

NARCOSIS

Narcosis: How Art can Shape the New World

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Chapter 1: The Origin Story

Five thousand years ago in ancient Mesopotamia, there was a city called Uruk, in which there lived a young god-king named Gilgamesh. His mother, the goddess Ninsun, his father the Priest-King Lugalbanda.¹

The demigod Gilgamesh was handsome, brave, and in his parent's eyes, perfect. At a young age, he became aware of the differences between himself and his peers. He was stronger than they. Quicker, both physically and mentally. His ego grew faster than his body. He felt a hunger for more but knew not what he wanted more of. His "self" was out of control, and he terrified the city of Uruk with his strength and tyranny. He saw nothing as his equal, yet the people of Uruk were unable to confront him out of fear of his wrath.²

They pleaded with the gods to send Gilgamesh an equal, a companion that might challenge him. To answer the people's pleading, the gods shaped from the finest clay on the Earth a man as strong and brave as Gilgamesh named Enkidu. Only the two of them considered the other their equal, and they found the friendship their hearts had been longing for, believing that together nothing should be impossible for them.

The two heard of a famed forest near Uruk, which was known to be never-ending and was protected by the ferocious beast Humbaba. The gods created this monster to follow their command; "no human should set foot in the forest". Gilgamesh told Enkidu that "they would not only be the first men to enter the forest together but that they would conquer it"³ Enkidu pleaded with him and asked, "How can any mortal fight a monster whose power has been given by the gods?"⁴ Nevertheless, Gilgamesh was convinced that he and Enkidu would make a name for themselves so that their story would be told even thousands of years later.⁵

The two travelled one-thousand miles a day before setting up camp in the evenings. Gilgamesh was visited by fearsome dreams every night, but each night Enkidu convinced him that they were good omens from the sun god. Finally, they came upon the lair of Humbaba and with the help of the sun and the wind, the two defeated him. As Gilgamesh held a knife to the monster's throat, Humbaba issued a warning. He claimed that the gods had placed him in the forest to protect it against the realms of men. If Gilgamesh were to kill him, a curse would follow him forever. With much urging from Enkidu, Gilgamesh ignored the warning and slashed the beast's throat. Thus, in disregard of the Gods' wishes, Humbaba was murdered.⁶

¹ Yiyun/ Lorenzetti Marco (ILT) Li, *The Story of Gilgamesh* (Random House Distribution Childrens, 2016), | p.1)

² Ibid.

³ Ibid.

⁴ Ibid.

⁵ Ibid.

⁶ Ibid.

Humbaba's curse came true when Enkidu fell sick and died. Gilgamesh realized that no matter how much a human conquered, they were still mortal, and their life amounted to dust. At that moment, he vowed never to die.⁷

It was said that the gods had ever granted only one person immortality. Centuries before, the gods had sent a great flood to dispose of humanity. All people fired from the clay of the Earth were washed away in the flood, their flesh crumbling in the rising seas. The goddess Enki saw the crumbling world and was saddened; thus, she tasked Utnapishtim with building the largest boat the world had ever seen. It was acres wide and high as a cliff, which enabled Utnapishtim to save humanity and the Earth's other animals. For seven days and seven nights, it rained, and the flood gave rise to "an ocean where no life could be found".⁸ The breadth of the destruction caused the gods to weep, and in the destruction, they recognized their error. They allowed the floodwaters to recede and for the boat to find a berth. Utnapishtim was granted immortality for his bravery against the water when the gods saw that their children had survived.

Enheartened by the tale, Gilgamesh found Utnapishtim but was shocked to discover an old and decrepit man who had gained immortality but not eternal youth. Nevertheless, Gilgamesh implored him to share the secret of immortality. Taking pity on him in his suffering, Utnapishtim told Gilgamesh that all men must enter the never-ending sleep, but that a plant at the bottom of the sea could prolong his life and give him youth. With capabilities beyond that of a normal man, Gilgamesh swam to the bottom of the sea, returning with the plant. Though the plant cut and mutilated his hand, he carried the burning plant with him back to the surface. He intended to carry it back to Uruk to test the plant's qualities on the oldest man in the city before eating the rest himself.⁹

On the journey home, he left the plant on the ground for only a moment while he was bathing whilst a serpent, enticed by the smell of the plant, slithered by and devoured it whole. From then on, the snake gained the power to shed its skin and remain eternally young. Gilgamesh broke down and wept at his misfortune, understanding that the gods had not willed him to achieve eternal youth.¹⁰

The tale of Gilgamesh is the oldest piece of epic literature known to man.¹¹ The fabled god king's story sets the stage for the following millennia and for our current epoch, in which every human, young or old, became obsessed with their "self" in philosophies of "individualism" or "egoism".¹² The desire to cheat death and be immortalized in their creations has filled humans with an insatiable hunger for meaning. This hunger can not be satiated by food or drink but rather by slaying "monsters" shaped by the gods in nature to be remembered for valour. It is necessary to understand why this idea has been anthropocentric and a proponent of creative destruction in the modern age.

As author Jared Diamond explains in his book *"Collapse: How Societies Choose to Succeed or Collapse,"* human societies creating systems that may eventually lead to collapse is something that has

⁷ Ibid.

⁸ Yiyun/ Lorenzetti Marco (ILT) Li, *The Story of Gilgamesh* (Random House Distribution Childrens, 2016), [PAGE], p.1)

⁹ Ibid.

¹⁰ Ibid.

¹¹ Ibid.

¹² John Nolt, "Anthropocentrism and Egoism," *Environmental Values* 22, no. 4 (2013): doi:10.3197/096327113x13690717320667

happened repeatedly throughout history.¹³ However, he also seems to repeat throughout the book that to err is to be human and that society has the chance to learn from mistakes. Societies of the past that collapsed did not change their practices even as they realized they were running out of resources and that their practices were not sustainable. The current generation has the unusual opportunity to learn from our predecessors by reacting to the modern-day environmental crises. This would require learning and innovating rather than being focused on practices that have led to growth and progress but at the expense of biodiversity, air quality, and rising sea levels. These viewpoints are especially poignant for artists, who, much like during the enlightenment, can work together with science to propose solutions.

The Birth of Romanticism

*“Genesis 7:23 - Every living thing on the face of the Earth was wiped out; people and animals and the creatures that move along the ground and the birds were wiped from the Earth. Only Noah was left, and those with him in the ark”.*¹⁴

In the tale of Gilgamesh, elements of the land and sky seem to be supporting the young god king in his quests. It is the water that becomes a symbol of the enemy, the single element that the gods use as a form of punishment. First, the rising sea wipes humanity from the face of the Earth, then later the plant from the bottom of the sea injures and mutilates his hand. Finally, upon entering the water to bathe, the snake finds the free moment to devour the plant that might have delivered him eternal youth.

This epic led to the origin of flood stories throughout human history in which the sea is described as a “lifeless mass of water”.¹⁵ The original myth and subsequent retellings show a distinct separation in life in the sea versus life on land. Life within the seas is never mentioned; it is portrayed as something that God or the gods have cursed. Almost as if the floodwaters themselves were something that devoured life.

It is imperative to be fully aware of this depiction of the sea that has been ingrained in human memory not only throughout recent history but throughout the evolution of western society. The oldest retold epic that would filter down to the most popularized stories in world religions depicts the rising seas as a punishment for the arrogance of egotistic humans. In the same epic, the ingenuity of man’s engineering becomes a symbol of humanity overcoming the fates written to us, even death. A ship later became the symbol of humanities’ collective ability to be the first to explore unknown territory and eventually to conquer it, as will be documented throughout this chapter.

The history of past centuries of exploration and colonialism in some ways reiterates the Epic of Gilgamesh. One man believes himself to be better than the rest, and thus he deserves more than the rest. This makes him inclined to conquer nature and new territories because it is his right. According to Timothy Morton in the book *“Hyperobjects and the End of the World,”* many persons of the modern epoch are unsure of whether the human inclination to discover and conquer is detrimental or not; for

¹³ Jared Diamond, *Collapse: How Societies Choose to Fail or Survive* (London: Penguin, 2013), [chapter 1]

¹⁴ The Holy Bible: Containing the Old and New Testaments. London: Trinitarian Bible Society, 2010.

Genesis

¹⁵ Ibid.

this reason, the Anthropocene is sometimes labelled as the *Colonialscene*.¹⁶ The following chapters shall discuss these theories and how the human impact of nature has brought society to a precipice. First and foremost is understanding essential developments of the last century that led to *the Great Acceleration* and mass negative impact on the health of the world's ecosystems.

The Ship and Navigation

In the previous flood stories, the ship is seen as the barrier between life and death. It is the thing that holds humanity afloat in a world inundated by the sea. In the 21st century, the idea of the dying world is still a popularly told saga, yet the boat is replaced with a spaceship and external world colonies in sci-fi films. As the idea and technology of the ship have expanded, thus has the location of our salvation. In the past, it was often the will of “the gods” and bravery that took humans towards a never-ending horizon. Whereas now, it is technology, information, and bravery that may take humanity to the farthest reaches of the galaxy. As in the Gilgamesh saga, in the wake of Utnapishtim's death, when Gilgamesh begins his quest for immortality, memory, human society finds the question of our mortality the most challenging concept to accept. Understanding that our time on this earth will imminently end whilst equally believing that death or extinction may be overcome by leaving behind a legacy that may be etched in societal memory; is one of the great dichotomies of human existence. One hundred fifty years ago, before *the Great Acceleration*, many explorers attempted to build their legacy through exploring and mapping “unknown” parts of the world.

A Western Perspective

Travel on open water was something that throughout most of western history was a sure sign of insanity. Widely accepted were ideas of a flat earth and the mythical possibility that; should one sail too far, one would fall off the edge of it. This old belief is a fantasy even popularized in modern novels such as C.S. Lewis's “*the Dawn Treader*”.¹⁷

Even more immediate than the danger of falling off the edge of the world was the notion of navigating on open water. Not having a coastline to navigate posed the danger of losing bearing and aimlessly sailing in circles in the open sea. Within Europe, Nordic cultures and the Vikings were the first to master navigating open waters.¹⁸ At the time, the concept of open sea travel was so unprecedented that the Vikings must have seemed to be demons coming out of the sea when they first landed on the shores of Cumbria.¹⁹

¹⁶ Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World* (University of Minnesota Press, 2017), [chapter 1]

¹⁷ C. S. Lewis, *The Complete Chronicles of Narnia* (Place of Publication Not Identified: BBC Worldwide, 2014), [whole book]

¹⁸ Sarah Pruitt, “Did Vikings Use Crystals to Rule the Seas?” *History.com*, April 05, 2018, [PAGE], accessed November 13, 2020,

<https://www.history.com/news/viking-navigation-sunstones-evidence>

¹⁹ *Ibid.*

How did the Vikings then achieve what other cultures had not? Probably with the help of the navigational tool, the sunstone, and a strong belief that their gods were guiding them.²⁰ The symbolism of the sunstone parallels nicely with the story of Gilgamesh and the sun gods supporting his quest. Additionally, much like the saga of Noah, a Viking named Raven Floki reputedly kept ravens on board to detect when the ship was nearing land.²¹ It was indeed no coincidence that Floki used Ravens, the sign of the most powerful Nordic god “Odin.”²² Along with being a navigational tool, the raven held symbolism that should the gods be on the side of the explorers; then nothing should be impossible for them.

It is hard to say for certain which of these Viking elements were fact and which were legend. However, recurring themes of the sun and the winds assisting explorers through ancient legends could suggest that these were the elements that could turn their favour to or from the explorer.

A Non-western Perspective:

History books within the west tend to have a very Eurocentric outlook on exploration and critical historical events. Mapping and understanding the sea were almost always focused on the land and spaces that could be conquered. This was not always the case in other cultures that saw the sea not as a lifeless space but as a living organism. Although it is not often discussed in history courses, the navigational knowledge of the Polynesians was so advanced that many historians find it incomprehensible as to how their cultures became so widespread across the Pacific.²³ Perhaps this lack of understanding stems from Eurocentric focused education systems. In his book “*Hyperobjects and the End of the World*,” Timothy Morton touches on colonization not only of geographic regions but also on education systems; this absolute colonization is why many have argued that the *Anthropocene* (also known as the human epoch) could be deemed the *Colonialiscene*.²⁴

As discussed by author Christina Thompson in the book “*Sea People*,” the people of Polynesia had an acute understanding of the sea, currents and winds that were little understood to the peoples of Europe.²⁵ It is often typical of Europeans to respect our historical mapping and navigational systems yet the first European maps of the world do not even include Oceania, which became later known by James Cook as the 4th part of the world.²⁶

²⁰ Joshua J. Mark, "The Legendary Settlement of Iceland," Ancient History Encyclopedia, October 11, 2020, [PAGE], accessed October 14, 2020,

<https://www.ancient.eu/article/1317/the-legendary-settlement-of-iceland/>

²¹ Ibid

²² "Odin's Ravens • Facts & Mythology about Muninn and Huginn". Gods & Goddesses. October 19, 2020. Accessed May 26, 2021. <https://www.gods-and-goddesses.com/norse/odins-ravens/>.

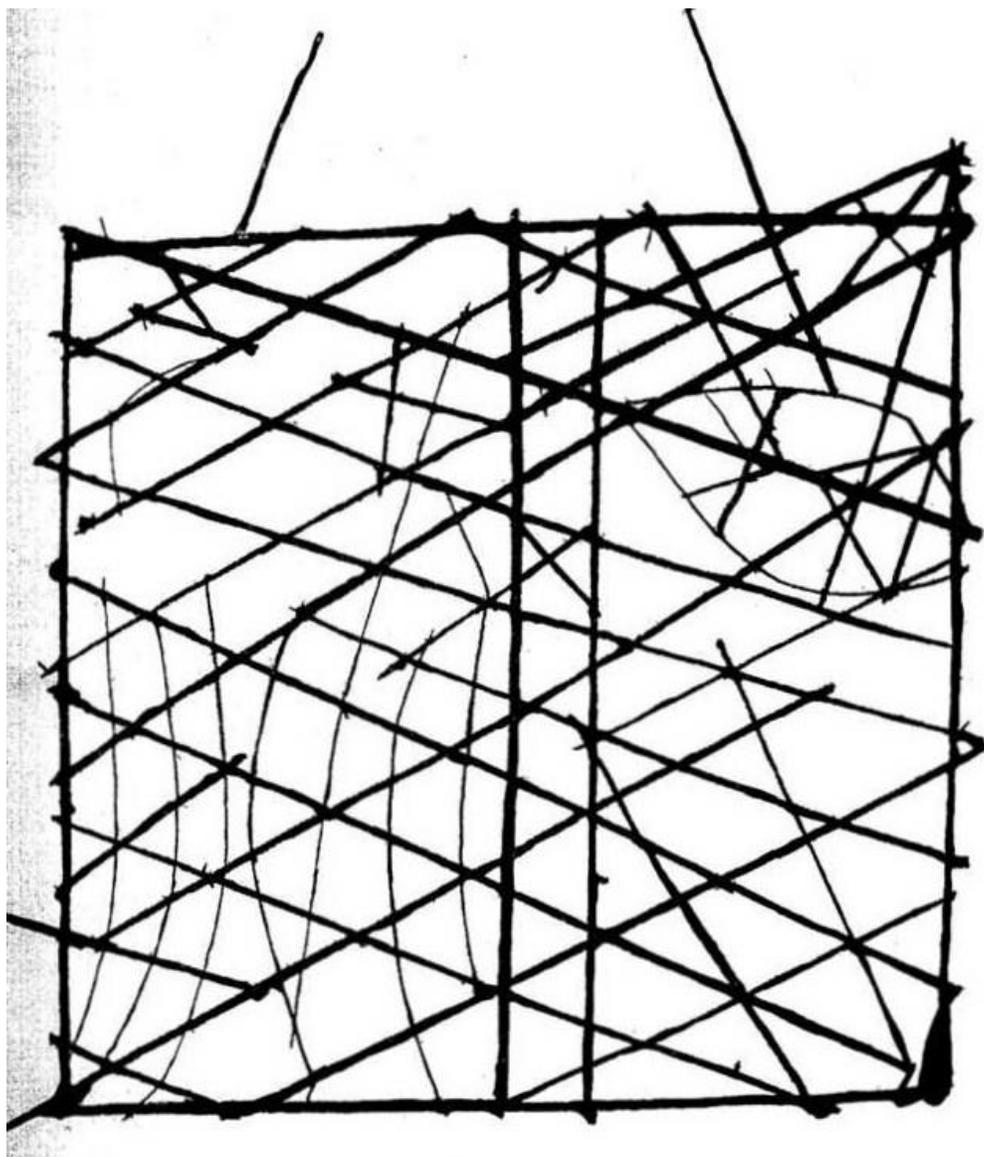
²³ Christina Thompson, *Sea People: The Puzzle of Polynesia* (London: William Collins, 2019,)

²⁴ Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World* (University of Minnesota Press, 2017), [whole book]

²⁵ Christina Thompson, *Sea People: The Puzzle of Polynesia* (London: William Collins, 2019,)

²⁶ Ibid

The Polynesians had already been exploring this 4th part of the world through the rise and collapse of many societies.²⁷ It is believed that should one of their island states have run out of supplies, they would have travelled to some of their closest neighbours searching for support or recolonization.²⁸ The mapping system that they used is less well documented and understood than the production of maps in Europe. Yet, we know that ancient people had effective records of ocean routes based on constructed objects such as this Micronesian navigation device showing directions of winds, waves and islands, c. 1904. (fig. 1.)



Polynesian mapping system circa 1900 ²⁹

²⁷ Ibid.

²⁸ Ibid.

²⁹ "Polynesian Navigation Device". Southbaysail.com. Accessed May 26, 2021. <http://www.southbaysail.com/the-polynesians---natural-navigators.html>.

Historically, cultures based on verbal storytelling and which do not have a written history are regarded as less developed, and their knowledge is often lost. Mapping knowledge of Europeans has been recorded in maritime history as the most pertinent, and subsequently, much knowledge has been lost. Maps and paper documentation is also much easier to store than these constructed objects. However, there is a particular tragedy about losing the knowledge that is not respected enough or can not be conveniently stored.

