society.

4.1.1 The meat industry: stop and replace

Although not strikingly common during most of our evolutionary journey, meat became a staple in most societies and households by the end of the 20th century. In the last 20 years, global meat production has increased by 100 million tons, and the impact this has on the environment is monumental (Ritchie and Roser 2017; wri.org). Half of all methane emissions that can be linked to human activity, and two-thirds of all nitrous oxide output are directly caused by the global meat industry (epa.gov; Grossi *et al.* 2018, 69-70). For reference, nitrous oxide has c.300 times the warming effect that carbon dioxide has on the atmosphere. Methane has around 80 times the potency of carbon dioxide, but due to its quantity, it contributes to 25% of all global warming caused by human activity (Myhre *et al.* 2013, 714). On top of this, there is the issue of clearing natural and diverse land to house animals, and finding suitable sustenance and water for them. In short, we are actively destroying the self-regulating and cooling biodiversity across large areas of land, and sweltering our planet. The meat industry worldwide is obscenely and unnecessarily large, and yet, as the 20-year growth of 100 million tons would suggest, it has become a social norm. So, how does the Lascaux model apply here?

There are 17 million people in The Netherlands, an on average, each person who eats meat will eat around 77kg per year (www.wur.nl). However, The Netherlands also consumes the largest quantity of meat-replacement foods throughout the entire European Union. Hypothetically, were the meat industry subsidies revoked and instead directed towards more sustainable and authentic meat-replacement/meat-alternative foods, the environmental impact would be greatly reduced. Action is needed quickly, and it must be directed towards colossal industries. Stop industrialised meat production and replace it with something else.

Democratic human societies are not prone to making large scale or absolutist changes very quickly. This is in part due to the fact that, as discussed earlier, even our glaringly obvious mistakes are not unidimensional. The social and economic structures that we as a species have created for ourselves are so intricately interwoven that rapidity is arguably dangerous in most situations. As frustrating as it may be, public opinion and political policy take a long time. A recent example of this is Brexit: a misguided and lengthy general populous decision that took several years to actualise and realise. Another factor is that contemporary humanity is also highly focused on concepts such as the individual, more

specifically their rights and entitlements to freedom of choice. Rights are a fundamental glue for human social constructs, however, in the balance of rights vs. responsibilities, the latter has arguably taken a back seat. How else are we to earnestly explain the damaging continuation of modern-day meat-industries? These are complicated issues, of course, but we have sent our own species into space and created vaccines for micro-viruses: our lack of sustainability does not stem from a lack of intelligence, but from unwillingness.

In a hypothetical world where science and politics govern side-by-side (Plato-esque), the immediate cessation of the meat and fish industry, and a switch to a largely vegetarian, vegan, or (pending further upscaling) cell cultivated meat diet would have monumental benefits for Gaia (Poore and Nemecek 2018; Sinke and Odegard 2021, 26). The horrendous damage done to ocean sea floors and eco systems would stop and those areas would be allowed to heal, large quantities of land occupied by colossal livestock farms (and animal feed farms) could be allowed to redevelop a diverse and natural ecosystem as humanity uses the rest for the production of replacements. Soybean is a common protein for meat replacement foods, however, 85% of all soybean crop production is utilised for feeding livestock. It is estimated that unit for unit, when we compare beef, pork, and chicken protein with soybean protein, that animal protein farming take between 3-32 times more land to produce (Machovina *et al.* 2015, 426). Another particularly interesting alternative to meat comes in the form of a product called Quorn. Quorn products are primarily produced by utilising a single-celled protein or fungal protein known as mycoprotein (specifically *Fusarium venenatum*). In very simple terms, fungus is used to create 'fake meat' (quorn.co.uk). Quorn is estimated to have a much lower carbon footprint than livestock producers and uses anywhere from 6-12 times less wheat (or comparable feed) during the process. Less water is required, and the waste results are substantially lower (webarchive.nationalarchives.gov.uk; quorn.co.uk). Our economies and ways of life are not set in stone, there is no viable reason to prohibit the switch to more sustainable food types. Authentic replacements can serve to satisfy and to protect.

This text paints an optimistic image, but it is undeniable that there would be difficulties along the way. It is foolish to assume that Gaia would no longer suffer after this switch, but it offers a much-needed improvement. Lascaux: *stop and replace*.

4.1.2 Fossil fuels: stop and replace

Food production and consumption is vastly important, and many experts predict it will be one of the most challenging obstacles that our species will face in the not-so-distant future, however, the Lascaux parable is also applicable to our energy production methods. In order to slow global warming as a result of climate change, our species needs to massively reduce our greenhouse gas emissions. Many experts have argued that in order to avoid catastrophic and unstoppable damage (a run-away heating of Earth) this reduction must hit net-0 (ipcc.ch). As discussed above, one way to help this reduction would be to disband the meat-industry, another way, however, is to step away from fossil fuels.

As of 2021, around 84% of our global energy needs are met by fossil fuel combustion: 33% oil, 27% coal and 24% gas. By comparison, only c. 12% is supplied by renewable sources: around 7% is tidal and the remaining 5% is solar/wind/biofuel/hydro/geothermal combined. The remaining 4% is nuclear (bp.com; climatewatchdata.org; Roser 2020). The struggle we face is balance: we need to be able to step away from fossil fuel without setting ourselves back hundreds if not thousands of years. One of the most effective ways to set aside fossil fuels would be to switch to electric energy as much as possible. Electricity is very easily produced by energy sources and technologies with much lower emissions, however, our demand for electricity grows annually, and the problem we currently face is that most of the electricity we use today is still provided by fossil fuel burning. One potential solution to this comes in the form of nuclear energy.

France obtains 67% of its national energy from electricity that is powered by nuclear reactors. On top of that, 23% of the national energy is supplied by renewable sources like hydroelectricity. Fossil fuel combustion accounts for only 10% (Ritchie and Roser 2020). Renewables are undoubtedly the future of electricity on this planet, but they still have a long way to go. It is either too windy or not windy enough; the sun doesn't always shine; seasons cause dips throughout the year; we cannot yet store electricity effectively enough to compensate, and so on. As such, we are presented with a choice. We can either go forward with fossil combustion until we fix the issues with renewable energy sources, and risk obliterating the planet in the process, we could mandate forced energy cuts across the globe, or we could use nuclear power.

It would be foolish to mention nuclear energy and pretend it is not commonly regarded (by non-experts) as dangerous and scary. This image was primarily caused by horrific nuclear disasters such as Chernobyl: when an outdated reactor core system malfunctioned, and the government tried to hide the disaster. To briefly examine the statistics behind the fear of Chernobyl: the European Green Party predicts 60,000 premature deaths have come about because of Chernobyl's fallout. Most other studies, whereunder falls the WHO's studies, account for much lower numbers that orbit around 4000 (Fairlie and Sumner 2006, 11-12; inis.iaea.org). Every death is a tragedy, be it one or one hundred; however, they do serve as a meaningful proxy for fear and danger. Let us quickly explore additional energy-type deaths.

Renewable energy deaths are generally limited to construction and maintenance accidents as they have such low negative outputs. In these categories, hydroelectric dams have been the biggest cause of death. Hydro works by building dams at different heights with turbines in between them, and allowing a controlled amount of water pass through to spin the turbine thus generating electrical currents. Hydroelectricity dams present a number of issues, one of which is the environmental impact they have as their construction usually decimates local ecosystems. However, we are now focused on humans. Hydroelectric dam failures have killed hundreds of thousands of people (Sovacool *et al.* 2016, 3955-3959). Dam breaks release catastrophic quantities of water at high speeds, levelling any and everything in the vicinity. The death toll of hydroelectric dam malfunctions eclipses even the most pessimistic Chernobyl estimations.

At any rate, both of these numbers pale in comparison to fossil fuel related deaths. The most common gases produced by the combustion of fossil fuels include ozone, sulphur dioxide, carbon monoxide and nitrogen dioxide. It is well known that these gases aggravate and cause conditions such as bronchitis and asthma, heart issues and emphysema. It is estimated that 29% of all lung cancer, 24% of all strokes, 43% of chronic obstructive pulmonary disease (lung disease) are linkable to fine particle fossil fuel pollution (who.int). It is also estimated that around 8.7 million individuals died because of fossil fuel combustion each year (Vohra *et al.* 2021, 1-6).

The energy debate is both complicated and exasperatingly simple: we cannot continue as we currently are. It is illogical to expect the populations who have access to as much electricity and energy as they want to drastically reduce their usage. It is also unlikely that their politicians, who require their favour, would enforce these cuts. As such, we must

halt fossil fuel usage and simultaneously find an authentic, non-disruptive means by which we can maintain a similar level of production to today. For example, nuclear and renewable. Lascaux: *stop and replace*.

5. Cosmology: animism, and relationships with reality

Religion, belief, and cosmology more so than most other characteristics, are wholly unique to human beings. In contemporary society, these phenomena still hold an active and passive influence on all of our lives. Even when we identify as agnostic, atheist or simply as belonging to one school of thought over another, everything from our laws to our taste in music has been profoundly influenced by several past and present religions. Cosmology, religion, belief systems, world ways, and other comparable terms, all denote the manner in which human beings view their world over time (Abramson 2018). As is the case with most archaeological material, solid evidence for established and shared cosmological beliefs becomes incredibly difficult to find at a certain point, however, as the saying goes: absence of evidence is not evidence of absence. Given the human capacity for conceptual thought, it is not illogical to assume that ethereal belief systems accompanied humanity throughout its evolution, long before we left enough traces of it behind to be found thousands of years later.

I argue, even if for nothing more than context, that understanding how we view the world is hugely important in our battle for sustainability. In the upcoming pages I will argue that religion, cosmology, belief systems, or world views throughout a majority of the human past have encouraged a particular type of relationship between human/environment. I will explore the concept of animism, discuss Martin Buber's ''I and Thou'' theory, and introduce the notion of factual and practical realities. In short, I suggest that a cosmological divergence in how humans view the world has greatly impacted how we interact with nature and is therefore, at least in part, responsible for our current issues with climate change and sustainability. Before we get to that, however, I will briefly explore two proxies that I find useful for suggesting the presence of an ethereal belief system in humanity. This should provide some impression as to how far back the existence of cosmologies or belief systems could extend.

5.1 How to find a world view? Burial

As a general rule, the further back in time we go, the harder it becomes to find material evidence for social or religious phenomena. At a certain point, the evidence for a semi structured or shared belief system become virtually non-existent. As such, we are forced to speculate about cosmologies that may or may not have been upheld. These speculations are based on a general understanding of humanity (past and present), and various theories and paradigms. In order to substantiate these ideas, decisions must be made as to how we can proxy the identification of world views. A proxy, in this case, is when one thing represents (the existence of) another thing. When searching for the existence of worldviews that extend beyond the rational of biological programming, I argue that simply looking for something beyond the scope of normalcy is a solid place to start. While human beings are undeniably animals, we do have particular quirks and characteristics that set us apart. For example, we tend to bury our dead. While this may make complete sense to us today, the act of purposefully, meticulously, and repeatedly removing dead bodies from the active physical world that all terrestrial beings interact with is wholly unique to the broader human group.

While burial may be unique to humans, other species within the primate group have demonstrated a very clear awareness of death. One particularly interesting example of a non-*sapiens* primate interacting with death can be found in chimpanzees. In 1989, when observing a group of chimps, researchers witnessed a female member of the group being killed in a leopard attack. Following her death several male chimpanzees gathered around the dead body and issued loud, continuous calls, after which they all sat in silence for some time. Eventually, lower ranking group members and female members made their way through the circle to inspect the body, while two high ranking males began to groom the dead bonobo's fur (Boesch 1991, 226; Boesch 2012). Even after hundreds of thousands of years of social evolution, revolutions and fluctuating norms, there are still notable similarities between us and our primate cousins. This story and others like it offer a fascinating and thought-provoking window into how earlier hominids may have interacted with death. Death, in many ways, is the part of dying not experienced by the individual. It is the aftermath and social disruption that survivors feel. The higher primate ability to 'understand' death is another reason as to why observable interactions with death serve as valuable proxies for belief systems.

5.1.1 Qafzeh burial

If we take the intentional burial of humans as a proxy for some degree of ethereal thought process, we find evidence for it in modern-day Israel as far back as 100,000 years ago. This period is known as the middle Palaeolithic era; commonly referred to as 'the Stone Age'. Qafzeh cave or Kedumim cave, is located in the Lower Galilee region, to the south of Nazareth. Within the cave system, archaeologists discovered a number of stone tools and anatomically modern *Homo sapiens* remains (Vandermeersch and Bar-Yosef 2019, 256, 260-273). This in itself is an interesting discovery, as the tools included scrapers, points, and cores, which may suggest some degree semi-frequent presence on the site. However, more importantly for this discussion, there are two specific burials I want to discuss: a double burial of an adult and a child, and a singular burial with additional intentional deposit (offering, grave good etc.)

One of the Qafzeh skeletons belonged to an adolescent male: a 13-year-old boy. The body was lain on its back, with the boy's skull slightly raised or angled so it could lean against the wall of the burial area. His legs were folded up towards his stomach and leaned off towards the right of his body, and his pelvis was covered (and crushed) by a large limestone block; the only block of that size found in this particular layer. The boy's arms were arranged in such a way that his palms were facing skywards and lay beside his neck. A large piece of deer antler had been placed across the boy's chest, and the attached deer skull fragments strongly suggest that the deer was killed on a hunt (because when deer shed their antlers naturally each year their skulls remain fully intact) (Vandermeersch and Bar-Yosef 2019, 268).

The skeletal remains of the double burial were slightly curled on their side, facing North-South, and consisted of an adult and child. Analysis of the adult bones (ischio-pubic index, the sciatic notch and under-pubic angle) suggests that the individual was a young woman, around 20-23 years-old. Dental analysis of the child, and the fact that not all of the bone epiphyses had fused, suggest they belonged to a 6-year-old. The skeletons were manipulated into particular positions that simply do not correlate with accidental death or deposition. The layers above and below this burial slope and angle themselves on an incline, however, the bodies remain entirely horizontal. This suggests that the area was dug out and a pit was prepared before the bodies entered. Both bodies were buried at the same time: neither skeleton showed signs of disturbance, and the homogeny of the sediment suggests that the burial had not been re-opened. In conclusion, what we see

here is the simultaneous and intentional burial of an adult and small child 100,000 years ago (Vandermeersch and Bar-Yosef 2019, 267).

Structured burial with embellishments such as antlers or simultaneous internment goes beyond the rationality and practicality of other animal species. It strongly suggests some degree of ethereal tendencies, or at least a sentimentality that stretches beyond the practicality of 'objective' physical life. There are many other fascinating and (to varying extents) speculative examples of early burials, that range from de-fleshing amongst Neanderthal groups (Rougier *et al.* 2016, 1-7) to additional early grave goods, and eventually early cremation in *Homo sapiens* (Bowler *et al.* 1970, 56-58). At any rate, burial as a proxy for belief systems extends far back into the human past.

5.2 How to find a world view? Figurines (Lion-Man)

Other proxy types for identifying religious or cosmological belief systems occur later in human history, but also provide a larger degree of insight as to what said beliefs may have entailed. The so-called 'Lion Man' from Städel is an ivory piece that has been carved to display a zoomorphic figure; a cross between a lion and a man (Ebinger-Rist *et al.* 2018, 416-417). Such artifacts are known as figurines, and this specific one, found in Germany, dates to c. 40,000 years ago. The Lion-man figurine, which has since been reconstructed with fragments obtained from various excavations, measures 31cm tall, over 5cm wide and nearly 6cm thick (Ebinger-Rist *et al.* 2018, 429-432). The design was carved using a flint knife, and the base material is mammoth ivory. While it is largely unsubstantiated to discuss the value of ancient materials and time-allocation, the level of craft and skill that went into creating such a realistic figurine out of something as hard and rare to obtain as ivory strongly suggests that this figurine held significance. The accuracy and detail also imply that the creation of such an artefact must not have been a one off, but instead a repeat activity; one with certain standards or expectations that correlate to a substantial level of importance. This figurine represents a clear ability for the human mind to conceive of concepts, such as half-man half-animal entities, that exist purely within an ethereal, imagined space. This is an inherent trait and characteristic of cosmologies, which also rely on the ability of the brain/mind to imagine and construct ethereal phenomenon. While separated by thousands of years, this artefact is just as recognisable in what it is and how it was made as the later figurines from Summer, Egypt, or Rome.