Christian Thompson described Polynesians as ‘sea people’ rather than land people, as a person bottle-fed on the Gilgamesh epic might consider themselves.³⁰ Little is known archaeologically about these map artefacts, but one thing can almost be sure: they predate the invention of European navigational tools such as the sextant.³¹

As many scholars can judge, Polynesians did not sail to colonize or discover for their own personal glory but rather to sustain the longevity of their culture and peoples. It is supposed that when James Cook first arrived in the Marquesas (1775), the islanders believed he was from a country where provisions had failed.³² James Cook was, of course, only one of an extensive series of European explorers searching for land and goods, not for the longevity of his native England but the luxury of it. The following centuries would see the manipulation and exploitation of lands and environments the world over. The famous phrase, “the sun never sets on the British Empire,” suggests a great sense of pride in the fact that England ruled (or enslaved) so many peoples.

The Age of Discovery to the birth of Romanticism

The previous section presents a core difference in the “why” of the British and Polynesian navigational explorations. Whereas Europeans seemed to have the approach of “conquering” because nature and persons were theirs to exploit, the Polynesians often seem to have navigated and explored in times of need rather than for greed.

This glorification of the word “conquer” became something that endured throughout the centuries. Nature, peoples and challenges were something for the strong, educated, “renaissance man” to overcome for the sake of his greatness. Much importance was placed on the idea of individual accomplishments. The glory attached to the colonization of the so considered “lesser” peoples allowed countries to plough through other cultures without a sense of shame as long as they contributed to the furthered progress of the European community. Even today, explorers such as Christopher Columbus are glorified in the minds of many. In Columbus’s case, he “luckily” stumbled across an island in the

³⁰ Christina Thompson, *Sea People: The Puzzle of Polynesia* (London: William Collins, 2019),

³¹ Liesl Clark, “Polynesia’s Genius Navigators,” PBS, February 15, 2000, [PAGE], accessed March 31, 2021, <https://www.pbs.org/wgbh/nova/article/polynesia-genius-navigators/>

³² Christina Thompson, *Sea People: The Puzzle of Polynesia* (London: William Collins, 2019), [whole book]

Bahamas after a navigational calculation error.³³ As is popularly known, he believed himself and his crew to be in India.³⁴

Subsequently, Columbus and his men seized many of the natives from the surrounding islands, enslaved them and returned them to Europe to be sold in Spanish markets.³⁵ Despite this, today, the glorious ingeniousness of Christopher Columbus's discovery of "the new world" is still celebrated. Yet the "new world" was only a new location on European maps for colonialist exploitation, and few today would be inclined to think of Columbus as a pillaging slave trader. According to history magazines, though, within 60 years after Columbus landed, only a few hundred of what may have been 250,000 Taino natives were left on their island.³⁶ This genocide by explorers is typically shrugged off, and Columbus is praised as a hero working towards the "greater good". One purpose of this paper, though, is to question the positive connotation that the word "conquest" holds for many westerners. Ultimately, the hope is to place a different emphasis on what should be considered progress and what we as individuals would like to be remembered for by those who come after us.

Developments in navigation within Europe become an important part of the story. As they greatly expanded western ideas of development through the rest of the world. This development also saw a key effect on art in the coming centuries. During the enlightenment, a ship on the open seas became a symbol of knowledge, proof that man without land as a bearing could navigate across open water.³⁷ Navigating the open sea became a point for understanding man's place in the universe and the ability to utilize even the heavenly bodies for-profit and discovery. The glory of discovery and the role of man to exploit nature was reflected in the art of the enlightenment.

To know or to learn was not enough, but to see with one's own eyes became an integral part of the experience of knowledge. It was the intrinsic responsibility of mankind to search for the truth, as it could not be gained without exploration and discovery. Philosopher James Locke argued that human nature was mutable and that knowledge was gained through accumulated experience rather than by accessing an outside truth.³⁸ His ideas were based on the Cartesian idea of thought: a belief that humans are born without ideas and that all we create and think is a reaction to the surrounding world.³⁹ According to Locke, it was of the greatest importance that higher-ups in British society "discovered" as much of the world as possible. The Grand Tour (travel through European capitals) became known as a rite of passage into proper society.⁴⁰

³³ Artem Dunaev, "Why Columbus Day Courts Controversy," History.com, October 07, 2019, accessed November 13, 2020,

<https://www.history.com/news/columbus-day-controversy>)

³⁴ Ibid.

³⁵ Ibid

³⁶ Ibid

³⁷ Boundless, "Boundless Art History," Lumen, [PAGE], accessed November 13, 2020, <https://courses.lumenlearning.com/boundless-arthistory/chapter/the-enlightenment/>)

³⁸ John Locke his "Essay Concerning Human Understanding" (Locke, James. "An Essay Concerning Human Understanding

³⁹ Ibid.

⁴⁰ Boundless. "Boundless Art History". Lumen. Accessed November 13, 2020. <https://courses.lumenlearning.com/boundless-arthistory/chapter/the-enlightenment/>



Colbert Presenting the Members of the Royal Academy of Sciences to Louis XIV in 1667, by [Henri Testelin](#); in the background appears the new [Paris Observatory](#).⁴¹

In the enlightenment painting "Colbert Presenting the Members of the Royal Academy" by Henri Testelin, the globes are of particular interest. Is this knowledge attached to understanding the world rather than just books?⁴² For painters of the enlightenment, explorers like Columbus made this access to knowledge a possibility. They had undoubtedly not been concerned that he had obtained this knowledge by being financed through the trade of human bodies.

This painting takes place in the royal academy of sciences, and in the background is the new Paris Observatory. Once again, the symbolism of the stars (relationship to heavens and god) guides us on the Earth. Governments that took control of this "divine" right then did not see themselves as violent colonialists or warmongers but rather as prophets of wisdom.

The philosophy at the time supported Locke's theories of the two methods of obtaining knowledge: that ideas arrive through the senses or the mind's reflection of its own activity. Thus, the greater the access to knowledge, the more groundbreaking the experience, the more groundbreaking the individual's thoughts would be. Thomas Reid would later write in his essay "Essays on the Active Powers of the Human Mind:

*"When I observe a plant growing from its seed to maturity, I know that there must be a cause that has power to produce this effect. But I see neither the cause nor the manner of its operation. But in certain motions of my body, and directions of my thought, I know not only that there must be a cause that has power to produce these effects, but that I am that cause;"*⁴³

⁴¹ "Testelin, Henri - Colbert Presenting the Members of the Royal Academy". Wikipedia Archive. Accessed May 26, 21.

https://commons.wikimedia.org/wiki/File:Testelin,_Henri_-_Colbert_Presenting_the_Members_of_the_Royal_Academy_of_Sciences_to_Louis_XIV_in_1667.jpg.

⁴² "Testelin, Henri - Colbert Presenting the Members of the Royal Academy". Wikipedia Archive. Accessed May 26, 21.

https://commons.wikimedia.org/wiki/File:Testelin,_Henri_-_Colbert_Presenting_the_Members_of_the_Royal_Academy_of_Sciences_to_Louis_XIV_in_1667.jpg.

⁴³ Reid, Thomas. "Essays on the Powers of the Human Mind, Vol 3: Essays on the Active Powers of Man". 1803. doi:10.1037/11803-000.

This statement speaks of the power of our consciousness, which of course, brings to mind Descartes "I think; therefore I am".⁴⁴ During Reid's period, focus on individual power and the power of the human consciousness was given great importance.⁴⁵ So much so that Reid says, "*I am that cause (i.e. power)*". In the centuries that followed, these philosophies would be paralleled by many people working to understand nature to manipulate it. If "human" was considered to be the power that made the seeds on earth grow, then in Reid's day and age the foundations for the egoism of Ayn Rand (discussed in chapter two) had already been laid. The earth without the human would have stopped existing, thus manipulating nature for human need was never considered problematic.

During Reid's time, the industrial revolution that was taking place throughout Europe saw the most dramatic upswing in production in history as society moved from agrarian to industrial.⁴⁶ At this time on the planet, it is estimated that there were less than 1 billion people.⁴⁷ Alongside rapid growth at home was more demand for increased flow of goods from abroad. The obsession with travel and exploration led to exponential growth in the spread of colonization.

Governments funded more and more sea-based expeditions in hopes of finding the next Columbus. "The age of discovery" put a glorious spin on navigation and the establishing of new trade routes. Any amount of funds and human power was worth it to slake the insatiable desire of Europe for new luxuries. In contrast to the artists of the enlightenment, the romantics criticized the lust for adventure and discovery, depicting the macabre fate that awaited many explorers in place of glory as we shall see in the next section.

Romanticism and the Sublime

*"get up let us a voyage take,
why sit here at our ease?
Find us in a vessel tight and snug,
bound for the northern seas"*⁴⁸

⁴⁴ "Descartes: I Think Therefore I Am," New Learning Online, [PAGE], accessed March 31, 2021, <https://newlearningonline.com/new-learning/chapter-7/descartes-i-think-therefore-i-am>)

⁴⁵ Ibid.

⁴⁶ Stefan, Will, Wendy Broadgate, and Lisa Deutsch. "The Trajectory of the Anthropocene: The Great Acceleration". *The Anthropocene Review*, January 16, 2015, 81-98.

⁴⁷ "1960 Census: Population of Supplementary Reports". *United States Census Bureau*, United States Census Bureau, 18 June 1962, www.census.gov/library/publications/1962/dec/population-pc-s1-25.html updated February 2018

⁴⁸ William Howitt, "The Northern Seas (William Howitt, 1792-1879)," Poets.net, January 01, 1970, [PAGE], accessed May 26, 2021, <https://www.poets.net/2008/12/northern-seas-william-howitt-1792-1879.html>)

The poem by William Howitt entitled “*The Northern Seas*” stoked the idea of potential glory for navigators hoping to discover the Northwest Passage.⁴⁹ Finding a route from Europe to the West Indies across the 1,000 miles of ice in the Arctic became known as the Holy Grail of Exploration and was attempted for 400 years.⁵⁰ Despite the danger, one must remember that since the beginning of storytelling, the human had been fed the idea that the man who would conquer the seas held the divine favour of the gods and might be immortalized by fame. It was not just a coincidence that this impossible sea-based journey to the ends referenced a life-giving cup.

As time dragged on, and it became apparent that the journey north was more treacherous than initially supposed, critiques of the northern exploration teams became more vociferous. They imagined the ice to be a living moving beast, with passages opening and closing like a labyrinth waiting to swallow up ships and crews daring to pass through it. Friedrich’s painting of a shipwreck trapped in this maze of ice became one of the most memorable warning tales of the romantic period, one of prematurely ended lives and wasted funds devoured by an empire.⁵¹ (Fig. 3)



The Polar Sea (The Destroyed Hope) - Caspar Friedrich - 1824⁵²

Friedrich depicted the beauty, terror and overall futility of this northward journey in this image that reminds the individual of the overwhelming power of nature. The ice seemed to have its own volition and had only to decide to swallow explorers to end the dreams of a country at home. No matter how powerful these images, romantic artists creating at this time were slaves to limited

⁴⁹ Boyer, Photograph By Thierry. "In 1845 Explorers Sought the Northwest Passage-then Vanished". National Geographic. November 05, 2020. Accessed May 26, 2021. <https://www.nationalgeographic.co.uk/history-and-civilisation/2019/08/1845-explorers-sought-the-northwest-passage-then-vanished>.

⁵⁰ Ibid.

⁵¹ "The Sea of Ice," Wikipedia, March 02, 2021, [PAGE], accessed May 26, 2021, https://en.wikipedia.org/wiki/The_Sea_of_Ice

⁵² "The Sea of Ice," Wikipedia, March 02, 2021, accessed May 26, 2021, https://en.wikipedia.org/wiki/The_Sea_of_Ice

technology and were prevented from seeing many of these places themselves. Their paintings took on a feeling of imaginary and anecdotal. Just like any imagined scene from mythology that would have been an idealistic painting in the French Academy, the imagery had to be constructed within the artist's mind from recollections and suppositions.⁵³

One of the conclusive elements that would change this expansive knowledge for the rest of time became the invention of photography. Photography changed two primary things for society and art of the 19th and 20th century. Firstly imagery and knowledge could be more widely spread; an individual travelling to a given place was no longer necessary. The concept of the Grand Tour died. The photographer of the late 19th and 20th century was not only travelling to famous cities that were comparatively accessible, but to new frontiers.⁵⁴ These were places where most individuals would not have travelled even if they had had the means and the opportunity.

The second primary difference was the expected interpretation of the medium. Artists of the past had used painted imagery to document "historical myths" and tales from the bible. This documentation of imagery gave the public the feeling that these imagined sagas were actual occurrences. Politicians and religious institutions had used painters as the political propaganda outlets for the past centuries. Though the manipulation had been powerful and outstanding, the expanding knowledge of society came to interpret paintings with a grain of salt. Roman mythology had died out as a form of religion, Christianity was waning in some sense, and the depiction of angels, goddesses and winged beasts became a metaphorical illusion rather than a representation of an immutable truth.

Photography opened up the public's eyes to a new reality. It was the most accurate reflection of humanity, society, and the natural world. Although artists would also come to manipulate the truth through the medium of photographic documentation, there was a sense of trust given to the photographic image on an unprecedented scale. For the first time in recorded human history, humanity became more grounded in the measurable, concrete world around them than in the anecdotal and imagined spiritual world.

In the early 20th century, long after Friedrich's time, photography created a completely different approach to the widespread documentation of man's relationship with nature. Australian photographer Frank Hurley seems to channel much of the romantic condition regarding the relationship between human and nature in his photography.⁵⁵ The sublime themes of beauty, failed conquest, and isolation are repeated in the photos that would launch the 20-year-old's early career.⁵⁶

His documentation of the failed 1914 journey of the *Endurance* in the Weddell Sea set a premise for artists working with natural phenomena and landscapes.⁵⁷ Travelling and seeing with one's own eyes became an integral part of the creative process; it was a rebirth of the Grand Tour on a

⁵³ Alyssa Coppelman, "A Stranded Photographer Who Survived for a Year on Penguin Steaks," *Slate Magazine*, October 11, 2012, accessed May 26, 2021, <https://slate.com/culture/2012/10/the-photographs-of-frank-hurley-shackleton-s-antarctic-expedition-gone-wrong.html>

⁵⁴ Alyssa Coppelman, "A Stranded Photographer Who Survived for a Year on Penguin Steaks," *Slate Magazine*, October 11, 2012, [PAGE], accessed May 26, 2021, <https://slate.com/culture/2012/10/the-photographs-of-frank-hurley-shackleton-s-antarctic-expedition-gone-wrong.html>

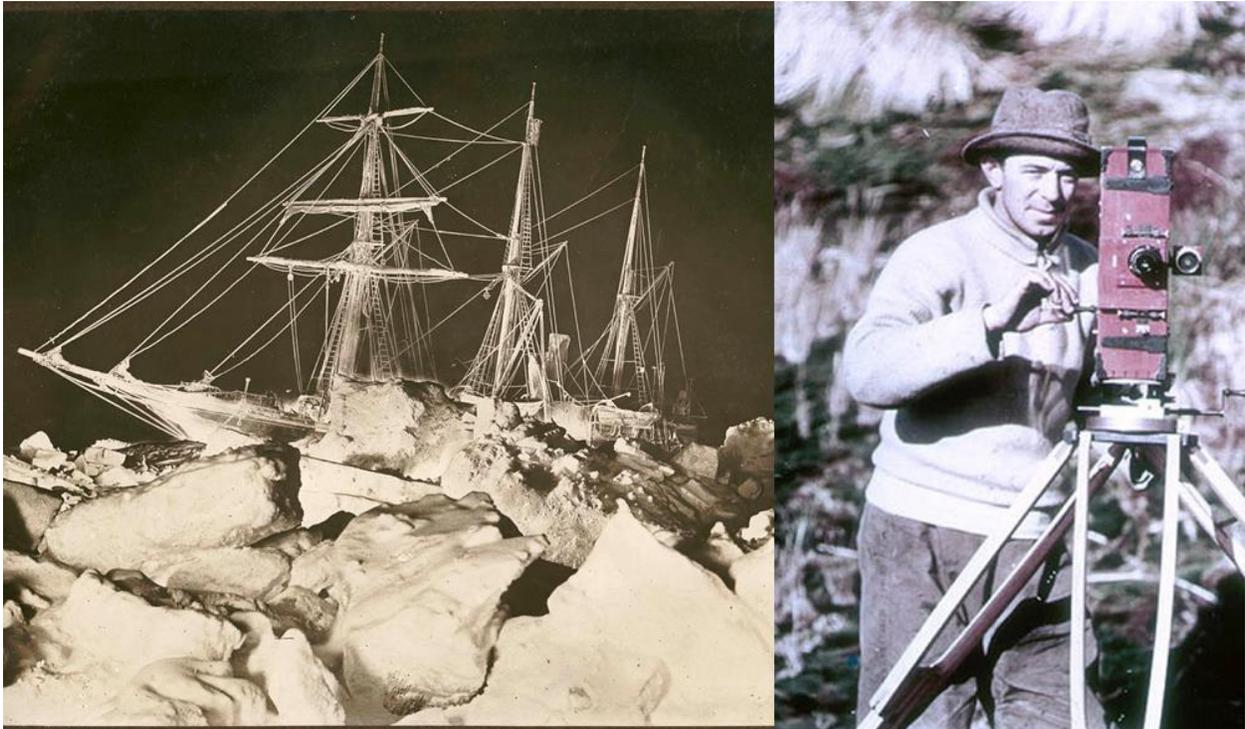
⁵⁵ Alyssa Coppelman, "A Stranded Photographer Who Survived for a Year on Penguin Steaks," *Slate Magazine*, October 11, 2012, [PAGE], accessed May 26, 2021, <https://slate.com/culture/2012/10/the-photographs-of-frank-hurley-shackleton-s-antarctic-expedition-gone-wrong.html>

⁵⁶ *Ibid.*

⁵⁷ *Ibid.*

monumental scale. The artist was a visual authority in human understanding, which agreed somewhat with Locke's theories on the expansion of knowledge, that in order to know, one must experience.

Hurley spent weeks in the arctic, documenting the voyage of the crew, the arctic ice, and the regal ship trapped in the pack.⁵⁸ In this way, the artist himself became a navigator and explorer rather than a recluse breathing life into the tales fed. This progress and development of travel and technology in the following century would completely change the documentation of the sublime. (Fig. 2 + 3)



58
ibid.