5.3 How to find a world view: anthropology

Another valuable tool for understanding the past, and specifically people of the past, is anthropology and ethnographic studies. Today, a majority of Earth's 7.9 billion humans live sedentary, city-bound, capitalist lives, however, throughout the modern-era a number of hunter-gatherer groups have endured and still practice a 'traditional' lifestyle (Kramer and Codding 2016, 4-6). Utilising the chronicles of information that anthropologists produce when interacting with contemporary hunter-gatherers or indigenous 'non-modern' groups, archaeologists can gain valuable insights. In this context, the value of anthropological analysis is particularly relevant for the fragments of culture that are not necessarily linked to material remains, or aspects for which remains no longer exist, like cosmology and world views. By observing ethnographic studies through an anthropological lens, we can carefully apply the obtained perspectives or considerations unto the past and (as archaeologists) speculate about how similar societies may have viewed their worlds long ago.

There are countless instances of anthropological studies on cosmology and worldviews that all essentially make the same conclusion: a large number of hunter-gatherer groups view themselves as a part of nature, and consider other living things as equally important entities (Low 2021, 2; Zvelebil 1997). While there are also accounts of comparable cultures who exhibit dominating and predatory attitudes towards nature (Knight and Rival 1992, 12), I am comfortable to move forward with the working hypothesis that a majority of indigenous, non-modern, traditional or hunter-gatherer groups, comparatively speaking, display a greater and more profound degree of respect and awareness towards nature than 'modern Western' society.

I have no intentions of rehashing the Obeyesekere vs. Sahlins debate on cosmology interpretation and bias across these pages, but I will say this: comparison and contrast provide ethnography, anthropology, and archaeology with a sense of applicability. It is not infallible, nor unchallengeable, but it is a reliable base from which to work from. As we proceed throughout this chapter, whenever necessary, I will readdress the nature of anthropological analysis and the difficulty of understanding ethnographic studies through a western lens, and why certain aspects of it are susceptible to certain difficulties.

I would like to close this section with an anthropological example from Tim Ingold's ''The Perception Of The Environment'' (2000). This example stood out to me when reading the book because of how well it correlated with the discussions that follow in this chapter: animism, I-Thou perspectives, and relationships with reality. This is a short but insightful analogue on how The Cree perceive their relationship to other animals within their local eco-system, and how respect flows between the human and non-human elements of nature.

5.3.1 The Cree

The Cree, who reside primarily in the North-eastern regions of Canada, are skilled hunters. When hunting a reindeer, as both the Cree people and wolves do, there is often a crucial moment that will either result in the deer living or dying. At a certain point, the chase will halt, and the deer will turn to confront their stalker. Instead of instantly fleeing, the deer will remain incredibly still and lock eyes with the predator. Below I have outlined how this is experienced from two perspectives (Ingold 2000, 13-15):

1) The Cree experience this moment of pause as an act of recognition. As they understand it, the animal registers what has happened and what will happen in the near future. As the deer stops, it offers itself up as sustenance for another living thing. When the standstill is initiated, the Cree will accept this gesture offer and launch projectiles at the animal. The energy and the physical body of the deer (caribou in North America) is thus not taken, but instead received. From their perspective, a successful hunt does not end in death, perse. The pursuit of the animal is just as important as the offering it makes (Ingold 2000, 14).

2) Biologists experience this moment of pause as an act of recognition. As they understand it, the animal registers what has happened and what will happen in the near future. As the deer stops, so too will the pursuing wolf. Both animals will compose themselves for a moment after an exhausting chase. The deer will usually initiate movement again, either in a final flee attempt or in a charge. As the deer has a split-second head start it retains a final advantage. Success is determined in a linear manner, from either the wolf or the deer's perspective (Ingold 2000, 14).

5.4 Animism, and our shift away from it

5.4.1 Animism: definition and pitfalls

Animism is an anthropological term that denotes a world view wherein all 'things' have some degree of spirit or essence to them. This includes, but is not limited to, animals, plants, streams, the weather, and even (at times) human tools and structures (Hallowell 1964, 51; Harvey 2006, xi). However, as anthropology is in and of itself a Western academic pursuit, it often fails to appropriately understand or truly encapsulate the essence of what it studies (Sahlins *et al.* 1996, 416). In that vein, ''animism'' is not a religion, and it is not a label used by the communities it is applied to. In fact, most research has suggested that groups adhering to animism rarely distil the belief into a singular term or phrase within their own language, as it is so inherent to their way of life and cosmology (Swancutt 2019, 1-3). As a majority of Western countries -particularly areas with a colonial past- are heavily shaped by Christianity, it is difficult to properly articulate and understand animism. Christianity has ensured that the acknowledgement of spirit and essence in anything beyond humanity has been rendered heresy and idolism in the West by centuries of nature objectification and division between the worldly and the divine (Sahlins *et al.* 1996, 411). When attempting to describe animism we are forced to use words that have been constructed to describe 'our' world view, based on our reality and our history; so we inevitably fall short (Hallowell 1964, 50-56). Alternatively, we could use words native to various communities that come closer to describing the phenomenon than we can. This, however, requires some degree of prior knowledge and the ability to relate to foreign terminology. Later in this section we will discuss a case study from the Nayaka people, and use some of their terminology to better understand their world view, but for now, we will proceed with a general and contextualising description.

Unlike organised and hierarchical religions, animism does not attribute or imply values and stature unto things, instead it experiences or acknowledges them. The basic philosophy behind it is that no other 'thing' is entirely passive in the existence for any other living or non-living thing. Every 'thing' has some degree of influence on the existence of another 'thing' (Bird-David 1993, 120; Bird-David 1999, 69). Agency is acknowledged in all matter, and there is no direct or lasting split between the ethereal and the physical (Bird-David 1999, 74-75; Hallowell 1964, 50-53). I believe one of the best ways to paraphrase and mentally transliterate animism is a quote from Graham Harvey, who said that animism is the belief that ''the world is full of persons, only some of whom

are human, and that life is always lived in relationship with others'' (Harvey 2005, xiii). Animism is the view that all things hold a sacred importance to life, and that the relationships that emerge between things are of the upmost importance. In this light, one of the key elements of animism is being a 'good' and balanced entity who partakes in these relations (Hallowell 1964, 75-78; Harvey 2005, xi). As the fundamental aspects of animism include balance, relationships, respect, and a certain degree of (by modern standards) humility, I argue it is not unreasonable to suggest that earlier cosmologies and worldviews like those held by the individuals buried in Qafzeh, or those who carved the Lion-Man figurine, would have closely aligned with it. Examining the world from this perspective, Gaia theory seems like an ideal bridge between animism and 'science'. This is something I will revisit later.

5.4.2 Animism: what happens when we make the shift?

As a (comparatively) elevated relationship with the environment and life itself is a key aspect of animism, it does not seem particularly farfetched to deduce that the Pagan pre-Christian religions of Europe and beyond were animistic in nature. Beyond this, I would argue that it is entirely logical to conclude that our general transition away from this type of relationship had dire consequences for the natural world. Our gradual transition into monotheism, and the subsequent de-elevated status of all other life forms helped manifest a string of disengaged and distance cultural systems across countless modern societies. These systems and world views have enabled the continuous exploitation of the Gaia system for hundreds of years (Sahlins *et al.* 1996, 411-416). Forests, rivers, animals, and environments that were previously regarded as sacred, equal, or simply important, were stripped of their status and obliterated for capitalist or religious progress. While Marshall Sahlins is well known for adopting this standpoint, Wendell Berry also recognised Christianity's culpability in the degradation of the natural world, and its ''uselessness'' in ''any effort to correct that destruction'' (Berry 1993, 149). Lynn White also claimed that anthropocentrism was established in Judaism, is observable throughout the Hebrew Bible, and that the Judaeo-Christian faith perpetuated this attitude across the world for centuries (Taylor *et al.* 2016, 1000-1001; White 1967, 1205-1206).

The introduction or adoption of rigid economies and agricultural systems has also played a huge role in humans re-thinking our relationship with the environment. The perception and connection that humans adopt in order to survive in a hunter-gatherer environment is vastly different than those adopted in a sedentary agricultural environment. This occurs for a handful of reasons, one of which is that colonialism, Christianity and forced economic/agricultural regimes have a long and bloody history together, however, assuming for a moment we can remove that from the equation, it is also true that in an agricultural economy plants and animals adopt a clear and necessary monetary value, and they require a higher degree of active manipulation (Russel 2011, 297-299). The adaptation of agriculture is almost an absolute trend at this point in time. There are virtually no communities on Earth that do not practice or engage with agriculture to some extent. Somewhere around 12,000 years ago, Homo sapiens began a multi-thousand-year (and dubiously named) process called the Agricultural Revolution. This process saw a steady global adaptation of agriculture, abandonment, or reduction of hunter-gatherer mentalities and life-ways, and laid the foundations for a cosmological

shift away from the ideals of animism. As this shift and the ‘’agricultural revolution’’ occurred so long ago, contemporary examples of this transition are rare and not particularly well documented, however, the Kattu Nayaka people of South India offer a rare modern-era instance of how this change impacts human-nature relations. I will explore this example below, as we discuss Danny Naveh and Nurit Bird-David’s work, and how they sought to examine the impact of subsistence strategies changes on epistemologies, ontologies, and cosmologies.

5.4.3 The Nayaka, and their shift

In 1978-9 Danny Naveh observed the Nayaka people and documented their subsistence strategies (Naveh and Bird-David 2014, 74-89). He recorded that the Nayaka gathered, collected, and hunted in order to sustain themselves. Occasionally members of the Nayaka would work at local plantations for periods of time, however, according to Bird, this practice was viewed by the group as 'wage-gathering' and thus did not distract from their identity as hunter-gatherers (Bird 1983,57-83). Both Bird-David and Naveh have examined Nayaka and their cosmology over the years, concluding that the group viewed their environment as being comprised of 'who' elements, and not 'what' elements. The 'who' was perceived as personhood (*Mansan* in their native tongue), and consisted of entities that shared experiences, resources, and themselves with one another (Naveh and Bird-David 2014, 75, 80, 87). Below I have outlined a brief but illuminating example of how inherent this belief system is.

The forest, in which the Nayaka reside, was home to many different animals. Amongst these animals were two elephants. An Indian state office had intended to capture one of these elephants and asked for the Nayaka to assist, but they refused. The office was successful, and one of the elephants was caught. Throughout the next handful of years, the remaining elephant would go on to kill two members of the Nayak community; two brothers. After both deaths, the elephant was sympathised with, empathised with, and remained unharmed. The group attributed the elephant's actions to its grief and anger at the loss of their mate, and knew it was not acting maliciously or with ill intent towards to Nayak. When asked about the death of the brothers, a surviving relative of the siblings went on to say this: ''there is nothing to say about it. We are living in this forest and this elephant is also living in this forest'' (Naveh and Bird-David 2014, 77).

As of 2003-4, the Nayaka people had retained a number of hunter-gather practices, but they had also successfully managed to introduce cultivation, animal husbandry and the use of domestic plants into their subsistence strategy. To this day, the Nayaka are able to cultivate tea, pepper, rice, coffee, and a handful of other plants at lower quantities (lemongrass, cardamom, and the like). Several families own and house chickens, cows, and dogs. The cows and chickens are primarily kept in order to sell their products, such as eggs, milk, and manure, to non-Nayaka communities (Naveh and Bird-David 2014, 78).

Interestingly, Naveh and Bird-David observed that these animals and domesticates that the Nayaka have recently introduced for economic gain are not viewed as *Mansan*, persons, 'who' or even as subjects of the Nayaka. They are viewed as 'things' (Naveh and Bird-David 2014, 79). This perception allows the Nayaka to treat the 'things' with aggression (hurting them, insulting them etc.) and generally in a manner that is considered wholly unacceptable for the other *Mansan* of the forest who are not used for economic gain (Naveh and Bird-David 2014, 79-81). Elephants, bears, deer, and all other wild entities are considered as *mansan*. The Nayaka are considered *mansan*. Trees and wild plants are also considered *mansan*. Cows, chickens, dogs, and cultivated plants are not *mansan*. To quote a member of the Nayaka ''these I grow so I can stell the leaves and buy what I need in the shop. They are not *mansan*'' (Naveh and Bird-David 2014, 80).

The Nayaka represent a community of hunter-gatherers that modified their cosmology, or had the cosmology modified, in accordance with the transition to sedentary-centric economies. Their environment transformed from a conglomerate of solely living entities to one wherein *mansan* could be reconsidered and reduced to objects. This represents a fundamental shift in world view, and has direct implications for how this group interacted with these objectified plants and animals. They were not longer afforded the respect, protection, and agency that they had previously enjoyed.

As we have seen above, cosmologies and world views help constitute our relationship with reality. For the Nayaka this relationship with reality shifted when they introduced agriculture into their subsistence strategy, and subsequently their relationship with the world was altered. Having and understanding a relationship, or relationships, with reality is hugely important, particularly for *Homo sapiens*. This is discussed more throughout the coming pages as I explore the notion of factual vs practical realities, and Martin Buber's I-Thou theory.

5.5 Relationship with reality: factual and practical realities

All living things share two fundamental truths: 1) they will die, and 2) in order to avoid premature death they must have an established relationship with reality. For example, most plants need sunlight, and without it they will die. Provided the plant can receive sunlight, their chloroplast will house chlorophyll reactions, and they will transform the radiation from the sun into the sugars they need to exist. This is (part of) a plants relationship with reality. If something were to alter a plants relationship with reality by restricting or abolishing its ability to obtain sunlight, the plant will eventually die. Human beings also depend on this relationship with reality: if we do not eat enough or drink enough, just like any other living organism, we will die. ''Reality is that which, when you stop believing in it, it doesn't go away.'' - Philip K. Dick, 1980. An interesting quote, and one that is as true for plants as it is for humans. However, they key word here is believing. The human ability to have, express and retain conceptual thoughts adds another dimension to the equation of reality, as humanity is free to construct perceived or practical realities that run parallel to factual reality. They are passed on from generation to generation and have a monumental impact on how we act. We have seen this in the Qafzeh burial, the Lion-Man figuring, and the Nayaka shift. As such, our relationship to reality should not only be viewed in terms of the ability to understand reality, but instead, the ability and wilfulness to distinguish between realities.

Today our species lives in an age of globalisation and interconnectivity. While the privileges of this world do not extend to all humans, anyone reading this text very likely has the freedom and ability to access an unfathomable amount of information simply by taking their phone out of their pocket. Even a quick search on the internet will provide enough raw and processed information on our reality to determine that the Gaia system has been rapidly warming for years and that we are making it worse day-by-day. This begs the question, if so many of us can read and write, if so many of us have received education and exposure to global information, *how* are we still in this situation? I believe that one of the reasons for this can be found deeply intertwined with our species social evolution. Namely, practical realities were (and are) monumentally important for human survival.

Practical realities, or practical truths, are interpretations of the world that – while not demonstrably factual – have an influence on how we live our lives (Wilson 2002, 220). I would like to briefly demonstrate the difference between a factual and practical truth or reality with an anecdote from my native country of Ireland, namely, the Hawthorne tree.

Of the many trees that call Ireland home, the Hawthorne is probably the most well-known. Hawthornes have leafage of around 6cm in length, with lobes and little teeth on the tips. Hawthornes flower with small, five petalled flowers, usually white but occasionally with a pink or purplish hue to them. The fruits of the tree are small dark red berries, tart in flavour, and they contain a singular seed. The trunk and bark of the Hawthorne is not smooth, but instead hosts a number of nooks and crannies that frequently house insects and small plants or mosses. They are resilient trees, growing well in fertile soil, rocky enclaves, and mountainsides. Hawthornes belong to the family *Rosaceae* and the genus *Crataegus.* Hawthornes are trees and contribute to various life cycles (Encyclopædia Britannica 2015). This is factual reality.

Hawthornes are known by another name in Ireland, namely; the Fairy tree. Hawthorne trees are the traditional home of the Fae, the original inhabitants of Ireland. The Fae are magical and mischievous entities, but when provoked can be extremely dangerous. Cutting down a Hawthorne will bring death, and damaging the branches or limbs will bring varying degrees of bad luck unto the perpetrator. Everyone in rural Ireland knows of a friend, a family member, a neighbour etc. who accidentally damaged the tree and would go on to break an arm, or a leg, or lose their crop. It is for this reason that lone Hawthorne trees can be spotted in the middle of farming land around Ireland, surrounded by piles of rock and stone. I myself have seen housing areas built around Hawthornes instead of disturbing them. There are recorded instances of entire motorway constructions being bent around the Fairy tree (Deegan 1999). I consider myself a scientist, and a (largely) sensible person. I grew up a Roman Catholic but stepped away from the religion, became an atheist and have since abandoned that term in favour of more useful and meaningful pursuits, such as Gaia theory. Be that as it may, as we say in Ireland, I wouldn't cut down a Hawthorne tree 'for love nor money'. This is a practical reality.

Practical realities are all around us. The beliefs surrounding religion are practical realities. Ancestor worship and the inherited divine right to rule are practical realities. Whether or not they are true (which is not the same as factual) is not important. They have helped

weave a tapestry of human history since the very beginning. Every society you can think of, from the ancient Romans to the Italian winners of the Euro 2020 football championship, are substantiated and propped up by practical realities.

I argue that practical realities are, at least in part, why so many of us have a hard time acting against the degradation of Gaia, against global warming or against climate change. This is why so many of us believe sustainability is a leftist drama. This is why so many of us will happily rally for right wing political parties that advocate a reduction of women rights and structurally target refugees. Practical realities, be they 'good' or 'evil', are how humanity has tethered itself to reality for thousands and thousands of years. This is why stories are so important, why the Nayaka devised *mansan* and non-*mansan*, why some old paint on a French cave wall attracted so many thousands of visitors. Human cognition runs on practical realities, on stories. The battle we are currently facing involves one of two things: undoing millions of years of hominid social evolution, or creating a better narrative than 'the other guy'.

The terminology of factual and practical truths is borrowed directly from David Sloan Wilson's ''Darwin's Cathedral''. One of the more profound statements the author makes, that illustrates the point I am making very succinctly is as follows: ''factual realists detached from practical reality were not among our ancestors. It is the person who elevates factual truth above practical truth who must be accused of mental weakness from an evolutionary perspective'' (Wilson 2002, 228). The dire situation we find ourselves confronted with is unpleasant and requires a drastic realtering of perception, attitude, and norms. We have to elevate factual truth, to run with it, and to allow it to be woven into the practical realities that keep our world turning. We will come back to this point during the discussion.

In 1923, Martin Buber published a book called Ich und Du, which was later translated into English under the title ''I-Thou''. The crux of the book is that the I-thou relationships that humanity holds for one another, and by extension between us and 'God' or 'gods', are relationships that elicit, demand and generate respect. The relationship that we experience with nature, however, would be classified as an ''I-It'' relation. I-It relations facilitate lenience, passiveness, and invite hierarchy. In short, I-thou is love, while I-it is use. It is my belief that for a majority of human evolution, hominids loved their world. I mean this in the most sincere and non-Romanticised way possible. We can see this in the

earlier recordings of the Nayaka; they undoubtedly held and still to some extents hold an I-Thou relationship with nature. The Cree, who view their interaction while on a hunt as a respectful form of sacrifice and offerings, they hold an I-Thou relationship with nature. It is also my belief that we now exist in a world where our relationship with nature and the Gaia system falls almost exclusively under the I-it paradigm, and that needs to change. Soon.

The existence of an I-Thou relationship, held between hunter-gatherers and their world, and between religious practitioners and their gods, permits concepts such as loyalty, love, accountability. If we manage to re-establish this relationship between the conscious and non-conscious elements of Gaia, that is to say humanity and everything else, we may be able to learn from the past, act in the present and be loyal to the future of our Earth. Religion and cosmologies are narratives. They are used to understand reality, but perhaps more importantly to relate to it. If we as archaeologists are willing to play a role in shaping humanity's relationship with reality by using our knowledge of the human story, if we can establish loyal behaviour towards the Gaia system on an intergenerational level, then we can truly call ourselves a discipline concerned with the human story. The past is generated every second, simply by virtue of the universe existing. Every star in the sky that has ever inspired a poem or encouraged a wish existed in the past; we see the echoes of star light, long after it has left its source. We exist because the past has happened and is happening. Archaeology, for some, may be the study of the past, but archaeologists are people of today, who are co-responsible for creating the future. We must do more.

5.6 Receiving reality: disconnect between truth and science

While there are numerous sources and papers available on the observable impact of climate change, I have opted to use NASA's website to have this short discussion. I have done this because upon Google searching phrases such as ''climate change'', ''climate change evidence'', ''how to see climate change'' and ''is climate change real'' NASA's website appeared within the top 3 results consistently. As one of my ambitions with this thesis was to write a more accessible and relatable piece of work, the information that the general public

have quick and easy access should either be sufficient enough to discuss here, or serve as an alarming wake-up call.

One of the most important aspects of science is that it does not directly concern itself with what we call 'truth' in our day-to-day lives. This can be a confusing, and frustrating obstacle to overcome when people are asked to trust in science. After all, how can you trust if there is no truth? Science and scientific hypothesis are concerned primarily with probability, or how likely something is to happen given certain circumstances. While this may seem like a very philosophical and somewhat arrogant distinction for science to make, it does not mean that science and scientists ignore truth on a societal level. For example, the chances of the sun rising tomorrow are astronomically (no pun intended) high. As such, we can accept that as true: tomorrow, the sun will rise. In fact, it is not simply a fabricated truth, it actually follows scientific principles. We use logic to understand truth. The sun has risen every day that we have been alive, and every day that everyone we know has been alive, so therefore the sun will rise tomorrow. Moreover, we know the earth orbits around the sun, and after a period of around 12 hours half of the world is in the dark and the other half is facing the sun. The sun will rise tomorrow. However, mathematically, and scientifically speaking, the chance that the sun will not rise tomorrow is not zero. There is an infinitesimally small chance that the sun will in fact not rise tomorrow. If scientists were to speak in social truths and logical truths, much of our calculations, theories and frameworks would be dangerously inaccurate, and this would have critical consequences for the world. Take the COVID-19 vaccines, for example. Pfizer is said to have a 95% effectiveness rating (Pfizer 2020). In terms of social truth, most of us would be happy to take a risk that was 95% in our favour. Those are strong odds. If there was a 95% chance that we would win the lottery, we would all sign up. While 95% is outstandingly high, governments, doctors and the public/privet sector need to be aware that while highly effective, the vaccine is not 100% effective.

Knowing what to do with information is important. Ignoring something because it's 'truth rating' (so to speak) is at 95% and not 100% is arguably even more dangerous that social truths in science. So, for a scientist, the phrase '' it is

true that the sun will rise tomorrow'' actually means ''it is true that there is an incredibly high probability of the sun rising tomorrow, and therefore, in non-scientific writing and debate, we can agree that it is true''.

When NASA make a statement, or publish information, that says ''the current warming trend is of particular significance because most of it is extremely likely (greater than 95% probability) to be the result of human activity since the mid-20th century'' (climate.nasa.gov) what they are saying is 'climate change is real, the planet is warming up, and the huge warming we see from 1950 onwards has been caused by human beings'. The sun will rise tomorrow, and human beings have drastically increased global warming.

Understanding how people perceive reality, and how people distribute reality (through information) is fundamentally important. Without doing so, the disconnect between individual or group realities may never be bridged. While this does not directly relate to the subject matter of archaeology, it is entirely relevant for how we communicate our information, as we are (depending on who you ask) a hybrid between the arts and the sciences. This is also a rather important example of how realities or world views are not simply a fantastical phenomenon to be attached to fairy trees or hunter-gatherers. It is still wholly important for our world today.

5.6 Animism: a glimmer of hope

Although no longer the dominant social framework in Western societies, I would suggest that animism never truly disappeared. So much of how we view the world is dominated by what we see, but if we shift our view away from the largely Christian West, there remain a number of prominent religions that embody the essence of animism. This is true for Shinto, in Japan, Hinduism and Buddhism, and Neopaganism.

It is estimated that around 3-89million people practice Shinto (depending on how you define practice), c.5-10 million are neopagan, 600 million follow Buddhism and 1 billion follow Hinduism (Pew Forum on Religion and Public Life 2012, 28-32; st-andrews.ac.uk; state.gov) This alone accounts over 1/5 of the entire human race. Animism and cosmologies that are guided by an innate reverence for life and nature have not disappeared, they are simply not what we are confronted with on a day-to-day bases in Northwestern Europe. Of course, this is not to say that areas with a higher rate of 'reverence' are currently acting in a manner that is better for the planet. China and India have contributed colossally to greenhouse gas emissions over the last 15 years in an attempt to grow their economy, after watching the UK, Europe and the United States do the same thing for decades. Our societies are still dominated by elites in the form of governments and economies that have increasingly benefited from being at odds with nature. That, however, is a topic for another paper. My point here, is that animism, and the world view that it helped create, did not disappear, 4/5 of us simply stopped paying attention. Humans are still inherently very prone to projecting and acknowledging personhood onto over living and non-living things. Every time we speak to our pets, shout at our computers, or plead for our cars to start, we are subconsciously acknowledging or creating agency and essence.

I would like to make two brief , optimistic claims about the existence of animism. The first is primarily anecdotal, but should not be underestimated. The second offers an example of how New Zealand has embodied traits of animism in some of its modern laws on sacred areas.

5.6.1 St. Brigid brings the Spring

A ‘religious’ sense of balance and reverence for nature may be an ancient concept, and one that has been largely displaced, but it is not a thing of the past. Within many cultures, including my own, we can still observe traces of how our ancestors interacted with their world. Below, I have outlined an example from Irish culture wherein older, nature-bound notions of religion and culture still exist, tucked away inside Christian traditions.

I grew up in the countryside of Northern Ireland, in a house just outside a Catholic village called *Port a' Pheire* or Portaferry. My grandparents had bought the house soon after marriage and raised their five children there. The area had around 10 distinct surnames, and the family linages went back a considerable length of time. Beyond what many would call simple Irish superstition (don't gift scissors to someone you care about, you must wave at a magpie to mitigate bad luck etc.) the area retained an appreciation for certain aspects of older Irish culture. A fine example of this is the celebration of St. Brigid’s day. Brigid is a Christian Saint who, by use of a magical cloak, secured grounds from a stubborn king so that she could build a church to God. However, throughout my youth, and back beyond my grandparents’ youths, Brigid retained many characteristics of her pre-Christian self. Brigid or Brig was an Irish, pagan goddess. She was a member of the Tuath De (Gaelic pantheon). Her divinity is associated with nature and healing predominantly, but also poetry. Brigid brings around the coming of Spring and light each year on Imbolc, the 1st of February. In Ireland many of us consider Spring to begin on the 1st of February, instead of the 21st of March. This is still when I consider Spring to start, after 11 years in The Netherlands. Brigid’s Christian feast day remains the 1st of February, and traditionally we leave small pieces of fabric outside for her to bless, we rake hearth ashes smooth so that she may leave a symbol and we weave special off-centre crosses out of green rushes and hang them above doors to protect against evil.

Just an anecdote perhaps, a story, but as I have said: the human mind runs on stories. Growing up we respected Brigid, and the Spring. We only took rush stems from areas that had them in abundance, and we knew the heling or power she brought was the spring itself running through her. A messy collision of superstition, religion, factual and practical realities, but one that offers some remnant of hope that these attitudes and ways of life are not entirely gone.

5.6.2 New Zealand, and the personhood of places

The protection of buildings or heritage sites is, at its core, the recognition of a value that does not correlate directly with biological rationale. We believe things hold value and worth in an ethereal, social sense, and thus we respect it. A hopeful example of this can be found in New Zealand.

The Whanganui River in New Zealand spans over 290km, passing through the North Island, traversing snow, volcanoes, and green valleys. This river is a sacred entity for the Whanganui tribes, who take their name and essence from the it (Lenihan 2016). For over 800 years the Whanganui has formed a key component of their identity and sense of self. In addition, it has provided transport, safety, and food for generations (Lenihan 2016). The Maori (the indigenous Polynesian people of New Zealand) and the Whanganui tribes had been fighting for years to protect the river, and in 2017 the New Zealand government granted and fully acknowledged personhood rights to the Whanganui River.

The protected and acknowledge status of the Wanganui as an entity of personhood means that harming the river is the same as harming a member of the tribes. It protects it against industrial, capitalist, state or individual abuse and interference. A year later, in 2018, Mount Taranaki (a 120,000-year-old volcano) was granted the same level of protection and acknowledgement as it is a sacred area for the Maori (Evans 2020; Smith 2018; New Zealand Ministry of Jusrice). An inspiring, and important example of the previously mentioned quote ‘’the world is full of persons, only some of whom are human’’ (Harvey 2006, xi).

6. Domesticates, agriculture and our connection to the past

As I mentioned at the beginning of this thesis, the value of archaeology does not lie exclusively in providing tomorrow's answers today. Context and understanding are also hugely important in orientating ourselves. Exploring how and to what extent we are connected to the past is extremely relevant for a number of reasons. Not only because it helps archaeologists know how and where to look for answers about the present/future, but because it helps establish the past as a resource that other people may gradually come to rely upon and support. Following this train of thought, below I have illustrated how connected we are to our past by demonstrating that a vast majority of what we consume today has accompanied mankind throughout history, at times from as far back as 11,000 years ago. After that, we will explore modern agriculture, possible alternatives with roots in our deep past, and examine how a lack of proper understanding and respect for an environment can lead to total devastation.

6.1 Humans, and other domesticates

If, as I said earlier, the human mind runs on stories, then at least in the modern-era, the human body runs on domesticates. Domesticates refer to plant or animal species that *Homo sapiens* have forced to undergo a series of genetic modifications, primarily through processes like selective breeding. After several generations, the geno- and phenotypes of these organisms are entirely different from their wild counterparts. This virtually always occurs so that they may better suit human desires (larger grains, more wool, less aggression etc.). Some domesticates can no longer reproduce naturally without the intervention of *Homo sapiens* (Larson *et al.* 2014, 6140).

Almost everything we put into our body is comprised of domesticated plants or animals. Fruit and vegetables, meats, meat replacements, cereal, bread, noodles, and rice all fill our supermarkets, city markets and cupboards, and are all (made with) domesticated organisms. *Homo sapiens* are the only species of animal to have ever existed that survive entirely off plants and animals that they have learned to propagate, modify, and control. At first glance, statements like this might provoke some sort of wow-factor, but in reality, the fact itself is not very surprising. Most humans today simply have no other option but to depend upon domesticates. There are simply too many people on Earth to successfully hunt and gather products from nature like our ancestors did. Using what we know about hunter-gatherer subsistent strategies, most research suggests that somewhere between 10 and 100 million hunter-gatherers could utilise the Gaia system successfully (Burger and Fristoe 2018, 1138). The upper limit of 100 million would boast a global population size lower than that of modern-day Ethiopia (worldbank.org). As of 2021, there are nearly 8 billion humans on Earth. Not to mention, the skills and knowledge required to truly live with or off an environment exist in a very small percentage of humans today. The amount of modern-day humans that could successfully hunt and gather without getting hurt, poisoned, or starving to death is incredibly low. Human beings are almost entirely dependent on the world that earlier humans have created for us. In that regard, we do not differ greatly from the other domesticates we now depend on.