The Endurance above The Antarctic Circle. Photograph series by Frank Hurley⁵⁹

The terrifying and sublime depiction of the icy wilderness is something that captivates audiences all over the planet. Something in the human condition compels one to believe that the more terrifying the frontier, the more fantastic the hero or heroine that conquers it. Obsession with the power of the human spirit personifies, “Endurance,” and the story of the photographic documentation is not about the ship stuck in the pack but about the heart of mankind. Despite the beast that swallowed the ship and held the crew back from obtaining the “holy grail”, humanity as a whole still overcame the terror of the ice beast through collective remembrance and reverence of the humans who failed but tried.

Fascination with the unforgiving terrain of the vast oceans, frozen or not, has not yet faded from societal memory. Even though the most advanced human technology has advanced beyond immediate danger for those needing to deliver goods, the mentality of “discover and conquer” is still etched into society.

An unrivalled example of this mentality can be documented in the famous trans-pacific yacht race called the Clipper. ⁶⁰ The repeated mantra of “fewer men and women have taken a yacht across the Pacific than have travelled into space” is proudly advertised to the modern-day people who aspire

⁵⁹ Alyssa Coppelman, “A Stranded Photographer Who Survived for a Year on Penguin Steaks,” *Slate Magazine*, October 11, 2012, [PAGE], accessed May 26, 2021, <https://slate.com/culture/2012/10/the-photographs-of-frank-hurley-shackleton-s-antarctic-expedition-gone-wrong.html>

⁶⁰ “Clipper Round The World Race,” *Clipper Round The World Race*, accessed March 31, 2021, <https://www.clipperroundtheworld.com/>

to partake in it.⁶¹ These chosen few shall have the opportunity to see and react to the knowledge that few will have the opportunity to.

“*Conquer*,” the word itself implies that someone needs to die for the conqueror to claim his title. No winner without a loser, the better man lives and the weaker dies, allowed to fall on his sword if he fights valiantly. That is the adrenaline-seeking goal for each man and woman that travels out on a yacht in their survival suits. To drive a sabre through the heart of the Pacific, tethered to safety by single lines of rope.

2018 “*Clipper*” participant Michael Ferguson recounted the tale of being on a yacht in the middle of the Pacific during a storm during a conversation with him. He stood on deck as the yacht beneath him lurched, and the wind from the storm screamed in his ears. Lightning spun around them, and they were perched there atop the crest of the waves; it was as if a Himalayan landscape of liquid mountains surrounded them. Each time arriving at the crest of the wave, the crew awaited the plunge downwards.

As the yacht plummeted down the side of the mountain, the world was muted in the bottom of the trough, like being trapped inside an inhaling lung, blocking out wind, blocking out life. The 2nd mate was opposite him on the deck, holding a thick white rope and attempting a knot as a violent wave swept him from the deck.

Held on by a rope, without even a dry suit, the second mate flailed in the water, panicking as the ocean waterboarded him. Despite the line keeping him attached to the metal rails, the salty liquid entering his lungs was drowning him with each merciless thrash. The crew was sure he was dead as adrenaline gripped them. Men reached the railing and the tether that held the second to the ship; hands somehow managed to grab his vest and heaved as the yacht plunged downwards. The second flew over the rails, crashing onto the deck. He jumped to his feet, vomiting out water and brine. Eyes crimson with adrenaline and salt, his fellow shipmates attempted to comfort him, yet he was possessed as a man carried away from the river Styx by a sewing string. He threw a punch at one of his mates, who dodged the fist in time.

The 2nd collapsed on a bench as the storm dissipated. Ferguson recounts going below and breaking the silence while the 2nd mate stared at the ceiling.

“What are you thinking about, mate?”

Clearing his throat, the 2nd said, “my kids,” he paused, “I thought I was dead”.

Ferguson replied, “to be honest, mate, I thought you were too”.

In the aftermath of the competition, the team recounts meeting and realizing that “conquering” the Pacific Ocean had been a vain effort and that the word “survive” was much more appropriate.

Nevertheless, the romantic elements of the sublime in their tale are undeniable; mountains of water at sea and the ability to survive these mountains with nothing but human willpower and a comparatively small yacht. The overall idea of the *Clipper* and other such races presents an impressive metaphor. In order for the fight between humanity and nature to be a fair one, humanity has to approach nature with one hand tied behind its back. No one in the modern age is interested in hearing the harrowing tale of someone crossing the Pacific Ocean in a commercial plane. This novelty long

⁶¹ “Clipper Round The World Race,” *Clipper Round The World Race*, accessed March 31, 2021, <https://www.clipperroundtheworld.com/>

wore off after Amelia Earhart's achievement nearly a century ago. These already "conquered" frontiers behave as a sort of plaything for the modern generation. This concept would have been unfathomable during the time of the enlightenment when discovery and conquering had to hold economic value.

What happened in the 20th century to take humans from the terror of crossing the never-ending ocean for mercantile purposes to treating the expanse of the Pacific as a young child might treat a football field?

Chapter 2: Nature is for man to exploit

"Why does man freeze himself to try and reach the North Pole? Why does he drive himself to suffer the staggering heat of the Amazon? Why does he stagger himself with the mathematics of the sky? Once the question mark has arisen in the human brain the answer must be found if it takes 100 years if it takes 1,000 years". -*Journey to the Center of the Earth 1969, Jules Verne*⁶²

I am a parasite. I have been a parasite all my life . . . I have fed on you and all the men like you who lived before we were born. . . . if they had not existed I would not have known how to put stone to stone. . . . I have taken that which was not mine and given nothing in return. - *Peter Keating, The Fountainhead, Ayn Rand*⁶³

Jules Verne was one of the most prolific writers at the end of the 19th century, with many of the themes of his stories centred around human innovation, discovery, and the glory of man uncovering the mysteries of the world.⁶⁴ The stories were fascinated with the power of the individual human, primarily the white affluent. Characters were often defined by the fact that they would be the first ones to accomplish something that would test the limits of the human. Such as "*Around the World in 80 Days*" or "*Journey to the Center of the Earth*". After he died in 1905, his novels seemed to set the stage for the century that would follow.⁶⁵

The technological advancements that were to come in the 20th century captured the world's imagination and inspired international collaboration between practically based sciences. Cars, planes, radios and eventually, the telephone would mean that individuals had more access to travel and communication than ever before.

As with Verne's glorified stance in his novels, and as we remember from the Grand Tour, there was a romanticism connected with travel and gaining knowledge that lives on until today. Inventions throughout the 20th century would make life more leisurely and allow for less work and more play for persons wishing to explore the world. The ability to do so was a symbol of status and curiosity, something that many people desire. This desire led to greater demand for things like cars, planes, and trains.

The "American dream" put on display the capitalistic dream of never-ending growth and the concept that intelligent, persevering and hard-working persons would always end up in first place. Novelists like Ayn Rand were aggressively capitalist and believed that socialism - which is in many

⁶² "Journey to the Center of the Earth". *Journey to the Center of the Earth*, 20th Century Fox. allegorical reference

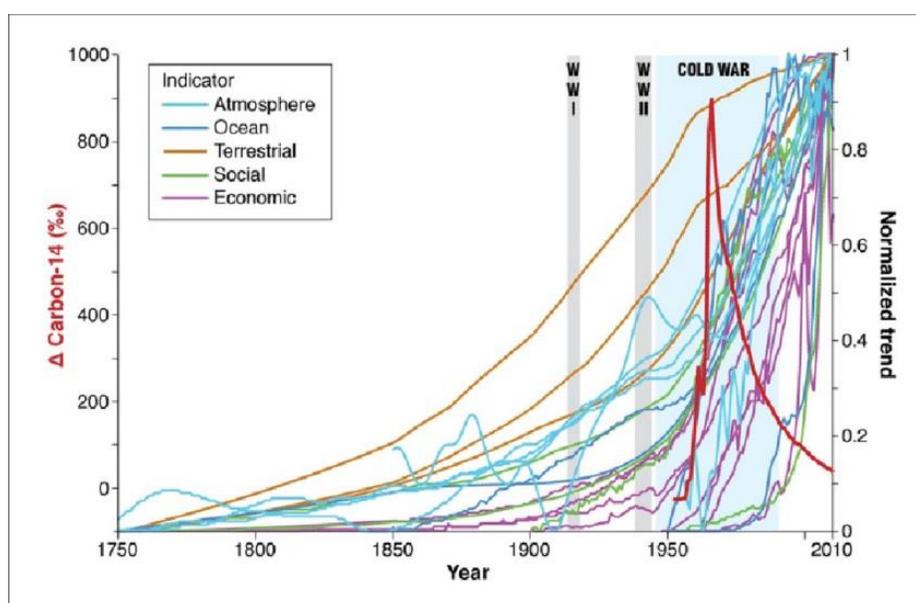
⁶³ Ayn Rand and Leonard Peikoff, *The Fountainhead* (New American Library, 2019),)

⁶⁴ Evans, Arthur. "Jules Verne". Encyclopædia Britannica. March 20, 2021. Accessed April 06, 2021. <https://www.britannica.com/biography/Jules-Verne>.

⁶⁵ Ibid

respects the polar opposite of capitalism - was a way to support lazy and talentless persons worldwide. The philosophies developed by Rand became a belief system called egoism.⁶⁶

This obsession with capitalistic development led to *the Great Acceleration* and the eventual proposed epoch known as the Anthropocene.⁶⁷ During the 20th century, the world would see a period of unprecedented growth in energy consumption, product consumption, population growth, pollution, and land usage boundaries.⁶⁸ *The Great Acceleration* was so closely connected to the ever more luxurious lifestyles of the West that some ecologists have argued that the name of the current epoch should be "*Capitalocene* or *Colonialocene* rather than the *Anthropocene*".⁶⁹ These criticisms are often based upon the fact that per capita energy usage, fossil fuel consumption, and production of pollution are much higher in western countries than in other regions of the World.⁷⁰ Samples of such statistics can be found on sites like statista where comparative reports on energy consumption per capita are available.⁷¹



"The Trajectory of the Anthropocene," January 2015⁷²

⁶⁶ John Nolt, "Anthropocentrism and Egoism," *Environmental Values* 22, no. 4 (2013): [PAGE], doi:10.3197/096327113x13690717320667)

⁶⁷ Heather Davis and Etienne Turpin, *Art in the Anthropocene: Encounters among Aesthetics, Politics, Environments and Epistemologies* (London: Open Humanities Press, 2015), [PAGE])

⁶⁸ Mark Lynas, *The God Species: How Humans Really Can save the Planet* (London: Fourth Estate, 2012), [PAGE])

⁶⁹ Heather Davis and Etienne Turpin, *Art in the Anthropocene: Encounters among Aesthetics, Politics, Environments and Epistemologies* (London: Open Humanities Press, 2015), [PAGE])

⁷⁰ Sönnichsen, Published By N., and Mar 8. "Global per Capita Electricity Consumption 2018". Statista. March 08, 2021. Accessed April 06, 2021.

<https://www.statista.com/statistics/383633/worldwide-consumption-of-electricity-by-country/>.

⁷¹ Ibid.

⁷² Stefan, Will, Wendy Broadgate, and Lisa Deutsch. "The Trajectory of the Anthropocene: the Great Acceleration". *The Anthropocene Review*, 16 stycznia 2015, 81-98.

For the longest time, acceleration was seen as a good thing and increased symbiotically with more comfortable lifestyles. As the population boomed, so did the need for more jobs, and the more jobs in production there were, the more significant amount of resources were being used up. As was stated in the documentary *"How Capitalism is Killing Itself"*, the people who lived at the beginning of *the Great Acceleration* (1945 onward) did not feel that the world's resources were being used up. In many ways, life was better than it had ever been.⁷³ Living was cheap, the pay was good, and there was a steady upward trend in the economy. As the documentary states "If this was capitalism, we loved it".⁷⁴

Any warnings mentioned in works such as the "Communist Manifesto" as a criticism of this system were written off as dangerous propaganda.⁷⁵ Although many of his views were misconstrued, Marx understood a world principle that physicists also understand. Infinite growth is impossible. He seemed to have predicted what many persons in the modern age are beginning to feel, the tremors of an impending collapse.

The Key to the Great Acceleration:

"Historians often describe the discovery of nuclear power as a kind of threshold in human history— a firewall through which our culture has passed and cannot return. Nevertheless, a crossing every bit as fateful occurred with research on nitrogen".⁷⁶

There are many well-supported opinions on the most significant catalyst of *the Great Acceleration*. However, if we could observe a synopsis of human history, one of the first population booms began with the Neolithic Revolution and the ability to feed larger populations. This paper will observe how a "second neolithic revolution", or "the nitrogen revolution", as it shall be called in this paper, was one of the most significant catalysts in population growth and the massive amounts of pollution connected with it. This chapter will observe how the rapid change in industrial farming at the beginning of the 20th century drastically changed the relationship between man and nature.

In his book "The Revenge of Gaia," ecologist James Lovelock discusses the symbiotic relationship between vegetation and mammals.⁷⁷ His idea of "Gaia", or how all of the living systems on the Earth function as a body, was unpopular amongst scientists for a long time. However, in 2002 the Amsterdam Declaration was signed and represented four global-change organisations' declarations and

⁷³ "How Capitalism Is Killing Itself," YouTube, March 22, 2016, [PAGE], accessed April 06, 2021, <https://www.youtube.com/watch?v=6P97r9Ci5Kg>

⁷⁴ *Ibid*

⁷⁵ *Ibid*

⁷⁶ A. Hermann, "Haber Und Bosch: Brot Aus Luft - Die Ammoniaksynthese," *Physik Journal* 21, no. 4 (1965): [PAGE], doi:10.1002/phbl.19650210403

⁷⁷ James Lovelock, *The Revenge of Gaia* (London, England: Penguin Books, 2007), [whole book]

more than 1,000 delegates.⁷⁸ The declaration's opening statement was, "The earth system behaves as a single, self-regulating system composed of physical, chemical, biological and human components".⁷⁹ The concept of a living system in which humans and the Earth are symbiotically related is imperative to understand why *the nitrogen revolution* was a turning point that led to the destruction of natural systems.

According to theories of Lovelock, the nitrogen process is as much a part of humans as it is of mammals, vegetation, and the ocean.⁸⁰ There is a well-supported theory that the natural processes of nitrification (addition of necessary nutrients that act as fertilizer for plants) in soil were dependent on the urea of mammals. Nitrogen is necessary for all life, but humans and other mammals get the nitrogen they need from the breakdown of proteins.⁸¹ Through the digestion of proteins, the body must also process nitrogen which, rather than being exhaled in nitrogen gas, exits the body through urea.⁸²

One might suppose an evolutionary purpose was to dispose of excess nitrogen through urination rather than exhaling. However, Lovelock explains that the former costs the human body more energy and more quickly dehydrates humans when water might be scarce.⁸³ This evolutionary phenomenon suggests that humans, and other mammals, evolved in an altruistic manner. It is within our very nature to live symbiotically with the vegetation around us. Through this natural fertilisation process, vegetation was supported, later consumed by the hunter-gatherer human or other mammals.

If the reader finds themselves shocked by this theory, it is a typical evolutionary pattern that "waste" is not waste and always serves a purpose. According to oceanologist, Viktor Smetacek, whale excrement is critical in ocean environments, creating essential feeding pastures for small fish and krill.⁸⁴ Krill, in turn, are the primary food source for whales. "Waste" in itself is an entirely human invention, as even excrement, urea and corpses never seem to have been wasted in the balance of natural processes and the environment.⁸⁵ The word's etymology comes from the Latin c. 1200 "vastare", meaning to lay to waste or leave in ruins or "vastus" meaning empty or desolate.⁸⁶ This means the original concept of waste appeared only 800 years ago, and the understanding of the word as we know it did not appear until much later.

In the industrial age that must support massive populations of humans with crops, natural nitrogen replenishment in soil (i.e. animal waste, decay, and lightning strikes) has long since been unable to sustain our needs.⁸⁷ Many would argue that the most important inventions of the 20th century were technological innovations such as the telephone, the car, or the plane. However, this

⁷⁸ James Lovelock, *The Revenge of Gaia* (London, England: Penguin Books, 2007), [introduction]

⁷⁹ James Lovelock, *The Revenge of Gaia* (London, England: Penguin Books, 2007), [34]

⁸⁰ *Ibid*

⁸¹ *Ibid*.

⁸² *Ibid*

⁸³ James Lovelock, *The Revenge of Gaia* (London, England: Penguin Books, 2007), [34-35]

⁸⁴ Robert Krulwich, "The Power Of Poop: A Whale Story," NPR, April 05, 2014, accessed April 06, 2021,

<https://www.npr.org/sections/krulwich/2014/04/03/298778615/the-power-of-poop-a-whale-story>

⁸⁵ *Ibid*.

⁸⁶ ("Waste (v.)". Index. Accessed November 13, 2020. <https://www.etymonline.com/word/waste>.)

⁸⁷ A. Hermann, "Haber Und Bosch: Brot Aus Luft - Die Ammoniaksynthese," *Physik Journal* 21, no. 4 (1965): [PAGE], doi:10.1002/phbl.19650210403

paper will contest that the "invention" of synthetic ammonia nitrates was the most essential technological threshold that humanity crossed in the 20th century.

Mastering Nitrogen:

The problem with nitrogen depletion began much longer before *the Great Acceleration*. In the 1840's crop production in Europe was slowing, and the growing populations were becoming increasingly desperate.⁸⁸ The main problem being a lack of nitrogen in the soil and an inability to find a crop that would create higher yields. Ammonia nitrates do indeed exist naturally but needed to be mined and imported, which was costly and time-consuming.⁸⁹

It became one of the primary goals of scientists of this age to find a way to easily replace nitrogen in the soil so that crops might thrive again. However, it was not until 1912 that a scientist from Wrocław (then Breslau) named Fritz Haber had a significant breakthrough and the *Haber-Bosch process* was discovered.⁹⁰ *Haber-Bosch* synthesized ammonia from nitrogen gas and hydrogen, creating a liquid that could be sprayed on the soil to assist with the starving crops.⁹¹

This miracle fertilizer would earn Fritz Haber a Nobel prize in 1918.⁹² He was credited with preventing millions from starving to death. Later he became known as the father of chemical warfare, and his discovery paved the way for an unprecedented acceleration that would come to describe the following century.⁹³ Mastering nitrogen became a *Neolithic Revolution* of the 20th century and similarly to the way Professor Yuval Harari described the first *Neolithic Revolution* in the book *Sapiens*, "it was perhaps the biggest trap humanity had ever encountered".⁹⁴

"The unlimited supply of nitrogen became one of the primary components for enabling German attack during World War I.⁹⁵ Synthetic ammonia from the Haber process was used to produce nitric acid, a precursor to the nitrates used in explosives".⁹⁶ Large amounts of nitrates were required for the

⁸⁸ Ibid.

⁸⁹ (Worrell, James. "The Nitrogen Bomb". Discover Magazine. May 17, 2019. Accessed November 13, 2020.

<https://www.discovermagazine.com/environment/the-nitrogen-bomb>.)

⁹⁰ (Hermann, A. "Haber Und Bosch: Brot Aus Luft - Die Ammoniaksynthese". *Physik Journal*, vol. 21, no. 4, 1965, pp. 168–171., doi:10.1002/phbl.19650210403)

⁹¹ (Worrell, James. "The Nitrogen Bomb". Discover Magazine. May 17, 2019. Accessed November 13, 2020.

<https://www.discovermagazine.com/environment/the-nitrogen-bomb>.)

⁹² (Hermann, A. "Haber Und Bosch: Brot Aus Luft - Die Ammoniaksynthese". *Physik Journal*, vol. 21, no. 4, 1965, pp. 168–171., doi:10.1002/phbl.19650210403)

⁹³ (Albrecht, Jörg (2008) "*Brot und Kriege aus der Luft*". *Frankfurter Allgemeine Sonntagszeitung*. p. 77 (Data from "Nature Geoscience")

⁹⁴ (Harari, Yuval N., David Casanave, and David Vandermeulen. *Sapiens*. London: Jonathan Cape, 2020.)

⁹⁵ (Albrecht, Jörg (2008) "*Brot und Kriege aus der Luft*". *Frankfurter Allgemeine Sonntagszeitung*. p. 77 (Data from "Nature Geoscience")

⁹⁶ (Worrell, James. "The Nitrogen Bomb". Discover Magazine. May 17, 2019. Accessed November 13, 2020.

<https://www.discovermagazine.com/environment/the-nitrogen-bomb>.)

production of munitions, and with Britain having control over the world's nitrate mines at the time, the *Haber-Bosch process* became essential for the German war effort.⁹⁷

The destructive aspects of the *Haber-Bosch process* did not end there. As they were initially considered a godsend, humanity could never have foreseen the loss of life that nitrates would cause in the late 20th century. As is typical with industrial changes, adverse effects did not happen overnight. Farmers at the time saw an immediate change in their yields and ability to feed millions who were malnourished. In this way, commercial farming and nitrates ended up being a robbing Peter to pay Paul situation, although no one knew that the latter debt was to be collected. It would be not those initially using nitrates but the generation of their grandchildren who would find themselves drowning in overwhelming environmental debt, with nearly 7 billion more people to feed, support and provide first-class lifestyles to than in 1800.⁹⁸

After the World Wars of the early 20th century, human-made nitrogen fertilizers became widely used in U.S. and world agriculture, providing an inexpensive source of nitrogen and other plant nutrients that resulted in considerable increases in agricultural productivity.⁹⁹ Since the 1950s, nitrogen fertilizer use has increased over five-fold in the United States and many other industrialized countries.¹⁰⁰

Being sure that crops did not fail was an ever-increasing concern, especially with the changing diets of the population following the war. The annual amount of meat consumed per person doubled from the years before the war to 2000.¹⁰¹ This change was significant to the strain put on farmers because, in terms of calories per acre, meat requires much more acreage to provide for a growing population.¹⁰²

A comparison of calories per acre: (1 acre = 4,046 m²)

⁹⁷ (Worrell, James. "The Nitrogen Bomb". Discover Magazine. May 17, 2019. Accessed November 13, 2020.

<https://www.discovermagazine.com/environment/the-nitrogen-bomb>.)

⁹⁸ *Ibid*

⁹⁹ *Ibid*

¹⁰⁰ Mary H. Ward, "Too Much of a Good Thing? Nitrate from Nitrogen Fertilizers and Cancer," US National Library of Medicine, October 21, 2028, [PAGE], accessed October 14, 2020, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3068045/>)

¹⁰¹ Janet Larson, "Peak Meat: U.S. Consumption Falling," Earth Policy Institute, March 7, 2012, [PAGE], accessed October 14, 2020, http://www.earth-policy.org/data_highlights/2012/highlights25)

¹⁰² James Videle, "Comparison of Protein and Caloric Energy," May 5, 2019, [PAGE], accessed October 14, 2020, <https://humaneherald.files.wordpress.com/2019/05/calories-and-protein-produced-per-acre-1.pdf>)

<i>Crop</i>	<i>Calories per acre</i>
Soybeans -----	6,271,628/acre
Sunflower seeds -----	4,376,915/acre
Wheat (winter) -----	4,103,204/acre
Dry Peas -----	3,317,604/acre
Dry Beans (Black) -----	2,674,263/acre
Lentils -----	2,171,265/acre
<i>Animal Products</i>	<i>Calories per acre</i>
Calories/acre Chicken (meat)-----	1,496,809/acre
Turkeys (meat) -----	1,040,886/acre
Milk from cows -----	1,005,811/acre
Pigs (meat) -----	888,516/acre
Eggs from chickens -----	670,216/acre
Cows (meat)source: ¹⁰³ -----	89,489/acre

As seen in the tables, soybeans could create a staggering 70 times as many calories in the same amount of land usage as beef.¹⁰⁴ We can naturally assume that other resources such as water also parallelly increase with land usage. Thus, to produce a comparable amount of calories in beef as a farmer would produce on one-acre soybeans, the collective farming community would need to have 70 acres of farmland. This meant much more strain on farmers to increase the size of their farmland, often by destroying forests, something that Mark Lynas in "The God Species" dubbed the land usage boundary.¹⁰⁵ This increase has led to the skyrocketing (5x) increase in ammonia nitrate fertilizers since the 1950s.¹⁰⁶ This change is unprecedented as the U.S. population has little more than doubled.¹⁰⁷

¹⁰³ (Videle, James. "Comparison of Protein and Caloric Energy". May 5, 2019. Accessed October 14, 2020.

<https://humaneherald.files.wordpress.com/2019/05/calories-and-protein-produced-per-acre-1.pdf>.)

¹⁰⁴ Ibid.

¹⁰⁵ (Lynas, Mark. *The God Species: How Humans Really Can Save the Planet*. London: Fourth Estate, 2012.)

¹⁰⁶ (Ward, Mary H. "Too Much of a Good Thing? Nitrate from Nitrogen Fertilizers and Cancer". U.S. National Library of Medicine. October 21, 2028. Accessed October 14, 2020. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3068045/>.)

¹⁰⁷ (1960 Census: Population of Supplementary Reports". United States Census Bureau. June 18, 1962. Accessed October 14, 2020. <https://www.census.gov/library/publications/1962/dec/population-pc-s1-25.html>. updated February 2018)

*U.S. population:***1960 - 150,697,000****2020 - 318,400,000**

A Bloomberg study on United States land use shows that currently 654 million acres are used for pasture and range for livestock, and an extra 127.4 million acres of cropland is used for livestock feed.¹⁰⁸ In total, they account for 781.4 million acres of farmland, whereas a mere 77.3 million acres is dedicated to food consumed by the United States population.¹⁰⁹

With this study showing us that a shocking 41% of the contiguous United States is being used for livestock, the land usage boundary is seemingly reaching a breaking point and we are experiencing an agrarian colonization of nature.¹¹⁰ In the past decade, as we have witnessed the rainforests burning across the Amazon and Indonesia. These are often fires started by local farmers striving to find ways to produce more food or expand cattle ground.¹¹¹ It is easy to be critical of turning natural spaces into farmland when spectacular areas of biodiversity such as the rainforests are being burned.

Nevertheless, we criticize without even mentioning the history of the destruction of the wild steppe of ancient Europe. Even today, the conversation is more extensive than just the rainforest. Areas unfit for farming are being scientifically manipulated by chemicals in order to produce food for the masses.

Many are asking once again how we can increase the calories produced on every acre of land. The hope for miracle genetically modified organisms or GMOs and fertilizers is on the rise, yet many catastrophes are appearing across the planet. This is a downfall that Rachel Carson already predicted back in the 1970s with her revolutionary novel "Silent Spring".¹¹² These ammonia nitrates set out to be the miracle cure for the human population and are now one of the leading causes of poisonous algae blooms and apocalyptic dead zones in waters across the planet.¹¹³ The impact of these nitrates on the environment and on the human body will be explored in the following chapter.

As we have observed in the first chapters, the West has developed an estranged relationship with the sea. It was a symbol of freedom that served to glorify the individual human that conquered and discovered new horizons. The effects of this mindset can be seen in the constant growth on land that paid little attention to run off in rivers and bays around our cities. A testament to this carelessness can be seen after the Second World War up until the 1970's when unused explosives and

¹⁰⁸ (Merrill, Dave, and Lauren Leatherby. "How America Uses Its Land". Bloomberg. July 31, 2018. <https://www.bloomberg.com/graphics/2018-us-land-use/>)

¹⁰⁹ Ibid

¹¹⁰ (Merrill, Dave, and Lauren Leatherby. "How America Uses Its Land". Bloomberg. July 31, 2018. <https://www.bloomberg.com/graphics/2018-us-land-use/>)

¹¹¹ Borunda, Alejandra. "Map: See How Much of the Amazon Forest Is Burning, How It Compares to Other Years". Environment. February 10, 2021. Accessed April 06, 2021. <https://www.nationalgeographic.com/environment/article/amazon-fires-cause-deforestation-graphic-map>.

¹¹² Carson, Rachel. *Silent Spring*. 2002.

¹¹³ "Blooming Baltic Sea". NASA. Accessed January 14, 2021. <https://earthobservatory.nasa.gov/images/86449/blooming-baltic-sea>.

chemical weapons were carelessly left in the seas worldwide.¹¹⁴ The same happened with unregulated ammonia nitrate usage. Humanity saw the ocean as its dumping ground, which we ruled rather than lived with in symbiosis. It is only recently that these terrifying impacts of *the Great Acceleration*, *Colonialscene*, and the *Haber-Bosch process* have come to be more popular knowledge. Yet, humanity is only beginning to realize *the Great Acceleration's* impacts on our descendants.

Chapter 3 Nitrogen Zones:

“Your lack of fear is based on your ignorance”. – Liu Cixin, [The Three-Body Problem](#)

In the award-winning novel “*The Three-Body Problem*” (Hugo Award for best novel 2015, [Kurd-Laßwitz-Preis for Best Foreign Science Fiction work 2017](#), [Premio Ignotus for Foreign Novel 2017](#)); author Cixin Liu tells of Ye Wenjie.¹¹⁵ She is an exiled physicist who, in the aftermath of the Chinese Cultural Revolution, ends up working in a logging commune in a labour brigade in Inner Mongolia.¹¹⁶ She picks up her saw to clear the branches of a freshly felled tree and describes the process as “cleaning a corpse”.¹¹⁷ Haunting memories of her father's death return to her in the forest. The process of cleaning the tree melds in her mind with a mortician's work, the splits and the cracks in the bark seeming to turn into old scars. Throughout the second chapter of Liu's masterpiece, the idea of the human body and nature seems to be interchangeable in more than one instance. The narrative reflects James Lovelock's *Gaia theory* (the idea of the Earth's natural systems behaving as a collective body) of the Earth having evolved harmoniously with all ecological systems across the globe, including the human body.¹¹⁸ Though the narrative above plays out in a sci-fi novel, pollution levels in the sea and on the human body simultaneously have very dire effects, which shall be explored through this chapter.

Later in the story Liu delivers a dramatic statement that is a metaphor for the climate crisis, he claims, “Even if they spilt all of their blood, it would cool faster than a pile of cow dung, and not be as useful. But burning was their fate; they were the generation meant to be consumed by fire”.¹¹⁹

One can interpret this statement to be connected back to the forest, the bodies of giants being felled, each cut of the saw hewing through years of history. The interchangeability of the human body and wood chips as a fuel source is a recurring theme throughout the novel. It is a metaphor that should the world's forests be consumed by fire; humanity may also be consumed in a wave of uninhabitable heat. Later on in the novel, this concept returns when the dehydrated bodies of tri-Solarians burn like wood chips in the three sun atmosphere.¹²⁰

¹¹⁴ “Chemical Weapon Munitions Dumped at Sea: An Interactive Map,” James Martin Center for Nonproliferation Studies, September 20, 2018, [PAGE], accessed April 06, 2021, <https://nonproliferation.org/chemical-weapon-munitions-dumped-at-sea/>

¹¹⁵ (Liu, Cixin, and Ken Liu. *The Three-Body Problem*. Tor, 2019.)

¹¹⁶ *Ibid.*

¹¹⁷ *Ibid.*

¹¹⁸ (Lovelock, James. *The Revenge of Gaia*. Penguin Books, 2007.)

¹¹⁹ (Liu, Cixin, and Ken Liu. *The Three-Body Problem*. Tor, 2019.)

¹²⁰ *Ibid.*

Liu very obviously criticizes this governmental machine by having the story take place at a turbulent time in China's history. However, the message of societal ignorance across the globe is securely founded in the sciences and ecological works that he conspicuously references throughout the novel.

As Liu implies in the Three-Body Problem, many believe advancements in technology led to unforeseen problems and that climate change became a disaster for the current generation. Yet despite overwhelming scientific evidence, many dramatic changes in nature go unnoticed by those who spend their lives in cities as carefully curated parks give the illusion that nature is still thriving. Yet, the depth of the climate crisis is staggering once one begins paying notice. In the past years, throughout diving practice, I have witnessed the effects of upset in ocean composition on different corners of the globe. These changes will make the planet of bounty which humanity currently inhabits a thing of the past. I shall cite three examples from Japan, Norway, and finally, the Baltic Sea.

Okinawa, Japan:

"Give me a child I whispered in his ear, and saw our son splashing in a Precambrian ocean". -Liliana Colanzi, *"Our Dead World"* ¹²¹

On the island of Okinawa, where 11 military bases are located, the idea of battle and war is still ever-present.¹²² Littered around the island are dumping grounds of artillery, coral reefs and a famous wreck of a destroyer ship from WWII, the USS Emmons.¹²³ Most people come here for the promise of Japan's pristine islands and the beauty of its natural wonders. Yet there is tragic lore to the islands, as some of the most brutal parts of the war took place here, and many believe it to be filled with sad spirits.

The popularity of the reef is not only amongst foreign tourists, and on the way to the dive site are two boats following closely behind us. When we are coming out of the water, I notice two women and an instructor descending. The woman lands hard on top of the reef and pats around her sides, probably unaware that this does significant damage to the ancient plants. The proof of collective destruction of the reef is the graveyard of bleached coral pieces scattered around the volcanic formations. They are white and hardened and remind one of shattered bones.

Of course, it should be noted that corals can bleach and break at natural speeds, but the alarming rates of destruction nowadays behave as a canary in the mine of climate change. Geological records confirm that coral reefs have been decimated through every mass extinction of the past because they are especially sensitive to ocean acidification - or rise in CO2 levels in the sea.¹²⁴ Many scientists are working towards better documenting and combatting this massacre of coral reefs worldwide. One such project is the *Caitlin Seaview Survey* formed in 2011 by the University of Queensland, which endeavours to study and document the health of the Great Barrier Reef.¹²⁵ The survey aims to make the underwater world accessible to the general public and put the problem on display for the world to see. The survey will build a compilation of around 50,000 high-resolution

¹²¹ Colanzi, Liliana. *Our Dead World*. Dalkey Archive Press, 2017.

¹²² John Griffin, "USS Emmons (DMS-22) at Okinawa," Destroyer History Foundation, accessed April 07, 2021, <https://destroyerhistory.org/benson-gleavesclass/ussemmons/index.asp?pid=45706>

¹²³ *Ibid.*

¹²⁴ *Ibid.*

¹²⁵ "About". XL Caitlin Seaview Survey. Accessed April 07, 2021. <https://www.caitlinseaviewsurvey.com/about>.

images of reefs around the world.¹²⁶ However, for those working on the survey, it is plausible that the border of destruction has already been crossed, as over 50% of the world's coral reefs have been wiped out by ocean acidification, climate change and pollution.¹²⁷ (Ocean acidification refers to a reduction in the pH of the ocean over an extended period, caused primarily by the uptake of carbon dioxide (CO₂) from the atmosphere.).¹²⁸ "From a scientific point of view, this survey is about getting a baseline record of the world's coral reefs and how they are being affected by climate change," said the project's chief scientist, Prof Ove Hoegh-Guldberg.¹²⁹ Coral reefs are an essential source of livelihood for persons the world over and are an essential indicator of the state of our planet.

Another catalyst of acidification in Okinawa and coastal areas worldwide is a process known as eutrophication.¹³⁰ As discussed in the previous chapter, at the beginning of the 1900s, *Haber-Bosch* came up with what seemed to be a miracle process of liquifying nitrogen from the atmosphere and using it as a fertilizer. Over the past many decades, as populations have boomed, more and more fertilizer was used without the general population being aware of the consequences. Excess nitrogen used on farmland is washed away into rivers and streams by rainfall, and large amounts of it eventually end up in the sea.¹³¹ This causes the water to be much more fertile than typical, which in itself does not sound particularly dangerous. However, water with high nitrate content causes algal blooms, making it more difficult for underwater plants to get the sunshine they need.¹³² Though this is not the leading cause of coral reef destruction, studies have found that eutrophic conditions can enhance the acidification of coastal areas.¹³³

The staggering loss of flora and fauna on the reefs may seem unbelievable, especially when the average swimmer can dive to the corals and see so much life. In the book *The Ocean of Life, the Fate of Man and the Sea*, Callum Roberts describes that basing our knowledge of the climate crisis only on single anecdotal experiences leads to significant inaccuracies. This is because the human lifespan is too short to have a broad understanding of the changes that have taken place in the last century.¹³⁴ Rather than seeing drastic change in the environment, an individual assumes that the current state of the world is how it has always been. For this reason, surveys such as the *Caitlin Seaview Survey* are imperative to clearly understand the changes in the sea in the past century. With great dismay upon

¹²⁶ Ibid

¹²⁷ ("Google Maps' Virtual Diving Brings the Great Barrier Reef into View". *The Guardian*, Guardian News and Media, 26 Sept. 2012, www.theguardian.com/environment/2012/sep/26/google-maps-virtual-diving-reef.)