When we examine the evidence we have for domesticated plants, we can see that wheat (*Triticum dicoccum*), peas (*Pisum sativum*), barley (*Hordeum vulgare/sativum*), rice (*Oryza var.*), flax (*Linum usitatissimum*), beans (*Fabaceae* family), and maize (*Zea mays)* were domesticated between 9000-7000 BC (Piperno *et al.* 2009; Weiss and Zohary 2011; Zhao 1998; Zohary *et al.* 2012, 1-2). During the previous section, when we discussed the Qafzeh burial and the Lion-Man figurine, we were confronted with dates such as 100,000 years ago, and 40,000 BC. By comparison, dates like 9000 BC might seem relatively recent. In actuality, 9000 BC is over 11,000 years ago and in human terms it would consist of over 680 generations. Every single empire that has ever existed has risen and fallen during this time period (Matthews 2003, 127). By 5000 BC, cotton (*Gossypium*), grape (*Vitis vinifera*), bananas (*Musa acuminata* ssp *banksia*), and avocado (*Persea americana*) had been domesticated (Perrier *et al.* 2011, 11313- 11315; Smith 1969, 135; Wendel *et al.* 2010, 15-17; Zohary *et al.* 2012, 125). 5000 BC precedes Petra, the Egyptian pyramids, and Stonehenge (Hemeda and Sonbol 2020, 1; Pearson *et al.* 2007, 639; Renfrew and Bahn 2016, 169-175). With the exception of eggplant (*Solanum melongena*), vanilla (*Vanilla* family), cranberry (*Vaccinium subg. Oxycoccus*) (Gaut *et al.* 2015, 709; Lubinsky *et al.* 2008, 128; Weese and Bohs 2010, 51) and a small handful of other species, every domesticated plant on earth is hundreds if not thousands of years older than Christianity, Buddhism, Islam, and Judaism (Gellner and Gombrich 2015, 886-887; Humphries 2015; Lapidus 2012, 31-37; Buckser 2021, 1).

The same is also true for the domestication of animals, all of which we still interact with today. There is evidence for the domestication of dogs (*Canis familiaris*) that predates the oldest known city in the world by many thousands of years (Sablin and Khlopachev 2002). Sheep (*Ovis aries*), pigs (*Sus scrofa*) and cattle (*Bos taurus*) were domesticated by 8000 BC, and chickens (*Gallus gallus domesticus*) by 6000 BC (Alberto *et al.* 2018; Caliebe *et al.* 2017; Buitenhuis 1983 in MacDonald 1992, 304; Smith 1995, 66-67).

Modern predictions estimate that there are somewhere between 5 and 8 million different species of animals and plants on Earth, with approximately 1.5 million species that have been named and registered. Of these 1.5 million known species, 2,500 plant species have been domesticated (a large number of which have nothing to do with sustenance) and less than 50 are domesticated animals (Costello *et al.* 2013, 413; Meyer *et al.* 2012, 30-31). With regards to animal species specifically, only certain types of animals are suitable for domestication. Jared Diamond identified six traits that an animal

must have in order to stand a chance of being domesticated, namely: broad appetite, quick maturation, docile non-aggressive natures, susceptible to social hierarchy, able to breed in captivity (willingness to breed), and a tendency to not be overtly skittish (Diamond 1997, 169-175). This in and of itself greatly reduces the number of suitable candidates, and goes some way to explaining why we have remained so dependent on the efforts of our ancestors from thousands of years ago.

Humanity, in spite of our prowess, have managed to domesticate only a small fraction of life on Earth, and a vast majority of this domestication occurred thousands of years ago. Of the very few domestications that have occurred throughout the last c. 400 years, a majority have served as regionalised, short-lived economic profits. For example, *Struthio camelus var. domesticus*, the partially domesticated ostrich species from South Africa that was spurred on by colonialism and Victorian-Era fashion trends (Boum and Bonnie 2015, 19-21). While it is true that we have moved into an era of genetic modification, this endeavour has proven to be not only controversial, but it has predominantly acted as an amplification and enhancement of the selective breeding and domestication of plants and animals that, once again, occurred long ago (Van Tassel *et al.* 2020, 1-3).

In short, the things we use to make our world go round outdate almost every single characteristic that we define ourselves by today: our nations, our political alignments, our religions, and many of the philosophies that helped create our sense of self. We have been playing with the same building blocks for thousands of years, and we are highly dependent upon them. The present, and by extension the future, are not simply connected to the past, they are products of it. We live in a world created by other people, and in turn create a world for future generations.

6.2 Agriculture: past and present

Agriculture has been mechanised and industrialised for the better part of two centuries in some parts of the world. This mechanical shift offered a boom in production and the ability to create a profitable surplus for nearly anyone with good ground. Such advancements have helped feed nations and boost economies around the world, however, while human progress need not be demonised, it does not come without its drawbacks. Beyond the fact that purchasing and maintaining machinery cost money and/or expertise, industrial farming is a heavy pollutant and devastating for local ecosystems (Chandini *et al.* 2019, 77-78). A combination of this, and the current global warming concerns, many communities around the world have begun reutilising ancient farming techniques that have accompanied our domesticated crops throughout human history. It is of course not feasible to expect the entire human population to turn towards domicile farming, or to expect the abolition of industrial farming with nothing to replace the global scale of demand, however, for communities that have the space and the means to become more self-sufficient in this way, archaeological and cultural information regarding the growth and harvesting of domesticates can be invaluable.

6.2.1 Modern single crop agriculture

Commercial large farms operate on the basis of growing and selling one crop as fast as possible. Given the current economic market, this makes sense. One plant is predictable, sellable, requires one type of treatment, and the demand is consistent. While this offers benefits to the farmer and companies that buy the produce, the prolonged use of a singular plant species can drastically degrade the ecology of the soil it is grown in. As the crop will take the same nutrients from the same soil year after year, eventually the soil develops a severe mineral deficiency and can no longer support said crop (Magdoff and Van Es 2000, 54-56; Mousavi and Eskandari 2011, 484). To make matters worse, if the mineral composition is heavily altered, the soil will effectively die and become entirely unusable.

In order for plants to grow, they need nitrogen. Nitrogen is naturally available to plants through a process known as bio-fixation, as plants can leech nitrogen compounds from the atmosphere and the soil. In addition, humans expose their crops frequently to animal manure and older decaying plant residue, which increases the amount of nitrogen that is readily available. This, however, accounts for only half of the nitrogen needed and used to produce crops on a 21st century scale. The remaining c. 50% come from artificial, inorganic, nitrogen-rich fertilisers (Smil 1999, 415). As I have said before, there is little sense in demonising human progress, but we must also recognise the consequences of it. Artificial fertilisers have helped facilitate our global population increase and helped feed the human race. They have also, however, led to widescale environmental degradation and pollution. Chemical fertilizers frequently contaminate local soil and water sources, and have proven to be toxic for other living things, such as birds, pollinating insects, plants and in many cases humans. In addition, prolonged fertiliser exposure leads to damaging salt build ups, heavy-metal contamination, and an excessive accumulation of nitrates (damaging to plants, animals, water, and soil) (Chandini *et al.* 2019, 77-81).

A major player in the field of fertilizers and genetically modified seeds, is the US based company Monsanto. Monsanto is estimated to produce and supply up to 90% of all soybeans in the United States of America alone, and has a long history within the chemical production industry. The company's seeds are modified to withstand their own brand pesticides, herbicides, and fertilizers, all of which are known to have adverse impacts on non-GMO Monsanto seeds in the vicinity of their use (Hettinger 2020; Waltz 2015). Most

of Monsanto's chemical products have been deemed extremely probable human carcinogens by the World Health Organisation (iarc.who.int), however, as this company has a monopoly on seed production and sales, many governments around the world continue to buy their products.

Not only is this an example of how monocrop agriculture is not a sustainable practice, but it is also a blatant example of elite institutions, both in a governing and capitalist sense, compromising safety and sustainability over economic gain; but more on that later. For now: vast areas of single crop use, dominated by pollutant companies, is by all accounts an undesirable situation. Unfortunately, for many countries around the world, it is a reality. However, as the next example will demonstrate, there may be alternative agricultural methods available to us through examining the past that could pave the way towards more regional and sustainable farming.

6.2.2 Companion planting and the Three Sisters

Companion planting is a form of agriculture previously and currently practiced by many cultures and indigenous communities around the world. In fact, it is essentially the same principle that the Dutch supermarket Albert Heijn employs with its ''*Moestuinmaatjes*'' campaigns. As the name might suggest, companion planting involves planting various complimentary plants together so that they can benefit one another as they grow. This is a direct contrast to contemporary industrialised mono/single crop farming, and it offers a number of clear-cut benefits. As we have discussed before, the human past and human evolution itself depended upon our balanced and knowledgeable relationship with an environment. As such, it is hardly surprising that our species has held a unique sense of crop health and growth for many thousands of years. That being said, it is still worth illustrating with examples.

There are written sources as far back as the second century AD wherein Roman scholars detail the negative impact of having certain plants within proximity to one another. For example, this excerpt from Marcus Terentius Varro: ''*The manner in which your neighbour keeps the land on the boundary planted is also of importance to your profits. For instance, if he has an oak grove near the boundary, you cannot well plant olives along such a forest; for it is so hostile in its nature*'' (Varro. Rust. 1, 223, 6). Of course, this is not the same as companion planting, and on first glance it may seem like the polar opposite, but it does follow the exact same logic, namely that planting certain things together has consequences; sometimes positive, sometimes negative.

6.2.3 The Three Sisters: Corn, Beans, Squash

While there are numerous examples of companion planting across the globe, both in the past and present, this phenomenon is probably best known for its use by the indigenous groups in the Americas in the form of the Three sisters: squash, maize, and beans. I will first explain the relationship between the plans and the benefits of their simultaneous growth occurring in the form of native agricultural methods. Afterwards, I will briefly highlight the history and the longevity of this approach to agriculture.

In order to plant the three sisters together, a flat-topped mound of soil of approximately 30cm in height is raised and impregnated with corn seeds. Occasionally, in order to

promote fertile growth, small dead animals or plant residue are included in the mounds. When the corn seeds germinate and sprout to around 15cm in height, beans and squash seeds are planted in the same mound, a few centimetres away towards the edges. As the corn continues to grow, so too do the squash and beans. The tri-plant set up creates an effective localised microclimate wherein the participating organisms help ensure one another's success. While the corn's initial growth leeched a great deal of nitrogen from the surrounding soil, beans are excellent bio-fixers, and can easily redeposit nitrogen compounds back into the soil. This pairing alone essentially replicated the benefits of crop rotation (a different species each harvest) while yielding multiple species at a time. The corn operates as a natural stalk for the beans to climb on, and once the squash begins to grow, its leaves will spread across the ground. Not only does this greatly reduce the possibility for weeds to grow by blocking sunlight, but it helps reduce moisture loss, and finally, when the leaves of the squash plant deteriorate they form a natural nutritious mulch. Depending on the specific species of plants used, they can also offer additional benefits, such as pest protection in the form of spiny stems, or through the attraction of pest predators (Mt. Pleasant 2006, 529-536).

Various botanical and ethno-agronomy studies have covered both the existence and longevity of the three sisters polyculture. The Seneca, an Iroquoian tribal group, call the three sisters unity ''Diohe'ko'', which means 'these sustain us' in their native language. Beyond, or perhaps better said, in complimentary fashion to the utilitarian benefits of this style of agriculture, the ''Diohe'ko'' appear in a number of myths, ceremonies, sacred narratives, and cultural memories of the Seneca people (Lewandowski 1987, 76-77).

Multiple studies, and native testimonies, have placed the existence of this kind of intercropping/companion planting/polyculture to at least 500 years before colonial contact was made with the native groups of the Americas (Hart 2000; Lewandowski 1987; Zizumbo-Villarreal and Colunga-GarcíaMarín 2010). That would suggest that native communities have been practicing this methodology since at least c. 1000 AD. However, there is archaeological and archaeobotanical evidence for these three plants being grown together in various regions dating back to c. 5000 BC (Smith 2001, 1325-1326). Given the acute knowledge these communities had regarding their local environment, and how essential it was for their survival, it is by no means a stretch to conclude that these plants were intercropped together for thousands of years. Additional research has concluded that while the three sisters agriculture may not have occurred continuously in mound

form for thousands of years, the ‘’milpa’’ farming method was almost certainly used. The ‘’milpa’’ agricultural method includes the intercropping of various species of plants, unsurprisingly frequently including corn, bean, and squash, but also other species, in close proximity and allowing them to grow together (Zizumbo-Villarreal and Colunga-GarcíaMarín 2010, 813-814). Whenever the soil began to tire, the fields are left for an extended period of time (in the modern-day for up to 8 years) in order for the soil to replenish itself while adjacent land is used and cycled through.

What we see here is not only the unity of three plants, but a unity of the physical and ethereal aspects of a community. It is an extension beyond the pure physical necessity of farming, and I would argue it is highly indicative of a deeply nurtured respect for nature, or the Gaia system. In a purely ‘scientific’ sense, this style of agriculture represents not only an awareness but also active manipulation and engagement with micro-climates and habitats by indigenous communities, rendering them and their deep history once again an invaluable resource for human sustainability. However, as we will see on the next page, the human past is comprised of both best and worst practices. While the indigenous communities of the America’s were able to distil the social, physical, and religious elements of agriculture into a sustainable and beneficial practice that lasted for thousands of years, the Nordic travellers of c. 800 AD were not so fortunate.

6.3 Bad soil management from the past

Much like sustainable farming, the occurrence of improper soil management and farming strategies is nothing new for humanity, and nor, as we will see, is it something that can easily be outrun. When Norse travellers and seafarers journeyed into Iceland at around 880 AD, they needed to settle the land and begin farming. In their attempts to do this, they opted to utilise the same land management methods that were practiced in their native homeland. *Landnám* ("land take" in Old Norse) involved large areas of land being repurposed via vegetation reduction (Allaby 2019). This created open spaces for settlements, farming, and animal husbandry. This system itself is not inherently flawed, however, in order to facilitate these pasture areas and to provide farming irrigation, large stands of trees were eradicated, and bogs were drained. Icelandic soil, we now know, is largely the product of volcanic eruptions and as such it carries very few clay particles. While Volcanic soil is largely recognised as being nutritious and rich land, it is also highly subject to erosion due to its makeup (Simpson *et al.* 2004, 471, 483). By removing the bogs and trees, the Norse drastically cut the number of plants that had evolved to live successfully and sustainably in this environment. The new species that the travellers introduced were not well suited to this ecosystem, both in terms of giving and taking from it. They did however replace a number of native species and reduced the overall balance and productivity of the environment (Erlendsson *et al.* 2009). While manuring (a natural form of fertilizing) helped yield success within the first handful of years per settlement, the environmental damage and degradation was sadly inevitable. Similar expeditions and attempts were made in Greenland, with even less success. The crops simply wouldn't take, and farming was rendered virtually impossible. The entire situation was made worse by the Little Ice Age of 1100-1300 AD, which caused temperatures to drop substantially (Bishop *et al.* 2013, 3897). An important reminder that human ingenuity and human struggles do not exist in a vacuum.

Researchers today believe that at least 40% of Icelandic topsoil has been stripped since the 9th century AD and that 73% of the entire landmass has been impacted by subsequent soil erosion (Massa *et al.* 2012, 123-125, 127-128). While we may have grown in our ability to predict future climates (marginally), we remain almost impressively unwilling to learn. With the planetary heating we are currently experiencing and our massive dependency on single crop commercial farming, we may soon see ourselves in a similar situation to

the old Nordic travellers; trying to move forward with their way of life while the entire ecological system fights against them.

7. Living in the Material World: the past, present and the future

As an archaeologist, looking at the ruins or remains of great cities and little villages is second nature. We can make substantiated estimates on population size, the reach of the urban centre, and arguably even understand some of the social dynamics. However, before things fall into ruin, they must first be allowed to exist. As archaeologists, we essentially examine the products of other peoples' presents and futures, simply from a different point in time. Assuming (optimistically) that our species is able to continue long enough into the future that 2021 becomes something archaeologists look back on with the same curiosity we currently do for the Bronze Age, or the Neolithic, other people will be examining our world; our present and our future. They will be examining what is left, or the foundations from which other things evolved and emerged. They too will be looking back, just as the archaeologists of today do, but what if we looked up? We have the chance to look around us, and to look forward, so what happens when we apply the critical archaeological perspective to our contemporary physical world?

For a majority of people today, particularly those in the Northern Hemisphere, and even more specifically the Central Western regions of the Northern Hemisphere, the human world is urban. Cities, towns, and suburbs set the scene for most of our births, lives, and deaths (population.un.org). These places are social and cultural hubs, but they are also physical material places. Perhaps then it is not entirely surprising that some of humanity's most widespread unsustainable behaviours can be found in these environments. In fact, the very materials we use to build *our* world are the ones destroying *the* world. Throughout this chapter on materials, I will discuss how damaging two of our most commonly used materials are, and discuss a few examples of alternative materials (rooted in the past) that we could use to make a more sustainable urban environment.