¹²⁸ National Oceanic and Atmospheric Administration US Department of Commerce, "What Is Ocean Acidification?" NOAA's National Ocean Service, August 01, 2012, [PAGE], accessed April 07, 2021, <https://oceanservice.noaa.gov/facts/acidification.html>)

¹²⁹ ("Google Maps' Virtual Diving Brings the Great Barrier Reef into View". *The Guardian*, Guardian News and Media, 26 Sept. 2012, www.theguardian.com/environment/2012/sep/26/google-maps-virtual-diving-reef.)

¹³⁰ National Oceanic and Atmospheric Administration US Department of Commerce, "What Is Eutrophication?" NOAA's National Ocean Service, April 02, 2019, accessed May 26, 2021, <https://oceanservice.noaa.gov/facts/eutrophication.html>)

¹³¹ Ibid.

¹³² Ibid.

¹³³ National Oceanic and Atmospheric Administration US Department of Commerce, "What Is Ocean Acidification?" NOAA's National Ocean Service, August 01, 2012, [PAGE], accessed April 07, 2021, <https://oceanservice.noaa.gov/facts/acidification.html>)

¹³⁴ (Roberts, Callum. *The Ocean of Life: the Fate of Man and the Sea*. Penguin Books, 2013[whole book].)

analyzing government surveys of fish and coral populations, Callum stated, "*I had expected decline, but this was near annihilation*".¹³⁵



(Fish swimming across broken coral pieces) Okinawa, Japan: September 2019, photo credit: Otavio Munefica

The most acute effects of surveys such as the *Caitlin Sea Survey* is not to shock and frighten but to allow society a chance to react to one of the greatest collective crises of human history. In the case of Okinawa, where the reef is in a poor state that has also greatly damaged local fish populations, the Institute for Science and Technology has developed a way to fight back.¹³⁶ The Okinawa Institute for Science and Technology (OIST) works with regrowing coral in farms around the island.¹³⁷ Divers can visit the farm, which may remind one of a curated city park, but underwater. Similar actions for regrowing reefs and even making GMO's of reefs are being undertaken across Asia, the Caribbean and Oceania.¹³⁸

¹³⁵ (Roberts, Callum. *The Ocean of Life: the Fate of Man and the Sea*. Penguin Books, 2013[whole book].)

¹³⁶ ("Okinawa Coral Reef Farms". INTERVIEW :: OKINAWA CORAL REEF SPECIAL SITE. Accessed January 14, 2021. <http://beokinawa.jp/coral/interview.php>.)

¹³⁷ Ibid.

¹³⁸ Ibid.



Okinawa Science Center Coral Farms, credit:Okinawa Science Center Website¹³⁹

Though there are infinite projects such as the *Caitlin Seaview Survey* and the Okinawa Science Center's coral farms worldwide, there is much denial about the effects of CO₂ on the oceans around the planet. Even as environmental scientists make GMO's of corals to restore an Australian Great Barrier Reef that was proclaimed "half dead" in 2019, many people are still not convinced about the effect climate change is having on these ecosystems.¹⁴⁰

Exotic environments and reefs may seem more straightforward to lament the loss of due to the amount of biodiversity they house. However, European seas and other temperate waters are also important tourism, biodiversity, and commerce areas. Ocean acidification has brought about another change becoming a struggle for aquaculturists, fishermen, and seafarers.

In the Arctic Circle:

Across the planet, true wild spaces or untouched nature are difficult to come by. National parks cater to humans with wooden walkways, cement staircases and handrails in places where the going may be treacherous, giving the impression that nature can be manipulated for people. Comparatively, Scandinavian townships and regions north of the Arctic Circle appear relatively untouched.

This remoteness makes flying into Tromso, Norway, at sunset a memorable experience. Snow-capped mountains reflect the colours of the sky, whilst the water of the fjords is so clear passengers can see the shadow of the plane along the bottom of the bay. Though at first glance it appears

¹³⁹ (Okinawa Coral Reef Farms". INTERVIEW :: OKINAWA CORAL REEF SPECIAL SITE. Accessed January 14, 2021. <http://beokinawa.jp/coral/interview.php>.)

¹⁴⁰ James, Lauren E. "Half of the Great Barrier Reef Is Dead". Magazine. 3 maja 2021. dostę 16 maja 2021.

<https://www.nationalgeographic.com/magazine/article/explore-atlas-great-barrier-reef-coral-bleaching-map-climate-change>.

pristine, the reader must understand that even at this latitude, human society is having dire effects on the ecosystems and those who depend on it.

The Fjords:

We are stand-up paddleboarding in a fjord about an hour west of Tromso. It is September, and we are among the last people out on the water, but the sun is shining. As we start paddling across the waves on the fjord, I notice the incredible amount of jellyfish in the surrounding water. Every few meters is another giant purple blob about the size of a dinner plate.

Though their abundance is shocking, the purply-blue orbs seem relatively harmless as they languidly drift in the slow currents of the fjord. I feel a bit unstable as a strong wind comes and makes the waves more turbulent. At the exact moment, I notice that directly beneath me is a jellyfish wider than my board. It is a massive bloom of red and orange with tentacles sprawled out around me like an exploding star. I stop paddling and brace myself, worried I might fall into the water-filled with 20 meters worth of stinging tentacles spread in every direction. I see three more of these gigantic flowers drifting in the water beneath me throughout an hour on the fjord.¹⁴¹

This beautiful and intimidating creature is called the Lion's mane jellyfish, the largest of its kind on the planet. Their bells grow up to more than a meter in length, some reports tell of their tentacles being up to 30-40 meters long, a length that rivals even the Blue Whale.¹⁴²



Diver with Lion's Mane Jellyfish credit: google images

¹⁴¹ Documentation in Tromso, Norway, September 2020.

¹⁴² "Lion's Mane Jellyfish Fact & Information Guide". American Oceans. February 15, 2021. Accessed April 07, 2021.

In Norway, there are many environmentalists and artists actively interested in the changes of their local waters. Amongst the health of the kelp, water clarity and sea urchin populations, jellyfish blooms are becoming a growing concern. "A "bloom of jellyfish" is a seasonal abundance of a population increase due to reproduction or growth. Jellyfish blooms have closed beaches in the Mediterranean, clogged power plants in Sweden and halted fishing in Japan".¹⁴³

According to studies, jellyfish blooms are believed to have occurred every 40 years, and with changing ocean composition and warmer temperatures, these blooms are becoming much more frequent.¹⁴⁴ As discussed, when nitrogen-rich waters cause algal blooms and eventually oxygen dead zones (as discussed in the previous section), most animals are incapable of living in these zones. Except for highly opportunistic species, without a need for oxygen-rich water. Jellyfish are one such species.¹⁴⁵ Norwegian SciTech News discusses how many jellyfish species are opportunistic creatures that have been around for 500 million years.¹⁴⁶ "These animals have some tricks up their sleeves", states scientist Jarle Mork, who has spent the last 30 years studying the effects of jellyfish in Norwegian fjords.¹⁴⁷ One of his studies discusses how things like changing temperatures, plankton blooms and ideal breeding times are unimportant to these jellyfish.¹⁴⁸ With lifespans up to 30 years and the ability to breed at any time of the year, they are not only opportunistic but also an efficient predator".¹⁴⁹ "A dense *Periphylla* population can effectively devour whole populations of nauplii and other plankton and leave little for cod larvae and more mature fish.¹⁵⁰ *Not only do jellyfish devour plankton, but they can also devour cod and juvenile fish". In the innermost parts of Trondheim Fjord, they have replaced cod as the top predator.*¹⁵¹

Being opportunistic in today's environment is often something to be admired. However, these local jellyfish blooms spell havoc for a few of Norway's major industries, fishing and tourism. The Lion's Mane jellyfish and its copious tentacles have decimated both wild fish populations and aquacultures throughout fjords in Norway.¹⁵² Though the Lion's Mane Jellyfish does not have a deadly sting for humans, it is severe enough that when a fish is stung by even a stray tentacle, the wound will slowly

¹⁴³ (CBS News. "Jellyfish Population Booming Worldwide; or Is It?" CBS News. December 31, 2012. Accessed January 14, 2021.

[https://www.cbsnews.com/news/jellyfish-population-booming-worldwide-or-is-it/.](https://www.cbsnews.com/news/jellyfish-population-booming-worldwide-or-is-it/)

¹⁴⁴ Ibid

¹⁴⁵ (CBS News. "Jellyfish Population Booming Worldwide; or Is It?" CBS News. December 31, 2012. Accessed January 14, 2021.

[https://www.cbsnews.com/news/jellyfish-population-booming-worldwide-or-is-it/.](https://www.cbsnews.com/news/jellyfish-population-booming-worldwide-or-is-it/)

¹⁴⁶ (Bazilchuk, Nancy. "Jellyfish Invaders: Trondheim Fjord in Transition". Norwegian SciTech News. July 05, 2016. Accessed January 14, 2021.

[https://norwegianscitechnews.com/2016/07/jellyfish-invaders-trondheim-fjord-in-transition/.](https://norwegianscitechnews.com/2016/07/jellyfish-invaders-trondheim-fjord-in-transition/)

¹⁴⁷ Ibid

¹⁴⁸ Ibid

¹⁴⁹ (Bazilchuk, Nancy. "Jellyfish Invaders: Trondheim Fjord in Transition". Norwegian SciTech News. July 05, 2016. Accessed January 14, 2021.

[https://norwegianscitechnews.com/2016/07/jellyfish-invaders-trondheim-fjord-in-transition/.](https://norwegianscitechnews.com/2016/07/jellyfish-invaders-trondheim-fjord-in-transition/)

¹⁵⁰ Ibid

¹⁵¹ Ibid

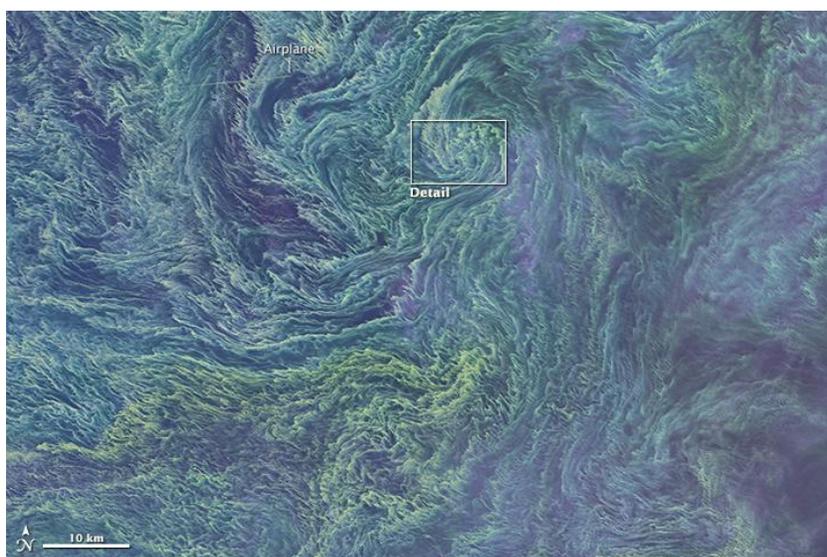
¹⁵² Ibid

fester and typically cause the fish to die.¹⁵³ This is significantly damaging for the fish farms in the fjords as there is a large population of fish in a concentrated area.¹⁵⁴

Signs of climate change and the human effect on the seas is apparent at every longitude, on both smaller and larger scales. For those not involved in aquaculture and who are not regular beachgoers, a boom in the jellyfish populations may not seem to be that dramatic of a problem. However, jellyfish blooms, like coral bleaching and destruction that was discussed in Okinawa, are merely symptoms of a massive problem of temperature and compositional changes in the sea. The third phenomenon is the most important for this thesis, and unlike the other two, it is literally visible from space.

Baltic Sea Blooms:

If one stands on the shore of a country in the Baltic during the Summer, one is likely to be greeted by kites flying, ice-cream stands, and happy beachgoers. Though the situation along shorelines has improved since 1980, several times a Summer, beachgoers may find it unwise or, in the worst cases, dangerous to enter the waters of the Baltic.¹⁵⁵ This is due to what most scientists believe to be cyanobacteria blooms, which are happening on such a massive scale that they are measurable from NASA satellites.¹⁵⁶



Baltic Sea Bloom source: NASA satellites

The Baltic has in the past century become the archetypal example of what can happen to nature if human activity goes unchecked. As one of the more shallow seas on the planet surrounded by

¹⁵³ Ibid.

¹⁵⁴ Ibid

¹⁵⁵ ("Blooming Baltic Sea". NASA. Accessed January 14, 2021. [https://earthobservatory.nasa.gov/images/86449/blooming-baltic-sea.](https://earthobservatory.nasa.gov/images/86449/blooming-baltic-sea))

¹⁵⁶ Ibid.

countries, it does not have external currents to filter into deeper oceans. As discussed in chapter 2, eutrophication has caused the Baltic to be the largest "dead-zone" on the planet.¹⁵⁷

As discussed in the sections about Okinawa and Norway, oxygen dead zones are exacerbated by nitrogen runoff into the seas. This excess nitrogen causes algae blooms that absorb the oxygen from the water and fill it with nitrogen. This becomes increasingly worse as more nitrates are poured into the sea, and dead algae sinks to the seafloor, also creating excess nitrogen on the seafloor in the form of plant decay.¹⁵⁸ The sublime power of these images from space is enough to make anyone shudder in the face of their temporality. In a somewhat apocalyptic fashion, the green blooms spread not only across bays but expand from the shores of Finland to Estonia.¹⁵⁹ Upsets in nitrogen have adverse effects on the sea and ecosystems as well as on the human body and our psychological reactions.

Nitrogen Narcosis:

The effects of algae blooms on the human body are well documented. They may cause rashes, some claim respiratory problems, and in general, should one ever encounter blue-green algae in the water, it is safe to assume that a shower is needed and avoid the beaches for the near future.¹⁶⁰

An effect that was termed by Jacques Cousteau (the inventor of modern SCUBA: Self-Contained Underwater Apparatus) documents the effects of nitrogen and other gases on the human body underwater.¹⁶¹ Whilst partaking in recreational SCUBA, a diver can go up to 40 meters below the sea for a certain amount of time, depending on their weight and air intake.¹⁶² At this depth, the human body cannot process the same mixture of air that we breathe whilst on land, and the greater the depth, the greater the risk.¹⁶³ When diving at such a depth, there is always the risk of Nitrogen Narcosis, or "being Narked" as colloquially named by divers.

Though no one understands totally why some divers are more prone to nitrogen Narcosis than others, its effects are well documented. After a certain time at depth, the diver may begin to hallucinate and believe that jellyfish or other animals are around them that do not exist. They may begin to experience a state of euphoria that is unexplainable, which makes them incapable of dealing with the danger of reality. Once in this state, the only thing a diver must do to avoid death is swim back towards the surface where their body can properly process the gases in their body.¹⁶⁴ However,

¹⁵⁷ *Ibid.*

¹⁵⁸ ("Blooming Baltic Sea". NASA. Accessed January 14, 2021. <https://earthobservatory.nasa.gov/images/86449/blooming-baltic-sea>.)

¹⁵⁹ ("Blooming Baltic Sea". NASA. Accessed January 14, 2021. <https://earthobservatory.nasa.gov/images/86449/blooming-baltic-sea>.)

¹⁶⁰ *Ibid.*

¹⁶¹ (Kirkland, Patrick J. "Nitrogen Narcosis In Diving". StatPearls [Internet]. August 22, 2020. Accessed January 14, 2021.

<https://www.ncbi.nlm.nih.gov/books/NBK470304/>)

¹⁶² *Ibid.*

¹⁶³ *Ibid.*

¹⁶⁴ *Ibid.*

the danger in Nitrogen Narcosis lies not in the immediacy of death but in the potential inability of the diver to understand the great danger that they are in.¹⁶⁵

For many of us, it may be difficult to imagine what type of effect this might have on the human body. Some divers say that whilst at a depth of 40 meters, it is similar to drinking a dry martini on an empty stomach for every 10 minutes at depth.¹⁶⁶ The mental effects of nitrogen on the body have also been popularized by many teens across the world who inhale pure nitrogen to experience a euphoric high for around 30 seconds.¹⁶⁷ Although this pure nitrogen is not considered a hard drug or illegal, the eventual brain damage resulting from inhalation is significant.¹⁶⁸

As Lovelock discussed in his Gaia theory, each individual must realize we are not independent of the world around us and that working towards the good of nature will also work towards the good of humanity. Humanity, however, has split and isolated itself into different camps. The groups are the following; those who are deeply concerned about the state of the world, those who wish not to believe, those who wish to remain ignorant, and those who are adamantly averse to believe that the changes made on the planet have any connection with humans.

The final works of the PhD are based on nitrogen pollution in the sea and nitrogen pollution within the human body, representing the effects of climate change in hallucinogenic imagery. The artistic creations make one ponder the relationships between the micro and the macro. On the one hand, there are images taken from space of psychedelic patterns of cyanobacteria exploding across the Baltic, Asia, the Gulf of Mexico and the world. On the other, the human body itself holds a metaphor for the effects of unbalanced gases within a balanced system within its DNA. As we dig ourselves continuously deeper into the hole of climate change, we poison our bodies, and there is only so long that we as a society can hold out before making a drastic change. Many are asking how our society can keep going deeper, keep building, and keep growing. Yet should we be more concerned about the fact that we may be running out of air, out of clean water, and that productive, bountiful society may be a form of mass hallucination?

The scope of human history tells of societies, small cultures, and great empires that have fallen to collapse. However, those who have survived recognized significant challenges present at given points in history and worked together as a society to overcome and avoid imminent catastrophe. The social climate at this moment has created a unique environment for artists to work in. As a group, artists have the power to transform logic into emotion and communicate it to the masses. At cultural events and in creation, there is not only the opportunity but the necessity to envision the world that we would like to live in, rather than only be worn down by an apocalyptic vision of the future.

Chapter 4: A World in Transition:

¹⁶⁵ Ibid

¹⁶⁶ Ibid

¹⁶⁷ Yan W, Ji X, Shi J, Li G, Sang N. "Acute Nitrogen Dioxide Inhalation Induces Mitochondrial Dysfunction in Rat Brain". *Environmental Research*. Accessed May 16, 2021. <https://pubmed.ncbi.nlm.nih.gov/25791864/>.

¹⁶⁸ Ibid.