7.1 Modern materials: Concrete

Concrete is by most accounts a wonder-construct. It is a building material made from partialized or broken stone or gravel, sand, and water. It can also contain cement (lime and clay exposed to heat and oxygen, then powdered), which in modern times has become a synonym for concrete. It does not burn or rust, it is incredibly strong, it can be used almost anywhere, and has facilitated the highest buildings in the world as well as the longest roads. Most calculations place concrete as the second most consumed substance per human on Earth, second only to water (Encyclopædia Britannica 2021; Low 2005, 5; Sedgwick 1991, 70). Chances are, you are reading this inside a building comprised at least in part by concrete.

In terms of anthropogenic output, concrete remains one of the world's largest pollutants of CO2; contributing up to 8% of global CO2 emissions. Per tonne of concrete, 780kg of CO2 is released. Humans produce between five and ten billion tonnes of concrete annually. Concrete drastically amplifies city heat, and looking beyond the fact that it does not compensate for the biodiversity it displaces, the lime present in almost all concrete is leeched by soil, creating a highly alkaline environment that will kill plants and trees not specifically suited to this pH value (Babor *et al.* 2009; Meyer 2004, 203). In short, this material is not sustainably manufactured or utalised.

7.2 Modern materials: Plastic

Plastic is incredibly versatile and resilient. It can withstand most environments and chemicals, given the correct manufacturing. It does not corrode, requires very little maintenance, and can be used in everything from insulation to mobile phones. Chances are, you are reading this within 1m of at least one plastic object you use daily. In fact, as of December 2020, you will have been using (micro)plastic regularly to cover your face when you entered a public building or stepped into public transport, in the form of a face mask (Rijksoverheid, 2020).

Plastic/microplastics are amongst the most pollutant substances on Earth. There are 500 times more microplastic in our global ocean than there are stars in the Milky Way, and by 2050, estimates predict that 99% of all seabirds will have consumed plastic (United Nations 2017). Microplastics have been found in the placenta of pregnant women, thus interacting with unborn humans (Ragusa *et al.* 2020). Plastic consumption, which is almost unavoidable for most people today, has a myriad of damaging health impacts. Discarded

plastic can last for hundreds of years, thousands in some environments, causing harm for organisms that consume it or try to grow around it (as chemicals are leeched). Around 8% of global oil use is directly related to the creation and general production of plastic (Gould 2016). In short, this material is not sustainably produced, or utalised.

7.3 Man and materials

The materials we use to navigate our lives are damaging the Gaia system, which, lest we forget it, humanity is an integral part of. This is not the first-time humans have damaged themselves and the world around them in an attempt to make their lives easier, and I doubt it will be the last. At around 200 BC Rome started using lead pipes in public waterworks (Delile *et al.* 2017, 10061-10062). While the speculative controversy of just how terrible this was for the mass population of Rome is unknown, we do know that consuming lead is incredibly damaging to human anatomy. The Ancient Egyptians would grind grains with stone, and sieve the flour in order to make bread, but mortar dust gradually wore their teeth flat (Leek 1972, 127-128). This trend can be seen well into the middle ages throughout Europe as well (Esclassan *et al.* 2015, 185-186). Asbestos, the wonder insulation used in the late 19th century, kept houses warm and costs down, as well as putting a c. 40-year life span on anyone who was unfortunate enough to breathe it into their lungs (nhsinform.scot). As we saw earlier, Norse travellers cut down Icelandic vegetation in an attempt to build a life there, and unknowingly destroyed the very soil they so depended on. Humans make mistakes, sometimes catastrophic mistakes, however an admission of guilt is not enough; we need to do better. Below I have explored a handful of examples elaborating on material use from the past, imbued with modern technology and know-how, might stand a chance at mitigating some of the damage we have done.

7.4 What did the Romans ever do for us? Roman coastal concrete

While the very first use of concrete might be impossible to determine, we do know that by 200 BC Rome was using concrete on a large scale and in a composition that generally resembles our use today (Mogetta 2015, 1-3; Winter 1979, 138). While the untrained eye might have a difficult time telling modern and ancient concrete apart, modern concrete lasts only a handful of decades whereas the Roman concrete used to create harbours or ports has been withstanding waves from the ocean for nearly 2000 years (Preuss 2013; Jackson *et al.* 2013, 2598; Jahren and Sue 2017, 1).

Today we use steel rods to reinforce our concrete, as it keeps structures stable and strong. However, Roman coastal concrete (RCC) owes its strength and extended lifespan merely to its composition. This ancient concrete was comprised of volcanic ash, lime, and seawater. One of the many fascinating and puzzling aspects of RCC is the fact that it contains high amounts of aluminous tobermorite; a silica-based material that's very tough and very hard to manufacture in modern labs. This is, in part, what gave RCC its strength and resilience (Jackson *et al.* 2013, 2598-2599).

When steel reinforced concrete is exposed to seawater for large periods of time, small wears and decay in the cements open up the rust-prone steel to the elements, and the structures erode quite quickly. However, the volcanic ash that the Romans were using to construct their harbours, sea walls and piers proved naturally rich in phillipsite; a small, monoclinic mineral. Seawater would react with the phillipsite from the concrete and promote the growth of aluminous tobermorite. On a microscopic level this creates hardy, interlocking crystal structures that act much like reinforced concrete (Jackson *et al.* 2013, 2600).

Roman era concrete may provide an ideal solution to sea facing environments, not to mention tidal lagoons and other structures designed to harness wave energy. Of course, the composition of concrete is more complex than two ingredients, and it is not feasible to replace every inch of concrete with the volcanic alternative, but it does open many avenues of potential for coastal regions and marine engineers.

7.5 Using natural recourses, sustainably: Woodn't that be nice?

A great deal of the human material past is invisible to us because it has been worn away by time. Organic materials perish and decay, and even inorganic materials can weather or be repurposed. A fun example of this is stone henge. Not the fascinating circle of stones in England claimed by modern druids, but the wooden poles and structures that constituted its earliest phase (Castleden 1993, 29). Wood has been used in many parts of the world to construct entire cities in the past, from houses to wells to stadiums. Wood has been a hugely important building material throughout time, and has accompanied *Homo sapiens* throughout our chequered past. However, in modern times we have started to step away from using wood in our construction projects in favour of cement, metal, and plastic. Discussing wood as a potential for a sustainable future is a delicate topic, as it is so directly linked to deforestation. Deforestation on the scale and nature that it is currently practiced is by any account a cultural and ecological abomination. However, assuming we can find more sustainable, local, and measured extraction and reproduction of wood sources, it may prove to be extremely useful.

Wood lends itself naturally to recycling. Once used it can be reused, repurposed, or simply allowed to decay. The only other material we currently use in construction that can make this same claim is steel, which unfortunately has a much larger carbon footprint and while more resilient than wood in general, the given the right maintenance, wood can last a comparable amount of time (Song *et al.* 2018). While it may seem like a novel throw away to proclaim we should live like our forefathers and build from wood, it is a feasible addition to construction plans that already has real world implementations, some of which can be found here in the Netherlands.

Cross laminated timber is to wood what reinforced cement is to concrete. Layers of wood are layered in alternative directions over one another to create an incredibly tough interlaced structure (Brander *et al.* 2016, 331, 350-351). This type of wood management is the main principle behind Amsterdam's Hotel Jakarta; a hotel also renowned for having a very large energy neutral garden in the centre of its building that displays a large variety of plants representative of Indonesian floral diversity; from 5cm high shrubs to palm trees towering towards the ceiling. A hopeful example of a primarily wooden structure, housing greenery, connecting cultures. The building is predominantly wood and bamboo, both of

which require far less CO2 than cement and steel, but the garden in the centre helps store and process CO2 at the same time (hoteljakarta.com[a and b]).

7.6 Modern Mudbricks: building from the ground up

Mud bricks, as the name might suggest, are bricks made out of mud. Mud, sand, water, straw, grass, loam, and comparable materials are mixed together and pressed into a form or mould in the shape of a rectangle. The mud and water constitute the basic structure of the brick material, while the fibrous elements such as grass or straw act as binding agents to re-enforce the entire structure. After being pressed into shape and allowed to dry in the sun for a number of days (or weeks), the bricks are put to use for the construction of houses, walls, storage facilities and the like (Lorenzon *et al.* 2020, 117). The brick buildings are often stuck together with a mortar comprised of the unhardened mudbrick material, and in some cases when construction is finished the exposed faces are sealed with adobe or stucco plaster; a cover wash comprised of mud, water, and particle-heavy substances (Kidd 1999, 4-7). This description was written in the present tense; however, it just as easily could have been worded in the past tense. Mud bricks, which date back to at least 9000 BC, were (quite literally) the building blocks of Near Eastern civilisation for thousands and thousands of years. They were used to construct houses, temples, administration centres, funerary monuments and just about anything else a given culture desired or deemed necessary (Liberotti *et al.* 2016, 3656; Behnejad *et al.* 2012, 24-26).

This is also true for modern-day Shibam and Sanaa in Yemen, with seven story high buildings made practically exclusively with mudbricks (Attia 2020, 381). Mudbricks, or Earth Architecture as it is sometimes called, represent a renewable, eco-friendly, and time-tested category of building material.

7.6.1 Mudbricks in the Lowlands

''*Kijken In De Grond*'' is a project from the CHRITH initiative located in the Netherlands. The primary aim of the project (and organisation) is to provide an ecological and sustainable approach to building materials and generate discussion surrounding this topic. *Kijken In De Grond* wants to create awareness and appreciation for the relationship between the soil, land development, and natural building product possibilities. In order to achieve these ambitions, they have created mudbricks from Dutch soil. Following essentially the same principle as the ancient Near Eastern cultures, bricks made of earth are pressed into a shape and left to dry in the sun, and more predominantly in the Netherlands, the wind (chrith.com). This project took the Dutch geographical soil cart as

its starting point, and aimed to incorporate the five dominant ground types found throughout the country: Sand, River Clay, Sea Clay, Loess and Peat. In each location, the ground type was paired with a local binding agent that had some historical and cultural significance to the region. This initiative hopes to create a landscape biography of geological and cultural traditions, honouring the innovations from earlier and the delicate balance between people and place. In much the same way that your local beer is always the best, and your local baker makes the best bread, they hope to create attachment and resonance with local building materials. Due to the nature of unfired mudbricks, they classify as circular in nature, meaning once they are no longer needed, they can safely be repurposed or simply discarded and allowed to return to non-human centric nature (chrith.com).

A brick made from materials gathered in Wieringen, a former island now connected to the north of the Netherlands, is comprised of glacial till or boulder clay, and seaweed. 150,000 years ago during the Saalian glacial period the intruding ice sheets pushed heavy rocks and other sediment across the landscape (chrith.com). These (at the time) foreign elements scarred and changed the landscape, leaving grooves and trails where they had passed over. When the large icesheets passed over these areas, they would leave behind a deposit trail of fine sediment, known as glacial till. This geological layer from roughly 150,000 years ago gives bricks from Wieringen their distinctive mustard yellow colour. Seaweed was an important cultural and natural commodity in this region many years later during the 20th and early 21st century. Seaweed was used to help elevate and protect dam walls, it was used as food, matrass fillings and cushion fillings. Until the 1930's, when a disease struck the seaweed population on this half of the world, there were huge seaweed banks that would stretch all the way to the Dutch island of Texel. That is why seaweed was selected as the bind agent in this brick, and why the mustard-coloured stone has wiry flecks of deep green running through it (chrith.com).

Only a kilometre away from this 150,000-year sediment stone, sea clay and sand were mixed creating another brick, with sediment local to the region for no longer than 20 years due to the eb and flow cycles of the ocean (chrith.com).

Elsewhere in the country, De Koornwaard (Empel) was sampled to create bricks. This area is particularly interesting as it is the former meeting points of various rivers, namely de Waal and de Maas. In one specific section of this area the sediment is chalky in nature,

whereas the acidic influence of various river overflows and interactions dissolved the chalk long ago just a few kilometres away. To this day this distinction allows different plants and trees to grow here. Because the willow tree was so important to this region, for rope, baskets, dams, and more ethereal cultural reasons, it was incorporated with the local river clay to form De Koornwaard brick (chrith.com).

No two bricks behaved the same way or looked the same. The bricks made from peat came out a stunning dark grey colour, but would shrink 60% in size when drying. Sea clay mixed with cockles created a dry, dusty, cracked brick, but a readjusted ration of 70% sea clay and 30% sand the created a far more homogeneous and stone (chrith.com). The 'simplicity' of this technique should in no way be confused with novelty. Simplicity is efficiency, and practicality, and it by no means excludes reliability or scientific validity. Mudbrick architecture is and was a direct response to a local environment, which, when it comes to sustainability and survival in general, is profoundly important.

7.6.2 Mudbricks of the future

One of the obvious draw backs to using mud bricks in a wet climate like the Netherlands is the rain. Their water resistance is poor, and their structural integrity is quickly compromised. Researchers from the TU Delf have proposed using a readily available element of the Dutch agricultural landscape, namely cow-dung, to fix this issue (TUDelft 2020). It has proven water-resistant qualities and has effective preformed as a moisture buffering agent when applied as a plaster to mud houses. Cow dung is primarily a combination of indigestible fibres and bacteria: fibres absorb moisture from the air and can freely re-release it, and the bacterial components have shown themselves to be highly water-resistant (TUDelft 2020). This issue is of course less prevalent in dryer, arid areas, where mudbricks are still used, however, these regions can still grant us beneficial insights into embedding agriculture into society. For example, in Southern America, Taos Pueblo (New Mexico) has been inhabited consistently for nearly 1000 years by the people native to this region. All of their buildings are made from mudbricks, and plastered in stucco. While the rain is not an issue, heat and wind erosion are. Once a year the local community comes together, in the form of a village ceremony, to replaster and maintain the architecture of their homes and shared spaces. Not only does this create a sense of awareness and obligation amongst the inhabitants, but it connects them to each other

and their local landscape (nps.gov). This is hugely important for cultivating a sustainable future. We must make a clear shift away from the exclusive domain of consumers, and once again become active agents in our relationship with Gaia. A switch to more sustainable building materials is not only necessary, but also highly desirable in a social sense. Archaeology is not just a study of things; stone is rarely just stone, or metal just metal. The construction of buildings, or the remains thereof, can tell us just as much about how people existed *with* a structure as it can about how they existed *in* a structure. Buildings, and material culture in general, can serve as reflections of relations, norms, values, and ideas. Beyond that, they can serve as present day reminders and reinvigorates of this mentality.

7.6.3 Mud and beer

Many mudbrick remnants from ancient Egypt show threshed plant remains were incorporated into mud mix, as a binding agent, which improved the overall structure. Threshing is a process by which the desirable parts of plants for processing or consumption are separated from their hard defensive coatings (Barnard *et al.* 2016, 89). These outer layers had limited use to the farmers, bakers, or brewers that use the wheat or barley, but they were an ideal addition for strengthening mud bricks. Utilising spent or discard grain produce is also a possibility for the contemporary world.

Modern clay fired bricks often include small amounts of polystyrene in order to better insulate the structures they create. Polystyrene is a polluting substance, and requires additional pollution to actually create it. In an attempt to mitigate this pollution, and conform with emission restrains seen in the EU, the Acme Brick Company modified their brick recipe to incorporate 5% spent grains into the clay formula. The spent grains, in this case a mulch of barley malt and corn grits, are by-products of the beer brewing process and are of no further use to the brewers. When these spent grains were included in the brick formula the resulting clay fired bricks had their thermal conductivity reduced, porosity increased, and the mechanical strength was (with minimal deviation) maintained (Wotipka 2013; *Ferraz et al.* 2013, 1638 and 1644). In short, the bricks were just as strong and insulated better. A novel but hopeful example of past technologies and methods resurfacing and opening sustainable avenues for us to explore.