"It is better to be a dog in peaceful times than a man in a chaotic period". - Chinese proverb: quoted from why discourse is key to policy transformation.¹⁶⁹

"May you live in interesting times. There is no doubt that this curse has fallen upon us". -anonymous English diplomat ¹⁷⁰

The article "*A guide to a City of Ruins*" describes the landscape of Warsaw after the Second World War as a "desert of rubble".¹⁷¹ The aftermath of this destruction in Europe represents one of the most profound moments in human and artistic history. Persons of the time were living in a world where evil had not triumphed, but no one could say with true conviction that it had failed. Around 6 million Jewish people had been killed in concentration camps in the years during the war, perhaps even more shocking is the 75 million people that died worldwide on an earth that had collapsed into depravity.¹⁷²

Propaganda and nationalist art campaigns throughout Germany caused many artists to reflect that artistic creativity throughout history had been used as a tool of branding for glorifying governmental campaigns that resulted in a panorama of destruction. Examples of this can be seen in German propaganda and censorship of art throughout the time of Hitler's rule. For concision, these issues shall not be discussed further. However, it is moments of collective hardship and despair that one may see great value in human society as persons can collaborate to survive coming challenges collectively.

Images and videos of the dilapidated city and groups of Warsawians walking through the streets with signs of "Wszyscy do odbudowy Warszawy" (All of us rebuild Warsaw) is an inspiring metaphor for those who may feel overwhelmed with the modern-day climate crisis.¹⁷³ Statistics tell that the population of Warsaw was halved in the war's aftermath, and many were left living rough in the streets.¹⁷⁴ Yet, rather than falling into a state of despair, the population worked together to gather rubble, test foundations, and transform the "ash" of the destroyed city into usable bricks.¹⁷⁵ Venetian paintings from the 17th century were used as reference points for the architectural plans to rebuild the city.¹⁷⁶ Detailed carvings and moulds from the piles of rubble were added to building facades. In times of utter destruction, artistic works and creative approaches played an essential role in rebuilding. This is not something that should come as a surprise but rather as an awakening or reminder for artists of the modern epoch.

¹⁶⁹ Jean Monnet, "HY DISCOURSE IS KEY TO THE DYNAMICS OF POLICY TRANSFORMATION," proceedings of 5th International Conference in Interpretive Policy Analysis, Grenoble 23-25 June 2010, Boston University, Boston)

¹⁷⁰ Ralph Rugoff et al., *May You Live in Interesting Times: Biennale Arte 2019* (La Biennale Di Venezia, 2019), [3]

¹⁷¹ Patryk Zakrzewski, "Warsaw 1945: A Guide to a City of Ruins: Feature," Culture.pl, [PAGE], accessed April 12, 2021, <https://culture.pl/en/feature/warsaw-1945-a-guide-to-a-city-of-ruins>

¹⁷² "Research Starters: Worldwide Deaths in World War II: The National WWII Museum: New Orleans". The National WWII Museum | New Orleans. Accessed May 16, 2021. <https://www.nationalww2museum.org/students-teachers/student-resources/research-starters/research-starters-worldwide-deaths-world-war>.

¹⁷³ MuzHPtv, YouTube, February 17, 2015, accessed April 07, 2021, https://www.youtube.com/watch?v=f_J-VZ-L9bl)

¹⁷⁴ Zakrzewski, Patryk. "Warsaw 1945: A Guide to a City of Ruins: Feature". Culture.pl. Accessed April 12, 2021. <https://culture.pl/en/feature/warsaw-1945-a-guide-to-a-city-of-ruins>.

¹⁷⁵ MuzHPtv, YouTube, February 17, 2015, accessed April 07, 2021, https://www.youtube.com/watch?v=f_J-VZ-L9bl)

¹⁷⁶ Zakrzewski, Patryk. "Warsaw 1945: A Guide to a City of Ruins: Feature". Culture.pl. Accessed April 12, 2021. <https://culture.pl/en/feature/warsaw-1945-a-guide-to-a-city-of-ruins>

In the year 2020, statistics show that 98% of ecological and climate scientists are very concerned about the effects of human activity on the planet's natural systems.¹⁷⁷ Many of them believe that should humanity not react immediately, the fallout of the breakdown of these systems shall have the equivalent devastating effect of "war" on the planet. The book "*the Uninhabitable Earth*" by David Wallace outlines what affects the climate disaster shall have on the planet's future and why this is a disaster that is so difficult for many to come to terms with.¹⁷⁸ The book depicts a future in which millions will be displaced due to rising sea levels and global warming and a description of how the processes that have been put in motion by human activity have already become irreversible.¹⁷⁹ Rather than only being a painting of an apocalyptic future, "the Uninhabitable Earth" brings to question the respect humans should have for life on the planet and what each individual can do to minimize destruction.

Seeing is Believing:

As a child, I remember my grandparents discussing news of the holocaust during the II World War. They said many people believed the issues were propoganda and that the genocide could not actually be taking place. In 1945 Dwight D. Eisenhower spoke of his reaction to the death camps first hand and how before his knowledge of them had always been second hand, thus making the scale of the problem difficult to grasp.¹⁸⁰ He stated, "I am certain, however, that I have never at any other time experienced an equal sense of shock".¹⁸¹ An excerpt from his account of the visit in Crusades of Europe, speaks of the importance of visuals in urging persons to grasp tragedy and inhumanity. However detailed reporterly accounts may be, people still tend to accept, seeing is believing.

"I visited every nook and cranny of the camp because I felt it my duty to be in a position from then on to testify at first hand about these things in case there ever grew up at home the belief or assumption that `the stories of Nazi brutality were just propoganda.' I not only did so but as soon as I returned to Patton's headquarters that evening I sent communications to both Washington and London, urging the two governments to send instantly to Germany a random group of newspaper editors and representative groups from the national legislatures. I felt that the evidence should be immediately placed before the American and British public in a fashion that would leave no room for cynical doubt".¹⁸²

Nowadays, with growing proof of climate disaster and warnings from an overwhelming ratio of scientists about the need for immediate action, it seems odd that governments are not reacting in more radical ways to develop sustainable practices.

There is something in human psychology that finds it challenging to come to terms with disaster even when the overwhelming evidence of demise is staring society in the face. Especially difficult is coming to terms with the fact that the way we live and the societies that have been built over millennia are somehow problematic and potentially leading towards a great ravine. Keeping this

¹⁷⁷ "Scientific Consensus: Earth's Climate Is Warming". NASA. March 19, 2021. Accessed April 19, 2021. <https://climate.nasa.gov/scientific-consensus/>.

¹⁷⁸ David Wallace-Wells, *The Uninhabitable Earth: Life After Warming* (Random House, 2020), [whole book]

¹⁷⁹ (Wallace-Wells, David. *The Uninhabitable Earth: Life After Warming*. Random House Inc, 2020.)

¹⁸⁰ Eisenhower, Dwight D. *Crusade in Europe*. Norwalk, CT: Easton Press, 2001. [pg. 408 - 409]

¹⁸¹ Ibid.

¹⁸² Eisenhower, Dwight D. *Crusade in Europe*. Norwalk, CT: Easton Press, 2001. [pg. 408 - 409]

psychology in mind, artists, curators and creators must ask ourselves what importance the artist holds in the face of the greatest collective disaster our world has ever faced? Though the disaster we are dealing with is different from the immediate destruction of the Second World War, confronting the public with the evidence of imminent natural disasters has still become a duty of many curators and artists of today.

Examples of this can be found in some of the most significant artistic events and changing artistic movements worldwide. Since the late 1800s, one of the most important artistic events on the planet has been the Venice Biennale. Though its activities were suspended during the world wars, curators did not stop re-engaging in activities as soon as the world was in a period of relative stability.¹⁸³ Some might even consider the continuation of these artistic events in times of despair as a symbol of the world rebuilding itself and believing in the importance of human creativity.

In 2019, the Venice Biennale, which was themed "May You Live in Interesting Times". held poignant, almost prophetic messages for the year that would come. The theme captured many elements "From the acceleration of climate change to the resurgence of nationalist agendas across the globe, from the pervasive impact of social media to the growing disparity of wealth, contemporary matters of concern are addressed in many of the works in this exhibition," said curator Ralph Rugoff.¹⁸⁴

In the curatorial statement of the Biennale catalogue, the curators shared a proverb of the title's origins with the audience. In 1936 Sir Austen Chamberlain gave a speech to the British public in which he addressed the movement of German troops into the Rhineland, which was considered a demilitarized zone.¹⁸⁵ He stated, "We move from one crisis to another.... We suffer one disturbance and shock after another". In order to emphasize the turbulence of the world around them, he quoted an ancient Chinese curse that he had learned from an English diplomat, "May you live in interesting times. There is no doubt that the curse has fallen upon us".¹⁸⁶

Though it was later discovered that the roots of the curse were ambiguous and were most likely something that the diplomat had invented, the metaphor of the anecdote remains pertinent. It outlines a relationship between World War II and the most important artistic event in the world. In an inspiring quote that shall be the conclusive purpose of this thesis, the curators stated, "it is my hope that art can give us tools to reimagine the possibilities of these "interesting times" in which we live today, and so transform this phrase from a curse into a challenge that we can enthusiastically embrace".¹⁸⁷

Venice Sinking:

Rugoff could not have foreseen the ominous foreshadowing of the biennales opening theme, yet curators and artists alike show fascination with the theme of the climate crisis. A topic that was especially pertinent as rising sea levels throughout 2019 became of greater and greater concern. Being a city of canals rather than streets, Venice is a place where the human becomes half aquatic. It has

¹⁸³ "History of Biennale Arte," La Biennale Di Venezia, April 26, 2019, accessed May 16, 2021, <https://www.labiennale.org/en/history-biennale-arte>

¹⁸⁴ (Rugoff, Ralph, Mary Richards, Aurelia Di Meo, Manuela Faimali, Matilde Soligno, Vincenzo Estremo, and S. Notini. *May You Live in Interesting Times: Biennale Arte 2019*. La Biennale Di Venezia, 2019. pg 21)

¹⁸⁵ *Ibid* pg 22

¹⁸⁶ *Ibid* pg 22

¹⁸⁷ (Rugoff, Ralph, Mary Richards, Aurelia Di Meo, Manuela Faimali, Matilde Soligno, Vincenzo Estremo, and S. Notini. *May You Live in Interesting Times: Biennale Arte 2019*. La Biennale Di Venezia, 2019. pg 23)

slowly been sinking throughout history and the city is called an architectural layer cake by many, as new building layers were constantly added to its foundations to deal with the incoming water.¹⁸⁸ In the past, architects have left the historical memories of Venice beneath the sea. Nevertheless, nowadays, more extreme engineering measures are being taken to keep the sea at bay.

A monumental dyke system called MOSE (Modulo Sperimentale Elettromeccanico [Experimental Electromechanical Module in English, ed.]) was designed to combat the rising sea.¹⁸⁹ Many Venetians believed it would ruin the charm of the city where it was always visible. Thus, the dyke system was designed to be a few feet below the water and rise in flood threat times. The system, in some ways, has been a colossal failure where one can take initial projections into consideration. The originally estimated 1.6 billion euro budget changed into 5.5 billion euros, and the project is already ten years behind the implementation schedule.¹⁹⁰

The article "*A Story of a Failure*" states that an inspection has shown that the MOSE hinges, which have been underwater for three and half years, are already in an advanced state of corrosion.¹⁹¹ The issues with any engineering system in the time of climate change is that the projections of the extent of the crisis are constantly in flux. Sea levels are rising quicker than may have been projected when the project was conceived in 1981, and combating an opponent as formidable as the ocean is something that can not be done indefinitely.¹⁹² One of the most trafficked pavilions at the Venice Biennale addressed the relationship of society, water, and the anxiety of being trapped inside a blank space with an indeterminate future.

The installation by Plastique Fantastique group in Berlin questioned the relationship between human and water, asking participants to remove their shoes upon entering the delicate membrane.¹⁹³ Once inside, the viewer walked upon water in a meditative experience in which the outside world became blurred. Each participant was no longer within the city, yet they were not in nature. The spectator became trapped for a moment in a parenthesis of their own thoughts as if they had drowned. On the other hand, it could be seen as a tunnel of rebirth, a nod to creative destruction. In order to come out of the cave, must something perish? Though the experience is sublime, the white membrane offers a moment of calm or a feeling of transcendence that swathes a terrifying metaphor. The membrane separating our cities and coastlines from the water is delicate and susceptible.¹⁹⁴

¹⁸⁸ Goodell, Jeff. *The Water Will Come: Rising Seas, Sinking Cities, and the Remaking of the Civilized World*. Back Bay Books / Little, Brown and Company, 2018.

¹⁸⁹ (Giovannini*, Roberto. "Venice and MOSE: Story of a Failure". *Lastampa.it*, Lastampa.it, 19 June 2019, www.lastampa.it/esteri/la-stampa-in-english/2017/10/12/news/venice-and-mose-story-of-a-failure-1.34401212.)

¹⁹⁰ Ibid

¹⁹¹ Ibid

¹⁹² Ibid

¹⁹³ "Plastique Fantastique". Plastique Fantastique. <https://plastique-fantastique.de/>.

¹⁹⁴ Ibid



Plastique Fantastique, Venice Biennale 2019, source: plastique-fantastique.de¹⁹⁵

Since the biennale took place in 2019, the city has already experienced two floods that the MOSE project may have stopped had the construction not been in an experimental phase.¹⁹⁶ Venice's parallel with Atlantis stands out in our minds, and the blurred coastlines represent what an empire underwater might look like. Last year, the city saw the worst flooding that it has had for 50 years, reaching a level of 1.87 meters, whilst just this December, levels reached 1.38 meters.¹⁹⁷

Plastique Fantastique's piece was fascinated by human civilization at the edge of this incoming water. The city is realizing its inferiority at holding back a force as unrelenting as Gaia. Though this installation was put on such a grand stage for the artistic world, artists at the Venice Biennale are not the only ones coping with the anxiety of humanity's fragility in our waning world.

The Arctic Impact:

"The world changes before our very eyes, the Arctic ice is melting, the climate is changing, species are disappearing. My goal is to show people this wonderful world under the ice so that humanity

¹⁹⁵ "Plastique Fantastique". Plastique Fantastique. <https://plastique-fantastique.de/>.

¹⁹⁶ (Berry, Nikky. "Venice Floods: Climate Change behind Highest Tide in 50 Years, Says Mayor". *BBC News*, BBC, 13 Nov. 2019, www.bbc.com/news/world-europe-50401308.)

¹⁹⁷ (Berry, Nikky. "Venice Floods: Climate Change behind Highest Tide in 50 Years, Says Mayor". *BBC News*, BBC, 13 Nov. 2019, www.bbc.com/news/world-europe-50401308.)

understands what we will lose in the near future if we do not turn our attention to this problem.”¹⁹⁸
Viktor Lyagushkin

Across Europe and a five-hour drive from the Russian city of Murmansk is the Arctic Dive base. Winter in the Arctic circle is a quintessential wonderland of fir trees and ice, and the roads are surrounded by seemingly endless forest. When one stands at the edge of the frozen White Sea, it appears to be a great plain covered in snow rather than a body of water. The only thing that gives it away are the elaborate fissured formations produced by the fracturing of the ice sheet as it moves up and down with the tide. Depending on the time, a diver might feel the ice sheet pressing down on them, creating an experience similar to being in a cave rather than the sea.

The Arctic Dive Base is where I first encountered the work of the legendary Russian photographer Viktor Lyagushkin. The lodge is filled with imagery of a fractured prism under the ice, which displays colours so vibrant they appear to be a filter. All of the images on the wall are also part of an unusual exhibition entitled *"Until the Ice Melts"*.¹⁹⁹ Unorthodox as the method was, Lyagushkin decided to create a museum of suspended imagery in the green water.²⁰⁰ The arctic base itself is already remote, but the museum underneath the ice makes it all but impossible to get to. What is the purpose of the exclusiveness of this gallery space?

The Why?

"Why do you want to go under the ice?" Upon arrival, it is the first thing the speciality divers ask. The weeks leading up to the trip had been a blur of paperwork, courses, and visa applications, including a last-minute trip to the Russian embassy in London. However, standing at the edge of the "myna" (Russian for a hole in the ice), knowing that the compressed air in the SCUBA tanks might freeze in the icy water, was the first time I considered the answer to that question. It was in some ways a modern-day version of the Grand Tour, of being Hurley and reaching the new limits of "humans should not be here". In other ways, it was a fascination with what isolation might feel like. Most of the worlds' population is made up of cities, packed metro stations, and airports. There is something unfathomable about being in a landscape void of the human. This was amplified by being at dive sites in the middle of a frozen sea, land drowned in the spring and resurrected every coming winter.

¹⁹⁸ "Extreme Diving with Ikelite and Viktor Lyagushkin," DivePhotoGuide, [PAGE], accessed January 03, 2021, <http://www.divephotoguide.com/underwater-photography-special-features/article/extreme-diving-ikelite-viktor-lyagushkin/>

¹⁹⁹ (Lyagushkin, Viktor, and SnowKitty. "Photo Projects by Phototeam.pro". Photo Projects by Phototeampro, 13 Feb. 2019, phototeam.pro/blog/until-the-ice-melts/.)

²⁰⁰ Ibid.



A “myna” in the White Sea, photo credit: James Cook

Maybe the exhibition "Until the Ice Melts" commented on the impossibility of recreating this frozen environment in photographs without the physical experience of being immersed in it? Alternatively, perhaps it was about the ingenuity of the human to create and curate a display of imagery beneath the thick ice. Ultimately though, it was a commentary on our inferiority in the face of global climate change and the impossibility to recreate nature even with human inventions and technology. If the ice melts, the gallery disappears, along with human creative purpose.



“Until the Ice Melts” Viktor Lyagushkin, photo credit: The Arctic Dive Base Russia²⁰¹

After the world's first exhibition under the Arctic ice, I was not surprised to discover that many of Lyagushkin's projects endeavour to be shocking and, despite his National Geographic affiliations, not strictly documentation. They take on a spiritual heir and represent the beauty of nature and the personification of natural wonders.