8. Hunter-gatherer forager education

The transferal and development of knowledge is an integral part of being human. We need to know what we can eat or what should be avoided, how to interact with the social norms and values around us, and how to pass this same knowledge on down the line. This is true for other animals as well of course, but the extent to which human beings are capable of doing it is substantially more profound. There are other, more elaborate descriptions for this phenomenon, for example cumulative culture, or Darwin's 'meme', but the basics remain essentially the same (Dawkins 1976 in Jeffreys 2000, 227; Mesoudi and Thornton 2018). Knowledge transfer, relative to the way in which human beings are capable of processing and experiencing knowledge, is unique and defining. In today's world, most of us have quite an orthodox, unchanging view on both what this knowledge is and how it should be transferred: we call it education. For the better part of human evolution, today's values and educational norms were inexistent as they were not applicable to the lives of our ancestors. Throughout most of our evolutionary journey (so far), *Homo sapiens* have existed in small groups of (semi-)nomadic Hunter-Gatherer foragers (Gowdy 2020, 1). While ancient cities, trade routes and our industrialised world remains endlessly fascinating and useful to examine, the longest part of our time in the Gaia system has been characterised by hunter-gatherer life ways. Hunter-gatherer education, and the values it embodies, have stewarded humanity throughout most of our evolution thus far. By examining education methods and values, and exploring the important and largely shared societal values held by modern hunter-gatherer groups, I argue that we can provide an alternative or at least complementary perspective on traditional Western education. In line with the rest of this thesis, I believe this analysis can help steer humanity towards a more sustainable state of being.

Throughout the following pages I have distilled some key aspects of hunter-gatherer societies that are foundational for their education philosophies, explored a number of anthropological and ethnographic case studies on modern-era indigenous, forager, hunter-gatherer and 'non-modern' groups, and closed this section with a brief discussion on the concept and importance of intergenerational loyalty. Before all that however, a small piece on why education matters.

8.1 Why does education matter?

On first glance, most other species on Earth are far better equipped for existence than humans, at least in a physical sense. Most organisms have become masters of their environments, having the slickest scales, the deepest roots, the lightest bones, the sharpest claws, or the quickest legs. In this light, *Homo sapiens* are astonishingly ill equipped to navigate the physical aspects of life. We are weaker than almost anything bigger than us, and several things smaller than us, we cannot hear particularly well, nor smell particularly accurately, we produce no natural weapons or defence systems, and our new-borns are frighteningly defenceless for the first several years of their life. However, there is something to be said for this lack of optimisation. While humanity has physically mastered very little, we have become highly proficient in almost everything that we have set our minds to. Our lack of specialisation helped us avoid niche entrapment, and offered extra motivation to develop the use of our brains (Turner and Maryanski 2012, 8-9). Human cognition, the ability to think, teach, talk, and imagine, has afforded us more opportunities than even the most specialised organisms on Earth.

Thinking, talking, and educating does far more for us than compensate for a lack of sharp teeth. *Homo sapiens* are characteristically social animals, and as discussed previously, our invented worlds or customs are just as important to us as the physical world. Education helps integrate new humans into their culture's created worlds, teaching them how to navigate with skills, values, and dynamics. Education, in a philosophical sense of the word, is the oil that keeps the machine of humanity running.

8.2 Hunter-Gatherer values: societal and educatory

In order to isolate the cornerstone values of hunter-gatherer societies I have relied on the works of Lew-Levy *et al* 2017 and 2018. I would like to note that the following is a generalised summary of diverse and complicated societies. I have selected three individual values to further this topic. The following summary fails to appropriately detail the nuanced and intricate elements that belong to the multitude of groups, nations, communities, societies, and cultures that ethnographic studies have focused on. These generalisations can best be viewed in light of this 'Western' comparison: Western societies encourage children to attend school and obtain a job that helps contribute to society. This statement is largely true, but also sweeping. It is sufficient for discussing Western capitalist work attitudes perhaps, but it does not account for the Spanish siësta, shops being open or closed on Sundays, or regional attitudes towards retirement. After due research and consideration, I believe that the three values listed below are indeed prevalent in a great many forager hunter-gatherer groups today, and were likely foundational in hunter-gatherer groups of the past. As such, they serve as an appropriate generalisation of such communities, aimed at fuelling a well-meant discourse for this thesis.

- *Egalitarianism*. The rejection or lack of permeant, established or absolute leadership/hierarchy, resulting in responsibility and opportunity being equally distributed and available to most members of society. The prioritisation of 'group' over 'individual'.

- *Sharing*. A vital notion that helps ensure group unity, the disengagement of individual property ownership, and a general motivation to aid one another. This helps sustain egalitarianism, and in theory renders the monopolisation of resources nigh impossible.

- *Autonomy*. Egalitarianism and Sharing require strong minded and independent group members. Group members must perform a multitude of tasks and navigate various social situations. The ability to autonomously develop into this individual and do so under one's own terms helps reinforce the sense of self. It also renders group members difficult to control or supress.

8.3 Indigenous education in practice

In contrast to Western set curriculums and schooling regimes, many groups of hunter-gatherers have their children learn and interact in largely ungoverned social groups. Such groups rarely adhere to consistent age categories and are seldom divided on the basis of sex, or gender. Interestingly, these groups are almost entirely void of adult interference and intervention. In this regard, the children have a high degree of agency in acquiring and creating their own learning experiences. (Lew-Levy *et al.* 2017, 369; Lew-Levy *et al.* 2018, 15-17).

As infancy comes to an end, young children are exposed to intergenerational play, they participate in social activities, and imitate/recreate social phenomenon that they observe within their larger home group (Lew-Levy *et al.*2018, 16). Here we can already see the three isolated values reflected in childhood education. The children experience autonomous agency from a young age, being responsible for the acquisition of their own early life experiences. As all children are in the same situation, and because cohesion is essential for group dynamics, sharing (in experiences and opportunities) is subconsciously encouraged. The lack of hierarchy, interference or set agendas also allows young children to experience the freedom and responsibilities associated with egalitarianism.

8.3.1 Developing personhood:

Many of the indigenous people under the Inuit group believe that education and/or teaching should only become active and expose children to social values after the age of five or six. By Inuit reckoning, this is when a child first starts to display signs of awareness and reflection two key indicators that an individual is approaching personhood, or *inhuma*. It is vitally important that children develop this sense of self and their *inhuma* on their own because it forms the foundation of all social and natural relations. A child guided towards *inhuma* can therefore not truly act as an active giver and taker in the various relationships they will need to establish throughout their lives. Once a child has developed personhood or *inhuma*, child-centric social groups remain the main stage for learning and new experiences. However, following the achievement of *inhuma*, passive teaching and more adult interactions are gradually introduced as the children grow (Briggs 1979, 392-394).

Teaching, as a phenomenon, should not be seen as counter-productive for this type of learning. Caro and Hauser propose that teaching should be viewed as the act of a person modifying their own behaviour to varying degrees in the presence of, or for the sake of, someone who is less adapt at a given phenomenon; this act need not and arguably should not have any direct or intentional benefit for the one modifying their behaviour (Caro and Hauser 1992, 153-154). This form of teaching is fundamentally important for mimicry and imitation. Within hunter-gatherer groups there are a multitude of activities and phenomena that lend themselves to facilitated teaching. To list a few: foraging, butchering, forest walks, the feeding of children, group debates and complex social dialogues (future planning, cosmology discourses etc.).

In other communities, for instance the San and Aka people of Southern Africa, children will accompany foraging adults on forest walks, if they so desire, and may also aid in the butchering of pray. These activities are stimulated at a later age, as it is important for the survival of the groups that all members are proficient in their environment, however during young childhood it is very much the child's decision. When children opt to participate in these activities, they will often recreate and mimic them, along with the conversations that occurred during said activities, when they return to their unhindered child-based social and learning groups, thus educating one another (Lew-Levy *et al.* 2018, 17-18). Briefly coming back to the Inuit communities: some groups will partake in a type of communal theatre, where past or hypothetical social situations are performed and explained by adults and children alike. This provides the young *inhuma* having children with an opportunity to experience and explore various charged emotions and discourses safely, and with guidance if requested (Lew-Levy *et al.* 2018, 14-15).

This explorative education is also practiced by the Nayaka, who believe that coming to terms with oneself and understanding how to peacefully be with others is the key purpose of education and learning (Lew-Levy *et al.* 2018, 13; Bird-David 2008, 543-544). We also know that the Nayaka do not view relationships as a purely human-human phenomenon. The distinctive values of animism are observable within the education of these communities, as they strive to allow group members to develop harmonious interactions with one another, and all living things that have essence, *mansan*, or *inhuma*. This is arguably the best case to argue the effectiveness of 'meaning-as-use- that we discussed in past one of this thesis.

8.3.2 Education from infancy

The balance of autonomy, sharing and egalitarianism result in strong, dedicated members of a society. It is for this reason that certain communities, once again the Nayaka but also the !Xun, will attempt to encourage the development of strong autonomous natures from as young as infancy. Mothers (both in a biological and social sense) who are able to breastfeed will only do so after the infant has visibly attempted to initiate the activity. The mothers will not bring the child to breast without some degree of calling on their part. This also has a reinforcing impact on older children, either watching or simply in the vicinity, as they are passively reminded that autonomy and agency must be upheld in order to benefit from egalitarian sharing (Bird-David 2008, 528-529; Takada 2005, 289-292).

The act of handing food to non-breastfed children is viewed as an instance of sharing by some of these communities, as the food and time taken to acquire this food are being offered from an autonomous and independent group member to a less autonomous and more dependant member. While this attitude towards infants and young children may see extreme to us, it is culmination of these activities and practices that result in children of the Yaghan people being considered independent social agents at eight years old, and independent from their parents in an economic sense by around 13 years old (Lew-Levy *et al.* 2018, 17 and 20).

The !Kung (part of the San people mentioned previously) will share gifts and perform ritualistic obligations on behalf of the infants in their family and societies, during rituals, celebrations, or negotiations (Lew-Levy *et al.* 2018, 20). This demonstrates how profoundly important these concepts are to groups that survive on the basis of maintaining healthy relationships with all living entities. While the pre-conscious infants may understand very little of what is going on, as they grow into personhood they will have seen and eventually understood that people have been performing important social activities on their behalf since birth. This firmly solidifies such practices and attitudes into the very essence of each individual's personhood and ensures such approaches to life are continued into the next generation.

8.3.3 Intergenerational loyalty

Intergenerational relations are profoundly important for 'non-modern' forager groups, and were undoubtedly also vital for hunter-gatherer communities in our past. It is also a trend seen across many animal species, and virtually every single type of primate (Turner and Maryanski 2012, 17-18). While it remains important for non-indigenous groups as well, I argue it is far less profound and intentional. In a society where computers and textbooks do not facilitate the flow of predetermined top-down information, it is intergenerational connections and loyalty that ensures the continuation of knowledge and values. All of the practices and examples provided above have been passed on from generation to generation, as have community origins, promises, narratives, myths, and legends.

Intergenerational loyalty and obligation is hugely important to indigenous hunter-gatherer communities, not only as it facilitates the continuation of their groups, but in many cases, it is considered a spiritual and inherited obligation. Intergenerational loyalty, in the most basic sense of the term, is thinking ahead of time so that those who come after the current generation can continue life's purpose while not being saddled with the negative consequences of today's decisions. In this light, while intergenerational relations may still be prevalent in many non-indigenous societies, I would argue that intergenerational loyalty is almost irradicated (at least, but by no means exclusively, towards non-kin).

Analysis on a myriad of indigenous groups in the North American continent has concluded that virtually every indigenous community in this region considers themselves as caretakers of Gaia or Mother Earth. They see their cultures as stewards of Earth, existing neither above or below other forms of life, but in harmony with all things and with the ultimate ambition of protecting all things. In order to fulfil this obligation and responsibility, they must ensure the survival of their community (and thus Gaia) for at least seven generations (Hauptman 2008, 14; undp.org). In a social sense, this responsibility is directly paired with a sense of fairness and justice, wherein future generations have every right to exist without the burden of previous mistakes. Chief and Faith keeper Oren Lyons of the Onondaga Nation had this to say on intergenerational loyalty: "We are looking ahead, as is one of the first mandates given

us as chiefs, to make sure and to make every decision that we make relate to the welfare and well-being of the seventh generation to come. What about the seventh generation? Where are you taking them? What will they have?'' (Lyons 1980 in Vecsey and Venables 1980, 173-174). ''When you sit in council for the welfare of the people, you must not think of yourself or of your family, not even of your generation. [...] make your decisions on behalf of the Seven Generations coming, so that they may enjoy what you have today." (sgds.undp.org).

This inherent drive for intergenerational loyalty compliments and is complimented by the three leading concepts of egalitarianism or fairness, autonomy and sharing. It, and virtually all education practices explored above, represent a non-consumer attitude towards society and nature. North American indigenous communities have deep, kin-level connections within their extended family systems, their clans are bound by loyalty to one another, group consensus is the foremost form of decision making, and the respect and love for other members of the group is as important as a love and respect for nature. These values are subsequently also projected well into the future. The survival of indigenous groups and past hunter-gatherer groups was entirely dependent on an acceptance and awareness of the relationship between these cultures and their environment. Strictly speaking, this has not changed for agricultural, urban settlements of humanity today, we simply choose to ignore it and rank its importance below that of economic gain and personal interest.

The belief systems of North American groups referred to as Native Americans or (in accordance with many groups reclaiming the word) 'Indians' has the same essential values that we observe in animism. As I have said before, animism is not a religion title that can be donned or prescribed, it is a loose description of values and beliefs that appear in a majority of indigenous and traditional communities around the world. The Native American communities drew their strength and their identity from their connection with the Gaia system, or Mother Earth. Colonists quickly made this belief a primary target during their attempts to 'modernise' and 'civilise' these cultures. They aimed to sever and break this bond, stripping these communities from their spirituality; the cornerstone of their communities, their values, and the fuel behind their concept of intergenerational planning and loyalty (Ogunbado 2012, 53-55). This furthers my argument that a shift from animism helped disengaging humanity with nature, and leads me to firmly believe that

re-establishing this type of intergenerational loyalty and respect towards all aspects of the Gaia system are of dire importance for the peaceful continuation of humanity.

Intergenerational loyalty involves a sincere acknowledgement of the future. Most indigenous communities are as aware and certain of future generations as they are of their ancestors, and of themselves. They refuse (as much as possible) from disenfranchising future generations, robbing them of time, recourses, and freedom. That is something that the non-indigenous world has wholly failed to do, to such an extent that it has been described by some scholars and experts as future or time colonialism (Krznaric 2020, 147-149). We have disregarded future generations who deserve rights, respect, and uninhibited chances to engage with their own world. We have stolen their resources and forced them into a way of life that they can either accept, and worsen the situation, or fight against. We have colonised future generations.

Part 3: Thoughts and closing

Discussion

Conclusion

Works cited

9. Discussion

This discussion section will not rehash the examples and thought processes that we have explored throughout the 'main body' of this text. Instead, I would like to focus on considerations and discourse points that arose while I was writing -and hopefully while you were reading- the previous chapters. As such, what follows is a direct result but not re-evaluation of Part two of this thesis.

9.1 Society, collapse, and the failure of elites (past and present)

We have discussed a number of examples depicting societies *without* clear and rigid hierarchies. While this is a general characteristic of many forager or indigenous communities, the human past is also filled with examples of clear-cut elites. Elites and elite systems have governed various types of communities and cultures for thousands of years, and continue to do so today. We might associate the term elite with a golden crown and a throne, but in reality, the term is far broader; more on that soon. Without going into scrutinous amounts of detail, it is safe to say that when governing elites perform poorly, overwork/disrespect their surroundings or the groups they rule over, or when they strain their relations with external groups, the societies they rule over suffer. This is true for the past and the present. Poor policy, decisions, and leadership in general lead to crisis. A glaringly obvious modern example is the COVID-19 pandemic. Many governments around the world failed to act quickly and effectively, with some even going as far as to suggest the pandemic was overhyped and nothing to worry about. This had huge consequences for the economy, international reputation, and public health (Fraser 2020). Elite failure in the (deep) past is more difficult to outline with examples, but they certainly exist. There are, for instance, theories that debate whether or not elite taxation was an overshoot of peasant capacity (Lowe 1985 in Tainter 2006, 61). Or, the degradation of the Tigris and Euphrates valleys, when wood requirements and poorly managed grazing destroyed irrigation systems and stifled agriculture, which was further exasperated by 'peripheral elites' seeking to mimic the luxuries of 'core elites' and further stripping the already burdened environment (Chew 2001, 20-26).

Societal failures, falters or collapse usually occur over decades if not centuries, and are virtually never exclusively caused by the foolish actions of one person or group of people (Butzer and Endfield 2012, 3630). The environment, the society at large, political struggles, external pressure etc. all filter into the rise and fall of social constructs. However, to pretend that groups of people with extreme influence, power, knowledge, and potential (read: elites) have no impact or minimal impact on this process seems almost as foolish as blaming them exclusively.

In today's modern world, the scope of the term 'elite' is broader than it ever has been before. In fact, since 1945 there has been a fundamental shift in global governing and elite systems, with more ruling reforms, international safety nets, agreements, treaties and failsafes than ever before. While a great many of our structures are not new (royalty,

governing bodies, presidents, religious leaders etc.) there are, I would argue, two sections of the elite that have vastly expanded in number and influence, although these descriptions do not necessarily apply to both. They are: Industrial-scale capitalist companies, and the highly educated.

9.1.2 Industrial capitalist companies

I will focus this brief discussion on oil and gas related companies, but I would like to note that this applies to virtually all large-scale companies. We explored this notion briefly when we discussed the meat industry during the Lascaux section, and the modern farming industry during the domesticates section. In short, elites in the form of companies are failing, and this has consequences for society. As I have said before, one of the benefits of archaeology is that it can provide perspective and context. Using that logic, the sooner we start viewing these entities as elites, and not simply the private capitalist domain of an individual, the sooner we can grasp just how detrimental and influential their failure is for us all.

In 2010, British Petroleum was responsible for an oil spill in the Gulf of Mexico. This oil spill amassed to 4.9 million barrels (200 million gallons) worth of crude oil being pumped into the ocean over a period of three months. In response agencies set up floating barriers to contain the oil, dumped chemical oil depressant into the ocean and initiated a series of controlled burns. Thousands of mammals, birds and marine animals were killed, while the fish count was estimated to be much higher (epa.gov; Goldstein *et al.* 2011, 1335). In 2021, just last week as I write this, an underwater oil pipe burst, once again in the Gulf of Mexico, leaving a blazing jet of gas erupting from the ocean depths to the surface for over five hours (pemex.com). These are two noteworthy examples of environmental negligence in the face of monetary gain, but the list is much longer. Amoco Cadiz: 1978, a huge oil tanker crashed and poured 230,000 tons of crude oil into the ocean (Chasse 1978). Piper Alpha: 1988: Oil platform explosion, 167 workers killed, 100-meter-high flames for several hours (BBC 2013; NOS 2013). Exxon Valdez: 1989, oil tanker crashed, polluting over 1900km of coastline and killing over 250,000 birds, 2800 otters, 250 bald eagles and over 20 orca whales (darrp.noaa.gov). Exxon is the same company that is now suspected of actively suppressing climate change research and evidence since the 1970's (Breslow 2012; Golderberg 2015; greenpeace.org). Tricolor: 2002, oil ship collided with a

container ship and leaked 2,200 tons of oil into the ocean. Additional collisions with the Tricolor wreckage caused a further 1,000 tons of oil to leak (Camphuysen 2004).

The general public are told to use bamboo straws, to turn off the lights, and shower in under five minutes, while multi-million-dollar companies backed by governments and the hyper-wealthy spill crude oil into the ocean, set the ocean on fire with gas leaks, cause a staggering majority of ocean plastic waste through discarded industrial fishing nets, and deforest c. 80,000 acres of land per day (fao.org; Ritchie and Roser 2021; wwf.panda.org). On top of this, several of these companies and politicians who benefit from the continuation of the status quo have actively sought to undermined climate change science and question the economic viability of climate action. A 2017 report concluded that c. 71% of global greenhouse gas emissions were generated by no more than 100 companies (Griffin 2017, 8). Capitalist companies guide and help shape capitalist economies and behaviours. While mistakes can happen, and it is of little value to demonise the transport of (previously) essential materials, the fault, and failures of these companies, in both their acts and their philosophies is abhorrently catastrophic. Our demand and use of fossil fuels has led to greedy, carless elites that would sooner turn a blind eye to planetary risk than adjust their economic foundations. This form of elite, and the other elite institutes that profit from their continuation, are failing humanity.

9.1.3 The Highly Educated

While it may be an uncomfortable notion for many of us, obtaining degrees from institutes of higher education places us all firmly in the class of elite. That means me, as the author of this thesis, and most likely you as the reader. We sit firmly in the class of elites, and I would argue we are (on large) failing society.

Education provides perspective, chances, knowledge, and power. Archaeology offers all of these things with the added perspective of the entire human story. Our discipline studies the single most advanced and agent heavy product that the Gaia system was able to produce in over 3.7 billion years of evolution. Without intending any disrespect, I would pose a very serious question: How many archaeologists do you know, or have you taught, that have used their position of elite privilege and their holistic knowledge of humanity to actively try and better society? Beyond the scope of academic articles, beyond the scope

of conferences and guest lectures, how much research have you seen or helped make its way into society? I can think of several individuals who are skilled in claiming their research is helpful, but I can think of far fewer who have actively pursued this cause in any meaningful way or for any meaningful length of time.

The very existence of an elite is inherently bound with some form of responsibility. When societies are built around them or built to use/be used by them, the existence of hierarchy, privilege or an elite must occur in a balanced and dutiful manner. Societies form symbiotic parts and positions, all of which fuel and are fuelled by one another. We currently use elite positions in much the same way we have used coal and oil. We are aware that it is problematic, we hear whispers of impact-heavy alternatives on the horizon but view them as a consideration for the next generation, for tomorrow's elites. We allow other parts of society, including the ones we operate within, to be misled and indifferent towards many of the issues facing our world. This extends to most areas of academia, but I am an archaeologist, and I truly struggle to think of a study with more potential for interacting and co-defining society. Sadly, this potential is largely squandered and picked up by politicians or companies that spin the information we produce into stories for the masses that we refuse to engage with. Above, when we discussed industrial companies, I said: ''the sooner we start viewing these entities as elites […] the sooner we can grasp just how detrimental and influential their failure is for us all.''. That applies here as well, with the added obstacle of us (you and I) being part of this specific problem, not a faceless company. This thesis is already testimony to the fact that we most certainly possess information that is useful in orientating ourselves in our current sustainability crisis. We have the tools; we just need to want to use them.

The elites of today are failing society. Their failure, *our* failure, is hurtling us all towards tragedy.

9.2 Bronze Age Swords and Christian prayers: re-establishing religion

The general public, and at times archaeologists, have an unfortunate tendency to view the past as a singular event consisting of a singular nature. More often than not, it is viewed as harmonious and peaceful place, where man and nature coincided successfully for countless years. I have, I am sure, also perpetuated this belief with my select choice of indigenous communities explored in previous chapters. This generic image is misguiding and guilty of romanticising our complex and nuanced past. It is not more accurate to say the past was peaceful than it is to say today is peaceful. It is a matter of perspective, how, where and when you look, and how much nuance you are willing to omit. While I do stand by the notion that past societies held a more profound respect and understanding of nature than we do today, it is inaccurate to paint all or any past communities as entirely 'harmonious' or 'peaceful'.

9.2.1 Predatory past

By the Bronze Age a considerable number of European communities were (semi)sedentary in nature, and practiced some form of agriculture or horticulture to support their economies (Tresset and Vinge 2011, 182-184). I would argue that groups did indeed have a profound understanding of just how dependent their lives were upon their own ability to utilise or manipulate nature. It is also highly reasonable to assume that cosmologies pertaining to this time period still revolved around a respect and reverence for nature, as a singular diverse entity or as diverse personifications in the form of gods. As such, it is not unreasonable to assume they considered themselves still as a part of their environment, as opposed to a superior entity whole dominating Earth. In short, the I-Thou paradigm would apply to groups from this period. However, during the Bronze Age, many European regions saw a deliberate and fast paced deforestation that swept across the continent (French *et al.* 2010, 34-36). This was done to ensure more usable and workable land would become available for agricultural purposes, such as growing crops and practicing animal husbandry. This activity does not necessarily present itself as particularly harmonious. In fact, the manner in which these communities successfully existed is best described as predatory. They would take what they needed from the environment, whenever they needed it. To briefly provide another example, and revisit the Native American communities discussed earlier, these groups utalised natural cliff

elevations to drive entire herds of bison over the edge and kill them. Eventually, these groups and others started to engineer such sites when no natural cliffs would suffice or in areas without substantial elevation. As such, they were able to hunt entire masses of large game animals, slaughtering entire herds (Reher 1978 in Clawson *et al.* 2013, 148). As I said above, neither of these examples are in line with the romanticised, peaceful, and harmonious communities of the past, who loved and adored nature. These are examples of predatory human beings, using the landscape and its resources as they please. However, we should not view these approaches as mutually exclusive, or even as contradictory. What we have just discussed are examples of human nature; the expression of our paradoxical ability to both love and destroy something simultaneously. I-Thou and I-It. This is a trend we can still see today.

9.2.2 Deposition based reciprocity

One particularly interesting note on the Bronze Age communities of Europe is that somewhere throughout their existence, they began depositing fine craftsmanship within the same landscapes that they loved, used, and abused. Large, masterfully crafted swords, forged from materials that are far harder to acquire than axes and farmland, were intentionally deposited in bogs and near rivers across Europe (Amkreutz *et al.* 2019, 113; Fontijn 2002, 269). One interpretation of this act, and one that I agree with, is that these communities viewed such depositions as acts of passion and reciprocity (Fontijn 2002, 267-268; personal communication Fontijn 2021). A meaningful and deep connection with an environment does not exclude the possibility for exploitation. The I-Thou and I-It balance is delicate, and not always all encompassing. As we saw earlier with the Nayaka, human perception can create wilful contradictions and blind spots that become impossible to see through. Everything has personhood until it does not, nature is to be respected, and at the same time exploited. I do not doubt that the deposition of such goods were profoundly moving and important acts for the communities of that time. I recognise that it is an incredibly powerful and symbolic gesture, the potency of which we may never truly understand, but one that can certainly be interpreted as displaying some degree of reciprocity with nature. However, I pose the question, is it any different than a Christian prayer?

9.2.3 Is it enough? Where is the line?

If a good Church-going Catholic tosses a plastic bottle into the ocean, or votes for conservative political parties that exploit and abuse the environment, but at the end of the day they kneel down and pray to their god for forgiveness and guidance, are they engaging in reciprocal acts that can be viewed as indicative of a love and respect for the world? I would argue that communing with one's god, and asking for forgiveness, love, or guidance, is on par with the deposition of a skilfully crafted blade. Both are acts and practices of importance to the actor's social world, as real and important to them as air and food. Both prayers and depositions help shape and provide meaning to the actor's existence and world view, but do either actually make any difference? And does that matter? Bronze Age societies may have deposited swords, but they continued to decimate forests and burn land whenever they needed to. Today, plenty of religious, generally kind people, pray to their god and ask for the strength to be a force for good, and yet they continue to behaviour in wholly unsustainable and damaging ways.

Where, then, should science and factual reality step in? At what point do our practical realities drift away from helpful and identity enriching guides for us to live by, into dangerous delusions? For example, it was of little value for scientists to tell the Cree (discussed earlier) that the deer was not in fact offering itself up for them to kill, but instead acting on a biological impulse that would have given it a final advantage against almost any other predatory species, except hairless apes with high stamina and sharp tools. Interfering with this practical reality would likely have done more harm than good. But what if the Cree had been hunting every deer in the Northern Hemisphere, under the assumption that these moments of interaction and offering were deeds that must be accepted? Would it be appropriate to interfere then? Is it appropriate to dismantle the practical realities that bind people's lives together for a 'greater good'? I do not have a yes or no answer for this, but I have isolated a middle ground, so to speak.

9.2.4 De-mystifying religion, and reinvigorating it

I think it is foolish to expect humanity to abandon our cosmological practical realities, in fact I think it would be incredibly dangerous for us to do so. Instead, I propose slightly altering the narrative, and re-incorporating Gaia or Earth back into religious and social significance. In the grand scheme of things, religions have done nothing but change

throughout time. While each generation may become hard-headed on their, or their parents' interpretation of religious standards, they are always prone to change. Japan nationally surrendered their emperor god narrative almost overnight (under duress). Christianity has embodied so many local old religious that it is different virtually from city to city, and the Christian narratives in general have gone through several amendments and councils to dictate the overall message. All religions, regardless of idiosyncrasies and flair, try to promote some form of harmony, peace, and continued existence. They all offer guides or ambitions for personhood and love. As virtually every branch of science or critical thinking tells us that a healthy environment is essential to a healthy population, it does not seem ludicrously farfetched to suggest that a reinvigorated incorporation of environmental love and respect into religions would be both highly important and achievable.

The factual truth, if such a term is applicable, behind a deity, be it Awilix, Ba'al, Jesus or Zeus are whole irrelevant. The existence of deities is indicative of humanity' incessant need to personify and create relational understands between ourselves and the world; to establish reality. As leading religious scholar Loyal Rue said ''religion is not about God'' (2006). Religion has been an essential part of navigating meaningful relationships with reality, and maintaining an I-Thou relationship with various elements of Earth throughout time. Godde is the old English spelling of the word 'God' that is gaining considerable traction amongst Catholic nuns, religious scholars invested in eco-theism, and feminists. It is a de-gendered and depersonalised form of divinity. Godde denotes a *personality* within reality, not a *person* beyond reality. Godde, in this sense, is then the physical and social reality that life has been interacting with for at least 3.7 billion years on this planet, with no intentional or direct relation to a person-based deity or any form of mysticism. Godde, again in this context, is reality and the Gaia system. This is also why, from time to time, I refer to the system solely as Gaia; I too consciously and subconsciously personify scientific logic. It is a unity between science and a distilment of the human need religion; the establishment and maintenance of a relationship with reality.

Reality, much like animism, is a recent term that is used to describe phenomena beyond the scope of terminology. Reality is simply how we see existence. It is atoms, molecules, the biosphere, the atmosphere, Mars, Dark Matter and Red Dwarf stars. The word reality, as it is colloquially used today, was likely of limited use throughout most of human evolution, and thus may not have existed until quite recently, even as a concept. Much like animism, it was simply self-evidence. It was and is evident to the Cree, it was

evident to the Bronze Age communities burying swords, and it was and is evidence to scientists today. We can trace an etymology for reality back to late Latin, where the word *realis* meant ''relating to things'' (languages.oup.com), but that is also of limited to a reality dictated by ancestors, spirits, and personhood. Religion is so often associated with the modern term God, that many of us take the two as almost synonymous, much like Coke and Cola, or Ping Pong and table tennis or Velcro and 'hook and loop' fasteners, but they are not the same. Religion is simply a repetition of faith and worship. Faith is an inherent and complete trust in something. Worship is the expression of adoration and reverenced towards a thing, but that thing need not be anything more fantastical or 'supernatural' than reality, the Earth System, Gaia, or science. Devising a relationship or religion with reality (godde, Gaia, or whatever term is preferable), wherein sustainability is practiced and worshiped as a human faith is virtually no different than what our species has been doing from the very beginning. The exception here is that it is purposefully and knowingly grounded in the betterment of humanity, coming from the past several decades of environmental negligence. Any form of godde or religion that does not incorporate cultural, personal, scientific, and historic evidence is anti-future, anti-human and detrimental to life on Earth.

Factual and practical realities have guided and safeguarded conscious life for longer than we could ever truly pinpoint, but on the basis of what we discussed throughout this thesis, I would argue that if we do not take an active role in re-establishing these relationships with reality, human collapse is inevitable. It is imperative that we begin transitioning from an anthropocentric viewpoint, to a bio-centric one. Finetuning and de-mystifying the scientific practice of 'religion' may well offer one method to do so.