²⁰¹ "Extreme Diving with Ikelite and Viktor Lyagushkin," DivePhotoGuide, accessed January 03, 2021, <http://www.divephotoguide.com/underwater-photography-special-features/article/extreme-diving-ikelite-viktor-lyagushkin/>



The Lady of Orda Cave, photo credit:Viktor Lyagushkin²⁰²

Another example is his project, the "Lady of Orda Cave", dedicated to the longest gypsum cave in the world located in the Ural Mountains.²⁰³ In the almost freezing water, Lyagushkin photographed freediver Natalie Avseenko in a flowing dress and wig to personify the spirit of the Urals. Avseenko is one of the few women who could have posed for these shots.²⁰⁴ As a freediver, she did not wear any breathing equipment so bubbles would not show up in the images. This required her to hold her breath for up to 4 minutes during the shots. Even with a thick wetsuit underneath the clothing, a water temperature of 1 degree Celsius makes diving in these temperatures incredibly demanding.

The personal connection between the human body and nature is one of the most intriguing aspects of Viktor's work and is reminiscent of Lovelock's theory in his book *The Revenge of Gaia*. Lovelock's theory tells us that humans are not separate from the natural world but evolved simultaneously.²⁰⁵ Human and nature, two entities which are often considered separate, are interdependent; the fate of one directly affects the other. However, when *Homo Sapien* gained consciousness, it began creating, so profusely it became destructive, making the desire for industrial progress a disadvantage as well as an advantage.

Lyagushkin's team tests this symbiosis theory by working with environments that are so remote and wild that a vast amount of planning must be done to take a photo. Without extensive planning,

²⁰² "The Lady of Orda Cave," Photo Projects by Phototeampro, <https://phototeam.pro/gallery/lady-of-orda-cave/>

²⁰³ Ibid.

²⁰⁴ Ibid.

²⁰⁵ James Lovelock, *The Revenge of Gaia* (London, England: Penguin Books, 2007), [whole book]

someone in the team could very likely end up dead in the depths of the caves or the extreme temperatures.

Unlike the works of Hurley or Friedrich, the battle between man and nature is absent in the works of Lyagushkin. Instead, present in the works is an immense longing and respect for a world that is in peril. For this purpose, Lyagushkin personifies places in nature, connecting the human to an environment or different species. It is also the purpose of the exhibition beneath the ice. The human body is drawn into the frozen environment to view the images, making one realize the inferiority of modern society in the face of more animal-like survival instincts. The photographs are documentation and a plea for the rapture of the prismatic beauty of what Lyagushkin considers an entire universe in peril.

Cortada Projects:

"By mapping the crisis to come, I make the invisible visible. Block by block, house by house, neighbor by neighbor, I want to make the future impact of sea level rise something no longer possible to ignore". Xavier Cortada²⁰⁶

Lyagushkin works represent and create a spiritual world connected to a mythology that comments on the reality of the endangered environment. Yet these works seem ephemeral, distant and somewhat dreamy. Though the sublime feeling is present because of the claustrophobic feeling of being trapped beneath a sheet of ice and the single umbilical cord that connects the diver to the surface, in general, the images present an idealization of a disappearing environment. Cortada projects, out of Miami, Florida, presents this feeling of the sublime from a different side of the spectrum. His projects that shall be discussed paint a picture for locals about the reality they shall be facing at sea level rise within the next century.

As a New York Foundation for the Arts sponsored artist, Cortada's Miami based project of Underwater HOA began in the North Pole.²⁰⁷ The piece, "Longitudinal Installation", featured 24 pairs of shoes, a representation of a global campfire, each placed on a different line of longitude. In a manner representing a spiritual recitation, Cortada read 24 stories of persons experiencing effects of climate change from different longitudinal points around the planet as he stood in the centre of the pairs of shoes. "*I want people to know that climate change is real, that it is affecting people at all corners of the planet,*" Cortada stated about the performance.²⁰⁸

In an interview conducted with Cortada in May of 2020, I asked Cortada if he felt that artists' fascination to travel to the North Pole was a modern-day take on the Grand Tour. Is it necessary to be in such places ourselves to create and be inspired, or is the art scene part and the obsession with travelling and experiencing things ourselves part of the problem that is exacerbating climate change?²⁰⁹

²⁰⁶ (Lescage, Zoë. "12 Artists On: Climate Change". *The New York Times*, The New York Times, 22 Aug. 2018, www.nytimes.com/2018/08/22/t-magazine/climate-change-art.html.)

²⁰⁷ (Epping, Sarah. "Xavier Cortada". *Revive*, Kunstimaja Estonia, revive.kunstimaja.ee/xavier-cortada-2/.)

²⁰⁸ Ibid

²⁰⁹ Ibid

"I know what you are saying," Cortada considered the question, "*I went to the South Pole with a lot of ideas, thoughts on proximity to different nations and cultures around the world. I wanted to talk about climate change, and I wanted to talk about time and imagine the future of these icebergs. It was connected a lot to human issues, my parents were both refugees and climate change is related so closely to displacement. What was it like [for them] coming from Cuba and ending up in Albany, New York?*"²¹⁰ As Xavier stated, the performance opened a portal to our empathy as humans, considering how many people will be displaced by the incoming climate crisis. The time frame he is talking about is only a flicker in the entirety of human history. In the next 100 years, the project discusses the belief that humanity shall experience dire consequences in the wake of the climate crisis.

In a similar fashion to Lyagushkin, whilst performing at the convergence of longitudes, Cortada was impacted by the massive sheets of ice around him that would soon melt. The scientists working there told him that the ice would eventually cause the coastlines of Florida to be reclaimed by the sea. "*It was not part of my proposal to make ice paintings, but once I was there, I felt I had no choice but to make them*".²¹¹ Using chunks of melting ice and watercolour, Cortada let water in its many forms become the protagonist in the paintings. Conceptually the images create a feeling of instability, a time-lapse of land becoming liquid. In consideration of melting foundations, I recalled the video of the collapsed Warsaw and the research constantly testing the composition of the Earth below them, determining if it would be able to hold the building for the next 100 years.

The paintings did not see their end in the arctic. In the aftermath of the Antarctic ice paintings, the project *Global Coastlines and Underwater HOA* was birthed.²¹² Rather than bombarding individuals with all of the facts pointing towards our sinking coastlines, Cortada printed numbers on the paintings of ice. Each number was related to each home's elevation above sea level. The lower the number, the greater the likelihood their home would sink in the coming decades. For individuals who wished to collaborate, all required was to go online and follow a clear instruction sheet. The app www.eyesontherise.org/app allowed participants to discover their home's elevation above sea level. Once individuals were already emotionally engaged in the project, they would be more inclined to learn more about the impact the sea would have on the coming generations.

²¹⁰ Ibid

²¹¹ "Xavier Cortada and Sarah Epping," interview by Sarah Epping and Xavier Cortada, Revive, October 1, 2020, [PAGE], revive.kunstimaja.ee

²¹² Ibid.



Underwater HOA, artist: Xavier Cortada source: Cortada Projects²¹³

One of the most important international agreements for fighting the climate crisis is the Paris Treaty, which has set projections for the impending sea level rise in the coming years. Even if all Paris Treaty conditions are kept, the best-case scenario is that the planet will see a sea-level rise of up to 3 feet by 2300.²¹⁴ However, a recent report from the United Nations' *Intergovernmental Panel on Climate Change (IPCC)* claims that we will likely see this much sea-level rise within 80 years.²¹⁵ What is more worrying for inhabitants of Florida or tropical islands is that unlike water in a bathtub, sea-level rise does not happen evenly across the planet. Due to the most significant gravitational pull happening at the equator, more water will collect at the equator. This will cause cities and islands in tropical areas to be the most affected by the rise. If these worldwide reports and predictions are accurate, 100,000's to millions of persons could be displaced by the climate crisis by the end of the century.²¹⁶

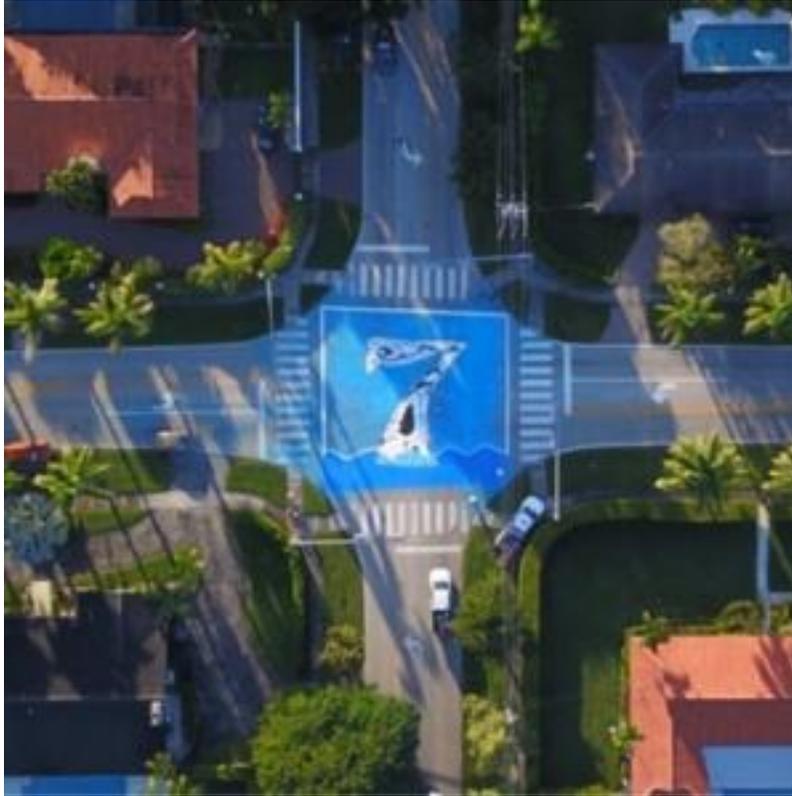
Though it was in many ways an educational project, Cortada's project connected to people in an incredibly emotional way by initially connecting a crisis to the very personal space of their homes. *Underwater HOA* placed signs not only in peoples' front yards but across the city of Miami. Reminding people not of the political parties that they follow but of the literal common ground they share that is very likely in danger of disappearing within their children's lifetimes.

²¹³ Ibid.

²¹⁴ (Woodward, Aylin. "Sea Levels Are Projected to Rise 3 Feet within 80 Years, According to a New UN Report. Hundreds of Millions of People Could Be Displaced". *Business Insider*, Business Insider, 25 Sept. 2019, www.businessinsider.com/sea-level-rise-3-feet-in-80-years-un-report-2019-9?IR=T.)

²¹⁵ Ibid.

²¹⁶ Ibid.



Underwater HOA at Miami intersection, Xavier Cortada - credit google images

Cortada explained that one of the big problems that will come with sea-level rise is that groundwater will be salty rather than fresh, which will cause trees to die.²¹⁷ However, one tree that can live in brackish water is the mangrove, one of Florida's native trees. The final step of the Underwater HOA project was to ask people to plant mangroves in their yards next to a white flag. For many along coastlines around the planet, accepting the fate of the effects of rising sea levels on their homes will be one of the big steps towards propagating change. Perhaps the biggest issue in Miami is that development is still booming, giving the impression of a stable long-term market. Cortada commented on this rapid development and said, "We need to remember that developers' have a different timeline than we do. They hope to see a return on investment after three years and do not tend to care what happens after that".²¹⁸

Perhaps a perfect testament to this statement came from the book "The Water Will Come". Reporter Jeff Goodall confronted one of Florida's top real-estate developers, Jorge Perez, with some of the risks of developing real estate at the waterfront of Miami. He asked, "Does it change the design of the building you are building?"²¹⁹ "No," he said, "this is not something I gave any thought to". Goodall pressed further, stating, "Aren't you worried that increased flooding in the city will impact the value of your real estate holdings? I mean, it is inevitable, isn't it?" Perez stated that he was sure someone

²¹⁷ (Epping, Sarah. "Xavier Cortada". *Revive, Kunstimaja Estonia*, revive.kunstimaja.ee/xavier-cortada-2/.)

²¹⁸ Ibid

²¹⁹ (Goodell, Jeff. *The Water Will Come: Rising Seas, Sinking Cities, and the Remaking of the Civilized World*. Back Bay Books / Little, Brown and Company,

would find a solution to the problem within the next 30 years, hesitated for a moment before adding, "besides, by that time, I will be dead, so what does it matter?"²²⁰

As artists become increasingly aware of the climate crisis, the realization is dawning that many politicians and real-estate developers are not interested in the well-being of the planet's future but rather the well-being of their bank account's in the here and now. Combating these unethical practices and creating policies that the majority of the population can see as pertinent is the greatest challenge society of the 21st century shall have to face. Artists and creatives have the chance to play a deciding role in making more persons aware of these unethical practices and creating art pieces that have a direct effect on bettering them.

Open Out Festival:

"This is about art, but it's also about society". - Marion Dubilier

The call said, "leave no trace". Artists were required to use recycled materials, have ephemeral performances, or create a workshop using found or foraged materials. Events included; an ice cream parlour with flavours made from common weeds and sea salts, performances made from recycled clay, and a performance put on by Oyvind Novak Jennsen, "Ek vletinde Maltyd" (a floating meal).²²¹

The effects of the climate crisis are never-ending. However, one of the most over-arching changes leading to global warming, sea-level rise, and ocean-acidification is CO₂ output by fossil fuels and industrial processes.²²² Trees and forests can process CO₂, which has led to many tree-planting initiatives worldwide.²²³ However, for many people worldwide, the realization has hit that trees take such a long time to regenerate and can be felled so quickly that a search for a more immediate alternative is becoming dire. For many scientists, farmers and aquaculturists, the answer is becoming more apparent. Kelp and sea plants can absorb CO₂ from the sea and thus the atmosphere, helping to combat the effects of pollution on the planet. They are also a reliable and healthy food source, and some species can grow up to 60 cm a day, faster than any land-based plant, including bamboo.²²⁴

As people are recognizing the benefits of our would-be saviours, many are also realizing that they are in a state of peril. In Norway, for example, booming urchin populations are causing a significant threat to the kelp forests. Urchins are a natural predator of kelp and often feed on kelp at the root, essentially cutting off an entire "tree" at the root for a single meal. Jennsen wanted to bring attention to this issue by diving for urchins and offering the city of Tromsø a free meal.²²⁵ Typically considered a delicacy, urchins are food that is expensive and difficult to come by. One of these faults

²²⁰ Ibid

²²¹ ("Open Out Curatorial Team". *Revive*, revive.kunstimaja.ee/open-out/.)

²²² National Oceanic and Atmospheric Administration US Department of Commerce, "What Is Ocean Acidification?" NOAA's National Ocean Service, August 01, 2012, [PAGE], accessed April 07, 2021, <https://oceanservice.noaa.gov/facts/acidification.html>)

²²³ Ibid.

²²⁴ Cecilia Asberg, Janna Holmstedt, and Marietta Radomska, *Methodologies of Kelp: On Feminist Posthumanities, Transversal Knowledge Production and Multispecies Ethics in an Age of Entanglement* (NNKS Press, 2020),

²²⁵ (Methi, Hilde, et al. *The Kelp Congress*. NNKS Press, 2020.)

being policies within Norway, Jennsen explains. Should there be an abundance of urchins within Tromsø, they would have to be shipped down to Oslo to be inspected before selling for commercial purposes. He claimed that if there was a better structure, urchins could be a very viable healthy food source for more people.²²⁶ In turn, by popularizing them as a food, we could do something very positive for kelp populations within Norway.



A floating mealtime by Oyvind Novak Jennsen photo credit: Open Out Festival²²⁷

The organizers at the Open Out Festival very carefully selected the persons they wished to take part in the events in a way that would create no impact or as small of an ecological footprint as possible. When I asked them how they foresaw future editions of the festival, the organizers told me, "we cannot imagine ever going back after this; it was like exiting the cave and now having a chance to do something better".²²⁸ The French organizer Miriam Dubilier said that the most beautiful opportunity for artists and organizers is to express these ideas and spread knowledge in a non-threatening and "generous" way.²²⁹ Imagine that the festival offered free ice-cream parlours and free hand-caught meals for passersby. It is about painting a picture of the world and creating an environment that we

²²⁶ (Methi, Hilde, et al. *The Kelp Congress*. NNKS Press, 2020.)

²²⁷ ("Open Out Curatorial Team". *Revive*, revive.kunstimaja.ee/open-out/.)

²²⁸ Ibid.

²²⁹ Ibid.

want to live in, a world that we want our children to live in. It is not about painting this apocalyptic vision of the future that is impossible to deal with.

Throughout my PhD studies, I understood that ecological concepts in art are omnipresent. Creating imagery that connects theoretically to the environment but does not restore to it became an empty practice. It did not play an active role in policy changing or system changes. Thus, it was a crucial part of my practice to consider changing the way we create. Even as ecologically-minded artists, our materials and systems have become part of the destructive planet. If we have constructed a destructive way of functioning in society, it is necessary to re-make ourselves. As we can see from the artists and movements above, raising awareness is no longer enough. There is a need for active change.

Chapter 5: Artistic Research

Algal Blooms in Art:

“I took one step after another in the outside, noticing the way I was disintegrating... but the desert confronted us with the great senselessness of our condition. Miles and miles of barren plain... The body was absorbed - destroyed - by that indifference”. - Liliana Colanzi ‘Our Dead World’

“The first thing we need to get out of the way is discouragement”. - *Betsy Damon*

The thesis's overall theoretical issue was how artistic practice could create something to raise awareness about the state of dead zones in the seas and industrial farming practices around the globe. This became explicitly centred around the Baltic as it has the biggest dead zone of any ocean on the planet. The question arose, is there a way to use chemical nitrate run-off that originated from the *Haber-Bosch process* to make something positive? Was there a way to reuse synthetic fertilizer waste that is getting trapped in the Baltic? Throughout the first year of doing practical work, my practice was centred around drawing ocean plants that have been debased by pollution in the seas. During a conversation with Mark Isaac, a Fulbright Scholar from the United States working on a project called *Baikal Lenses in Russia*, he stated: “We need to be concrete about the things that people can do in order to make a change, it is no longer enough to raise awareness”.²³⁰ Thus it was one of the primary goals of this doctorate to make a structural change in the way we create.