9.3 Gaia: The human chapter

9.3.1 Archaeology, in light of the Gaia system:

I have referred to archaeology as the study of the human story, as opposed to the study of ancient things or of materials, and I stand by that description. This story, however, is perhaps better viewed as a chapter, the greater story being life itself; a distinctly rare and unique physical condition expressed (as far as we know) in exactly one place throughout

the entire universe. Once or twice I described our discipline as the study of the human past. This description is applicable in many instances, but I find it rather traditional, and a drastic simplification of what archaeology is or should be. This discourse is all well and good, however, it does not truly account for the diverse 'types' of archaeology, for which further nuance is necessary. For example, academics working for a university are often afforded greater opportunities to explore the philosophical potential of archaeology than, let's say, field archaeologists working for a municipality. This is not to say that one is inherently more or less prone to engaging with the potential and significance of archaeology. The different branches should ideally be viewed as different legs supporting the same tabletop. The responsibility to push and further the discipline, forging it into a useful and reliable tool for humanity falls on all of us, to varying extents. In light of using the Gaia system as a passive and active framework for both this thesis and viewing biological life, I believe we can better describe archaeology in the following way: *Archaeology is the active analysis of the most complex and conscious elements of the Gaia system, with the simultaneous goals of understanding our collective past and ensuring our collective future.*

Our universe has existed for roughly 14 billion years. The numbers vary depending on the methods of analysis, but c. 14 billion years is a reliable average. Earth itself is c. 4.5 billion years old, making it just over a 1/3 the age of the universe. It took Gaia close to 4 billion year to create a part of itself, a part of life in this universe, that exists beyond the scope of genetics and DNA; it took 4 billion years to create a consciousness that could interact with the universe and other life. Humanity is quite literally the first and only instance of life in the universe that has the capacity to deliberately alter existence, on a cosmic scale. It is no more mystical or fantastical to discuss gravity or mathematics than it is to say that humanity is the universe and life looking back upon itself. Our study is not that of 'humans, the superior being', or 'humans, the humble animal', it is the study of a conscious part of an ecosystem. We have a strange tendency to view life and humanity as embodied in the same entity but being uniquely different, and that is wildly incorrect. Humans designing vaccines for disease, or humans destroying an approaching asteroid with rockets, is no different than a rose having thorns, or a hedgehog having spines. The human mind and capacity for thought, the sense of self that is often considered essence or soul by religious groups, is a part of the brain. Life and biology are not something that humans observe in other things, it is what we are. We are as much a part of Gaia as the birds, the trees, and the rivers.

Within the next few billion years, roughly the same amount of time that Earth has currently existed for, our sun will become unstable and begin its expanse into a red giant (solarsystem.nasa.gov). It will roast the surface of Earth with searingly high temperatures as volatile reactions create huge explosions on the sun's surface. If the formation of Earth, or the evolution of Gaia, had taken even a fraction longer than it did, if there had been another large meteor strike or a geological catastrophe that had interrupted this process, human consciousness would have come into existence only to watch the sun die and life become virtually impossible. The Gaia system no longer has the time, or the energy, to reproduce consciousness and life on a complex level. If a catastrophe occurs, or if we continue to bleed this system as relentlessly as we currently are an eliminate our species, that is the proverbial 'game over'. Not just for humanity, but for all life. As the only part of Gaia able to consciously act, humanity has an obligation to aid in the continuation of life. Archaeology, as the study of Gaia's conscious element, must make a concerted effort to help fulfil this obligation.

9.3.2 Anthropocene: do we have the right, and for how long?

There is often a back and forth on humanity: are we animals or are we more? As I have discussed above, and hinted at throughout my thesis, the answer is yes to both. While a part of me would very much like to adhere to the notion that we are but a simple part of an elaborate 4-billion-year-old web of life, we have far too much agency and potential as a species to simply revert to passiveness and let the chips fall where they may. The Anthropocene is not a debatable phenomenon. Plastic, the artefact of our time, has become buried deep into the Earth, it chokes our oceans and can be found in the womb of pregnant women. We have exercised control over virtually every spot of land on the surface of this planet, and almost every known living thing. We have the potential to destroy all surface level life and certainly all human civilisations, at the push of a button with nuclear weapons. The debate on what humans are or what our role should be is little short of delusional. The age of humanity is neither a badge of honour nor a badge of shame, it is reality, and something we must learn to control.

While we may be the only planet with life in the universe, it does beg the question: how many planets or undetected life systems across the vast universe missed their window to exist and thrive? How many Gaia systems exhausted themselves only to burn or freeze before they got the chance to do what all life has always done and expand into all possible

territories? Assuming our species somehow manages to survive another 5 billion years, which at this rate seems staggeringly unlikely, we will be face with an expanding sun that will incinerate our planet. As such, we have two choices: bank our hopes on future technology, as we have done with climate change, or explore space and look for viable expansion regions. Ironically, human short sightedness has cascaded so much debris into our local orbit that we are currently facing a 'prison of Earth' phenomenon (Witze 2018, 25). We have so much junk rapidly hurtling its way around Earth that it is becoming increasingly difficult to send up satellites and space craft. Our proclivity for pollution may begin to trap us on Earth and inhibit the next stages of humanity and life in general. However, assuming we can circumvent this issue, and travel into space, what will life look like? Will it be humans that shepherd life on Earth and throughout the cosmos, or something else?

We view time as a mixture of geological and human based blocks. As we left the Pleistocene and entered the Holocene, humanity has transitioned across a myriad of ages. Very loosely put, in this part of the world, it went something like this: Neolithic to the Bronze Age, to the Iron Age, to the Roman Era, to the Middle Ages, and finally into the Modern Era. Depending on your stance, one, some or all of these period occurred during Anthropocene. The geological era of Earth drastically influenced by human interactions. James Lovelock, the creator of Gaia theory reasons that we may be about to enter into yet another era in the not to distance future. He calls this era, and the book he published on it, the Novacene: The coming age of hyperintelligence (2019). In short, a combination of human and AI, with a steady but progressive dominance of AI will shape the next era of life on this planet. I happen to agree with him; however the validity and specifics of his ideas are not perse relevant here. His proposal did make me wonder, however, if perhaps the next phase of Gaia is indeed to use its conscious elements (humans) to create another vastly advanced form of existence, once again stepping further and further away from the bounds of genetics and DNA. Perhaps, in fulfilling our innate obligation to life, the greatest human achievement will be to usher in a new age. Beyond stimulating thought, this specific discourse helps me realise how profoundly selfish and foolish it is to pretend archaeology 'begins' somewhere around the 1950's, or that certain things are too modern for us to concern ourselves with. Humanity is exploring space, and will continue to do so until we find somewhere else to live, or we become extinct. At some point, if our species is lucky, our landing on the moon or our satellites be obscurities and curiosities that occurred thousands of years ago; the future's time equivalent of our Bronze Age. We can

either wait until today and tomorrow are deemed long enough ago for people with BA, MA, and PhD after the name to write clever quips about, or we can use our knowledge and active participation in the human story to help shape society and guide life on Earth.

10. Conclusion and closing

This thesis saw me explore the ways in which archaeology, and an archaeological perspective, can help orientate us in our modern-era battle for sustainability. While there was no distinct singular theoretical framework that I followed or adhered to, as is standard in most thesis works, I did use Lovelock's ‘’Gaia theory’’ as a lens through which to view biological life on Earth, and contextualise (or better said: re-think) the position and obligation of humanity and by extension archaeology. In order to achieve my ambition with this thesis I discussed a number of isolated archaeological phenomenon and archaeo-philosophical considerations. I have listed these topics slightly later in this conclusion to refresh the readers memory. For now, I will briefly re-establish why this work was important (to me).

Sustainability is an integral part of life; it is not an attitude that our species can duck in and out of to avoid disasters or when it best suits us. The Gaia system is under extreme duress, and its prolonged instability or forced rapid changes will have drastic consequences for all life on this planet; including us. As archaeology is the study of the human past, the human story, or as I prefer to see it, the study of the conscious part of the Gaia system, we have a moral, ethical, and professional obligation to use the wealth of knowledge our discipline has in order to help shape humanity into a more sustainable form of life.

I am now 25-years-old, but fate being kind, I will live long enough to see one of two things happen: the planet we live on deteriorate rapidly, or humanity as a whole pull together and evolve into a more sustainable part of Gaia. My role in this change will be fuelled by my learned skills and talents; by my education as an archaeologist. This thesis is my first deliberate and conscious step in that role.

An additional but fundamental goal of this thesis was to write it in a way that lent itself to a broader audience and in an accessible tone. To that end, I opted for a sort of hybrid between a traditional thesis and an 'extended discourse essay' atmosphere, wherein the story was not clinically cut into pieces, but instead flowed as an overarching and connected narrative. In addition, I have readily used language and rhetoric aimed at engaging the reader. While I understand and appreciate the ‘by experts for experts’ nature of most academic work, I did not want it to mark the end of my education.

Particularly for this topic, it felt inappropriate. I have, I feel, achieved the academic requirements while engaging with a slightly more liberal style of writing; not unscientific in nature, simply different.

Throughout this paper I discussed a series of archaeological phenomenon in order to explore the ways in which archaeology can help with modern sustainability efforts. I have listed them below and briefly summarised them to refresh your memory.

Lascaux: a palaeolithic cave in France, filled with paintings and rock art. After being opened to the public for 20 years, the atmosphere inside the cave had changed and threatened the artwork within. In response, authorities shut the cave down and built authentic replicas that satisfied the masses and protected the primary. I drew parables between Lascaux's 'stop and replace' mentality with how we ought to approach the meat and fossil fuel industry.

Cosmology: cosmologies shape and have shaped our relationship with the world around us for thousands of years. I suggested that a move away from animism, or better said the behaviours associated with animism, will have drastically altered how we treat the physical landscape and other living things. I talked about the significance of establishing a solid and reliable relationship with reality, and how human beings often dwell within the practical realities that we create for ourselves. The main case studies I employed here were from anthropological observations; namely the Cree and the Nayaka people.

Domesticates and our farming past: within this chapter I illustrated how solidly we have remained connected to our past. In addition to the fact that our subsistence cornerstones have remained largely unchanged for nearly 11 thousand years, this chapter also discusses alternative farming methods bedded deep in our pasts (companion planting) and also provided a rather solemn example of what happens when the environment is misread and misused (Iceland during the 800's AD).

Materials: here I projected the archaeological analysis of past materials and ruins onto the modern world, examining how damaging modern materials can be, and illustrating some sustainable options from the past. In addition, I explored a modern Dutch initiative to create mudbricks from local sediment sources in an attempt to both create sustainable building materials and restimulate local environmental engagement.

Hunter-Gatherer education: this chapter discussed how indigenous communities and 'non-modern' groups adhere to an education ideology that promotes responsibility, engagement, and intergenerational loyalty: all of which likely formed the educational foundations of past humans, and are of the upmost importance if we truly wish to reshape human behaviour and promote sustainability.

Suggestions and ideas need not change the world overnight, and they need not change the entire world either. The responsibility of the colossal shift we must undergo does not rest on the shoulders of a single discipline, nor one single approach. Some of the examples we have discussed throughout these pages offer solid, practical examples of how past materials or techniques can make small-to-large scale impacts, nudging us towards a more sustainable way of life. Others, the more philosophical points, help us to better understand how we have come to be in this situation, how we view our world, and perhaps, how we can change that too. Perhaps some of the topics that we have explored over the last X pages will indeed come to make a difference; that difference might be on a large scale, or on a small scale. The changes might occur because archaeologists try and utilise the human past as an additional resource in a sustainable future, or perhaps they will occur coincidentally with no direct relationship between those who study the past and those who live in the present. Either way, as this thesis has clearly demonstrated, there are a number of ways in which archaeology, and an archaeological perspective *can* help orientate us in our modern-era battle for sustainability. It can tell us how we got here, why we see the world the way we do, and offer a number of examples to help change today into a better tomorrow.

The past is a well of knowledge; one that is connected to, and fuelled by, the present. I believe the archaeological community is obligated to use their skills and this knowledge for holistic, societal good; to help humanity come to terms with itself, confront its learned behaviours, and transition into a sustainable and positive part of the planetary eco-system. To squander this opportunity and to ignore this obligation is wholly disloyal to the future of Earth. The Anthropocene is an opportunity and an obligation as well.

10.1 Future research ideas

As I was researching for this thesis, one of my bigger struggles was to remain focused on the goal I had set myself and not to veer off into the hundreds of fun ideas that popped up along the way. After due consideration, and to be wholly honest, if this thesis process has taught me anything it is how profoundly limited any singular discipline is on its own. In that light, I should very much like to engage more with philosophy, neuroscience and psychology, towards consciousness and understanding how that impacts being. In addition, I would like to explore how the brain itself, as a non-centralised set of parallel systems, may be comparable to how the Gaia system works. This, I believe, is not only important for the past, but also the present. I would also like to explore slightly less tethered relationships between the past and present, for example, the age-old practice of gift giving, and ownership rotation (reciprocity). I believe there is a connection to be drawn between that and how archaeologists, municipalities and nations engage with ownership of the past and archaeological remains. I would also like to potentially further some of the research I did during my RMA, examining the human proclivity for ritual as a biological impulse, and how that may contribute to our relationships with reality and impact our future, or how our relationship with reality impacts our interaction and perception of heterotopic spaces. The list is much longer, but in an attempt to keep it related to this work, my final idea for future exploration in this vein would be to begin modelling or hypothesising potential futures based on our current understanding of humanity (from the past through to the present); to predict where we may end up if we do not change, what events might force us to change, and how future perceptions on reality may well already be discernible with due understanding of consciousness, the human story, and Gaia.

10.2 Closing

There is a pub in Northern Ireland, where I am from, that has the following text on its gable wall: *''A nation that keeps one eye on the past is wise. A nation that keeps two eyes on the past is blind*''. A poignant quote for a country with a past like Ireland has, but beyond that, I kept thinking about this phrase when I was writing this thesis; about how it applies so strongly to archaeology. As a discipline that studies the past, we *must* take care not to become blind to the present and the future. I do not mean to suggest that

every archaeologist must be devoted to the same project or style of research, but the discipline as a whole *needs* to shift, remarket or co-define its general ambitions. If we do not, I cannot see the value and promise of archaeological knowledge being recognised or accepted by the public or funding agencies, especially when the Gaia system begins to falter. However, that is a discussion better left for another time. For now, I would like to close with the following paragraph (inspired by The Good Ancestor 2020).

Human beings truly are remarkable creatures. After billions of years, life spat us our and here we are; sending rockets into space, submarines into the depths of the oceans, and exploring everything in between. We create entire worlds in our heads, infinite expanding universes to store and process everything we know, see, do, touch, or feel. And yet, in the blink of an eye, it's all gone. Someone else lives in 'our' house, someone else has 'our' job, someone else furthers 'our' ideas. But that's just it really, isn't it? In reality, and I mean reality in the sense that we have discussed throughout this paper, a deep, proper reality, each of us are just ancestors in-waiting. We're only here for a short time. We steward thigs along, we try not to mess things up too terribly, and we hope to inspire those who are fortunate enough to come after us: either through admiration or hatred. One day when we are considered ancestors, remnants of a foreign place and strange way of life, I hope that our descendants will look back fondly on what we decided to do for them. I hope they can benefit from the mistakes we corrected, and the opportunities we helped ensure they could have. I hope archaeology plays a role in this.

Homo sapiens have started to kill this planet, and we need to do better. I believe we can do better, and I have shown how archaeology as a discipline can help us along the way. Each of us has a responsibility to each other, to the Gaia system, and to life itself. We have the capacity to be better, we just need to want it enough. As I said earlier: *Homo sapiens* must truly become ''Wise Man''.

Thank you for reading this thesis, and here's to a sustainable future.

Abstract

Life on Earth began somewhere around 3.7 billion years ago. Our species, *Homo sapiens*, have been on Earth for c.0.008% of that time, and yet in this small window, we have altered the planetary system (the Gaia system) dramatically. We have challenged Earth's ability to provide security and shelter, and placed countless lifeforms (whereunder our own) at great risk. Humanity must now make a concerted and genuine push to become more sustainable, or face global catastrophe. In this rush for sustainability, we often discuss renewable energy sources; be it wind, rain or sun, the answer lies somewhere in the elements. I do not disagree with this, but I do make a strong case for us to use an additional resource, one that is (for all intents and purposes) endless, and one that could truly help steer us in the right direction; namely, the human past.

The human past is littered with best and worst practices, with good luck and bad luck, and with countless large social and biological shifts that helped get us here today. This thesis discusses a number of examples from the past and the present in order to demonstrate how archaeology, and archaeological perspective and an understanding of the human past in general, can help orientate us in our modern-era battle for sustainability. From best practices to philosophical points of consideration, the human story is an invaluable resource when it comes to understanding humanity.

Throughout this thesis, I discuss (amongst other things): ''stop and replace'' models based on Paleolithic cave sites, examine how a shift away from animism could have desensitised us to our environment, explore how Lovelock's Gaia theory both humbles and makes demands of humanity, and after 6 years of education and 2 years of employment, finally make peace with the notion that archaeology *is* (or can be) ''the study of the past in order to understand the present''.

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