Creating the Images:

“My entire delight was in observing without being myself noticed,- if I could have been invisible, all the better. . . to be in the midst of it, and rejoice and wonder at it, and help it if I could, this was the essential love of nature in me, this the root of all that I have usefully become, and the light of all that I have rightly learned.” -*John Ruskin*

²³⁰ Sarah Epping, "Mark Isaac and Gabriela Bulisova – Baikal Lenses/Second Fire," *Revive*, November 2020, [PAGE], accessed May 01, 2021,

In the Summer of 2019, whilst on a trip to Grange-Over-Sands, United Kingdom, I visited an exhibition at Abbot Hall Gallery, "Following the Footsteps of Ruskin and Turner", featuring British artists John Ruskin and Emma Stibbon.²³¹ The monumental black and white images of Stibbon overwhelmed the rooms, yet I was most moved by the sensitivity of the delicate watercolour images of Ruskin. The detail in his sketches and subdued changes in movement from colour to colour would change the way I created. Rather than creating in black and white as I had for the past years, I shifted to a practice focused on colour. This colour later on connected to the hallucinations or shifts in reality that one can experience when affected by nitrogen level changes in the body. Colour enabled me to express an unnatural feeling in the drawings I would create. Rather than cooling or soothing, the underwater landscapes I painted appeared in yellows or oranges, colours connected to poison.



A Crimson Tide, watercolour and graphite, 90 x 70 cm, 2019



A Crimson Tide 3 panels, watercolor and graphite, 70 x 270, 2019

²³¹ Personal experience in Abbot Hall, Grange-Over-Sands, 2019

A Crimson Tide is a three-panel watercolour created in the weeks following the Ruskin exhibition. It is a piece that references red algae blooms that takes place around the world and causes respiratory problems in local inhabitants.²³² Though the image itself features delicate plants and soft corals, there are also bastardized DNA shapes swirling around in the red waters. The title takes on a double meaning, as the viewer may be unsure if it is water filled with blood or if it is the red algae causing dangerous living conditions for inhabitants. There should be a feeling of sublime beauty in the imagery. One is attracted to the sensitivity of the colours and appalled by the sickening abstractions that are taking place in what was once a healthy natural environment.

Following *A Crimson Tide* was a diptych entitled "The Prism". These were greatly inspired by the trip to the White Sea and the works of Viktor Lyagushkin (referenced in chapter 4). The images represent the world beneath the ice and the fascinating creatures that evolved upon the principle that light fractures when it shines through a prism. Many translucent animals seemed to be mirror images of the fissured ice that was above them. As if they had learned from their surroundings and wished to imitate them.



²³² National Oceanic and Atmospheric Administration US Department of Commerce, "Gulf of Mexico: Harmful Algal Blooms," NOAA's National Ocean Service,



The Prism: 2 panel, watercolor and graphite, 200 x 70, 2019

In order to experience the prism under the water, we must live in a world where there is still ice. Yet as Lyagushkin references much in his work, the ice is melting, and this specific world is disappearing.

The arctic flora and fauna made me wonder how they would mutate and change as the world around them was manipulated by human practices. In a nod to Darwin's and Audubon's nature logs of the *Birds of America* and other biologically diverse areas, I created my own nature log of the Anthropocene.²³³ A cloth title covers the hand-bound book with the words "To be human, humane, humanity" surrounded by 1 and 0's. One can flip through pages of jellyfish, dead fish, maelstroms and most importantly, pieces of trash to get a broader understanding of found objects and observations that inspired the larger abstract pieces in the gallery. The gargantuan realizations on the wall make the viewer feel as if they are surrounded by unusual stained-glass patterns, whereas the book is to make one carefully observe the loss of biodiversity on both micro and macro scales.

Images from the album were made in the same way as the prints. Original drawings, covered in chine-colle prints from the etching plates. A process video is also available for viewers. The images on the following pages are titled as follows.

Image one: Album cover, 1'0's, letterpress, 2020 - page 1, Maelstrom, graphite/chine-colle, 2020

Image two, page 1-2, Maelstrom, The coming tide, graphite/chine-colle, 2020

²³³ John James Audubon, *Audubon's Birds of America* (New York: Macmillan, 1950), [whole book]

Image three, page 5-6, Jellyfish and Bloom, graphite/chine-colle, 2020







Ghost Net Drawings:

The monumental final drawings that behaved as a summarization of the doctorate took on a more abstract nature than the pieces of ocean plants. The net patterns and mutated DNA shapes that showed up as a background element in the earlier pieces became an independent 5-metre drawing.

The title "Ghost Net" is a nod to unethical fishing practices that leave massive nets in the sea, eventually strangling and killing countless amounts of wildlife yearly.²³⁴ However, that is not the primary focus of the piece. The piece is a moment of overwhelming and heartbreaking meditation for the viewer. One scrutinizes the changes the environment will have on the human experience—changing our DNA, filling our bodies with microplastics, causing respiratory problems, and affecting our own mental states.

When that shall occur is for the viewer to decide as they try to sift through the beautiful yet distorted depiction of the world. This dystopian net encompasses all in the dichotomy of its undetectability but also its omnipresence.

In a similar fashion to all of the previous drawings, "The River" has two versions. The first version is the drawing that is somewhat meditative to look at though the colors are warped. The second, is the destruction of the image, and a representation of the current state of the sea.

On the following two pages the images are entitled as the following.

"The River 1-4," 70 x 100 (per panel), watercolor, 2020

"The River of Trash 1-4," 70 x 100 (per panel), watercolor/etching/chine-colle, 2020

²³⁴ Lorin Hancock, "Our Oceans Are Haunted by Ghost Nets: Why That's Scary and What We Can Do," WWF, June 25, 2019, [PAGE].



Ghost Net 4 panels, watercolor and graphite, 70 x 500 cm, 2020-2021



Narcosis Prints:

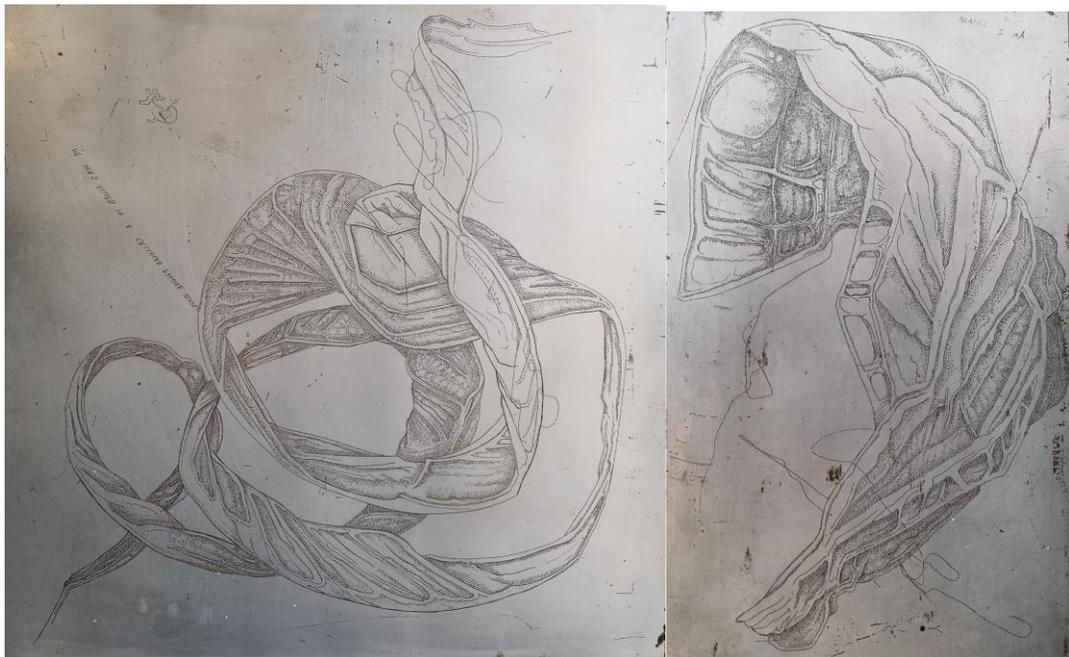
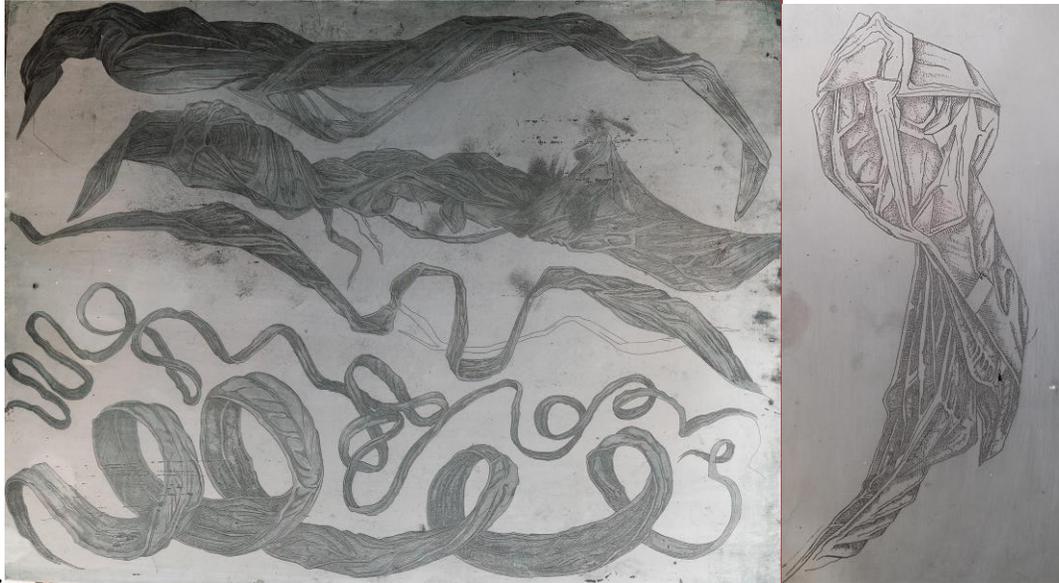
The sea makes one feel insignificance and connection to something more profound, less temporal than ourselves. When creating, I considered how to create a series of works that could be shown on a monumental scale but still be focused around printmaking. The central body of work is a series of 7, 270 cm x 70 cm prints, "the Narcosis" series. They were created by Chine Colle elements pulled from a broader series of etching plates. The plates were developed throughout 2019 - 2020, as there were around 20 plates used for the Narcosis elements.

Working in the Art Department of the Aristotle University in Thessaloniki, Greece, was where I first came upon the idea of incorporating collage. Greece is a country that makes the visitor consider the collapse of a great empire, as construction workers are constantly uncovering ruins of monumental buildings that the ancients assumed would have endured throughout millennia. Very often, they are in a state of disrepair. The potency of these ruins lies in the symbolism of the impermanence of humankind and the impermanence of art. Seeing so many edifices being exhumed, I imagined the fossil records of the future and imagined what traces would be left etched in stone.

Conclusively I began recording plastic as if it were biological elements, assuming the future fossil record would show plastic everywhere. I found it on beaches, took photos of it swimming in the sea, saw crushed cans on boardwalks. I discovered that these abstract shapes fractaled together to create beautiful and unusual patterns. Almost unrecognizable as the plastic, which was the inspiration for them. Later in my practice, these fractals would come to represent algae blooms or hallucinations. Yet the plates themselves are pretty unmistakable and are a record of floating trash. The plates range from A4 to 100 x 50. In total, around 15 plates were hand-drawn and etched for creating the chine-colle elements. A selection of 5 of them is in this paper.



"Plastic Glove Coral", etching, 30 x 17 cm, 2020



Images Top: “Ribbons” etching, 50 x 35 cm, 2019 - “Paper Bag” etching, 12 x 24 cm, 2019

Images Bottom: “Maelstrom” etching, 35 x 35 cm, 2019 - “Plastic Bag” etching, 18 x 35 cm, 2019

As potent as this beginning was, one of the most overwhelming observations I experienced throughout the research period was on a trip on the Asia Vision in the South China Sea in the year of 2019. Upon the Asia Vision, the trip from Kaohsiung, Taiwan, to Karratha, Australia, takes two weeks. We had been sailing for several days, and there was no land in sight. In the open sea, one becomes aware of the extreme vastness of it. It is rare to see a pod of dolphins or a whale on the surface. I would walk on deck for hours each day searching for life, most often to no avail. One morning I believed I had seen a jellyfish in the sea. Upon closer observation, I saw that it was a plastic bag

floating languidly in the ocean current. Within a few minutes, the sea was filled with plastic drifting around the boat, and we sailed through this plastic current for hours. The final images in the Narcosis series (documented at the end of this chapter) took on a double meaning. They could represent a river of trash in the middle of the sea or be strongly related to nitrogen pollution in the seas and the growing issue of eutrophication.

New Technical Processes - Creating Paper from Dead Zones:

The pieces created were directly connected to the state of ecology in the world and were inspired by harmful ammonia nitrate addition to the sea through commercial farming. Yet, there was one issue that remained for the final year of doctoral studies. The thesis concludes that artists should actively initiate movements that shall change the future and create a growing scene of socially engaged arts. If our career is to behave as creators, artists should create a better world than that which we inherited.

Though aesthetically pleasing, the images had yet to play an active role in this ecological movement. Thus, the primary question was how to lessen the effects of nitrate pollution whilst creating a useful artistic process.

Initially, I had set the goal for myself in year two to cultivate seaweed plants in small aquacultures somehow, or perhaps within the Baltic itself, to recycle excess nitrogen. More plants in the ocean has a similar effect to more forests on land; air quality, water quality, and biodiversity improve with more native plants. However, after discussing with scientist Jonne Kotta, an expert on eutrophication from Tartu University, I discovered that the current state of the Baltic makes it an arduous task to cultivate seaweed. This difficulty is due to the algae blooms and the dead zone in the Baltic discussed in chapter 3.²³⁵

The question of how to stop nitrogen, oxygen, and CO2 from becoming more disbalanced seemed to be frozen in its tracks. Imagine a field that is impossible to plant trees in because the air is too foggy for the seedlings to get any sunlight, this was the truth of the state of the Baltic. The solution that we came to was to remove "the fog".

Part of this "fog" is an overabundant seaweed known as "Ulva prolifera", which behaves like a weed in the Baltic and seas around the planet.²³⁶ The explosive growth of these weeds causes a phenomenon known as a green tide, in which entire beaches are covered in a thick layer of this abundant green weed.²³⁷ After floating in the sea, it sinks, decays, and adds to the process of "eutrophication" or over-nitrification.²³⁸

In collaboration with Charlotte Biszewski and the TYP A print and paper Museum of Tartu, Estonia, we researched how this plant fibre would behave in a paper, specifically if it would be a useful paper for printmaking. Gathering large amounts of the weed during the Summer was not an issue. Even

²³⁵ National Oceanic and Atmospheric Administration US Department of Commerce, "Gulf of Mexico: Harmful Algal Blooms," NOAA's National Ocean Service, April 10, 2019, [PAGE], accessed May 01, 2021, <https://oceanservice.noaa.gov/hazards/hab/gulf-mexico.html>

²³⁶ Yongyu Zhang, "Ulva Prolifera Green Tide Outbreaks and Their Environmental Impact in the Yellow Sea," *National Science Review*;

²³⁷ *Ibid*

²³⁸ *Ibid*

without the explosive green tide that occurs in many parts of the world, the beaches of Tallinn were filled with this weed. Within 10 minutes, 2 of us had collected 15 litres of it.

Several elements are necessary to fully grasp the benefits of using sea-based weeds for papermaking rather than trees. A quick overview of the papermaking industry and processes is analyzed in the following points.

1. The Land use Boundary:

The book “The God Species” by Mark Lynas discusses that amount of land currently influenced by humans.²³⁹ Of the planet’s ice-free surface 83% is influenced by humans 17 billion cubic feet of land from this percent contains trees deforested each year²⁴⁰. 55% of world paper supply comes from newly cut trees²⁴¹. This deforestation is responsible for nearly a fifth of the world's annual greenhouse gas emissions.²⁴² Should we find an alternative source for paper pulp, on a large scale, this deforestation could be lessened greatly, whilst at the same time removing nitrate creating plants within the Baltic.

2 . Growth Time:

In a temperature of 20 degrees C, *Ulva prolifera* has a growth rate of 28% of its mass daily while in contrast fast growing pine trees grow around 1-2 feet a year.²⁴³ The growth potential of sea plants versus land plants is unprecedented, and especially considering the massive amount of product already available in the yearly occurrence of green tides, this is a resource being vastly undervalued.

3. The Chemical need and breakdown time:

In terms of paper making, land based plants have another inherent negative that ocean based plants do not. Trees and land-based plants contain a compound known as lignin which must be broken down before the wood from a tree can be turned into paper.²⁴⁴ During a process known as “digesting,” sodium hydroxide (NaOH) or “white liquor” is boiled along with the wood chips to remove the lignin.²⁴⁵ The leftover of this process is known as black liquor, and must then be steamed down as it is very diluted until it forms a substance known as green liquor.²⁴⁶ The green liquor may have restorative chemicals added to it and be used again in the first break down process as white liquor.²⁴⁷ This digestive part of the process takes a lot of time and energy, where-as sea plants are made up of

²³⁹ Mark Lynas, *The God Species: How Humans Really Can save the Planet* (London: Fourth Estate, 2012), [chapter 4]

²⁴⁰ *Ibid*

²⁴¹ “The World Counts”. *The World Counts*. Accessed May 02, 2021. <https://www.theworldcounts.com/challenges/consumption/other-products/environmental-impact-of-paper/story>.

²⁴² *Ibid*

²⁴³ Yongyu Zhang, “*Ulva Prolifera* Green Tide Outbreaks and Their Environmental Impact in the Yellow Sea,” *National Science Review*. [PAGE]

²⁴⁴ IdForestProducts. “The Making of Pulp”. YouTube. October 19, 2012. Accessed May 02, 2021. <https://www.youtube.com/watch?v=2Uh3Xladm1A>.

²⁴⁵ *Ibid*.

²⁴⁶ *Ibid*.

²⁴⁷ *Ibid*.

cellulose and do not contain the 25% lignin that wood does, theoretically this entire part of the paper-making process could be skipped on an industrial scale.²⁴⁸

4. The Run-off :

There are many studies supporting the fact that seaweed is an incredibly effective, not to mention safer, fertilizer than synthetic ones made from extracting nitrogen from the atmosphere. During the boiling and cleaning process which does not require chemicals such as sodium hydroxide, nutrients could be extracted from the ulva-prolifera and concentrated in the final run-off liquid to make an ecological fertilizer. Thus, during the process, we remove a waste product from dead zones and also mitigate the problem of synthetic nitrates being applied to commercial farms.

Documentation of the Ulva Prolifera Paper:



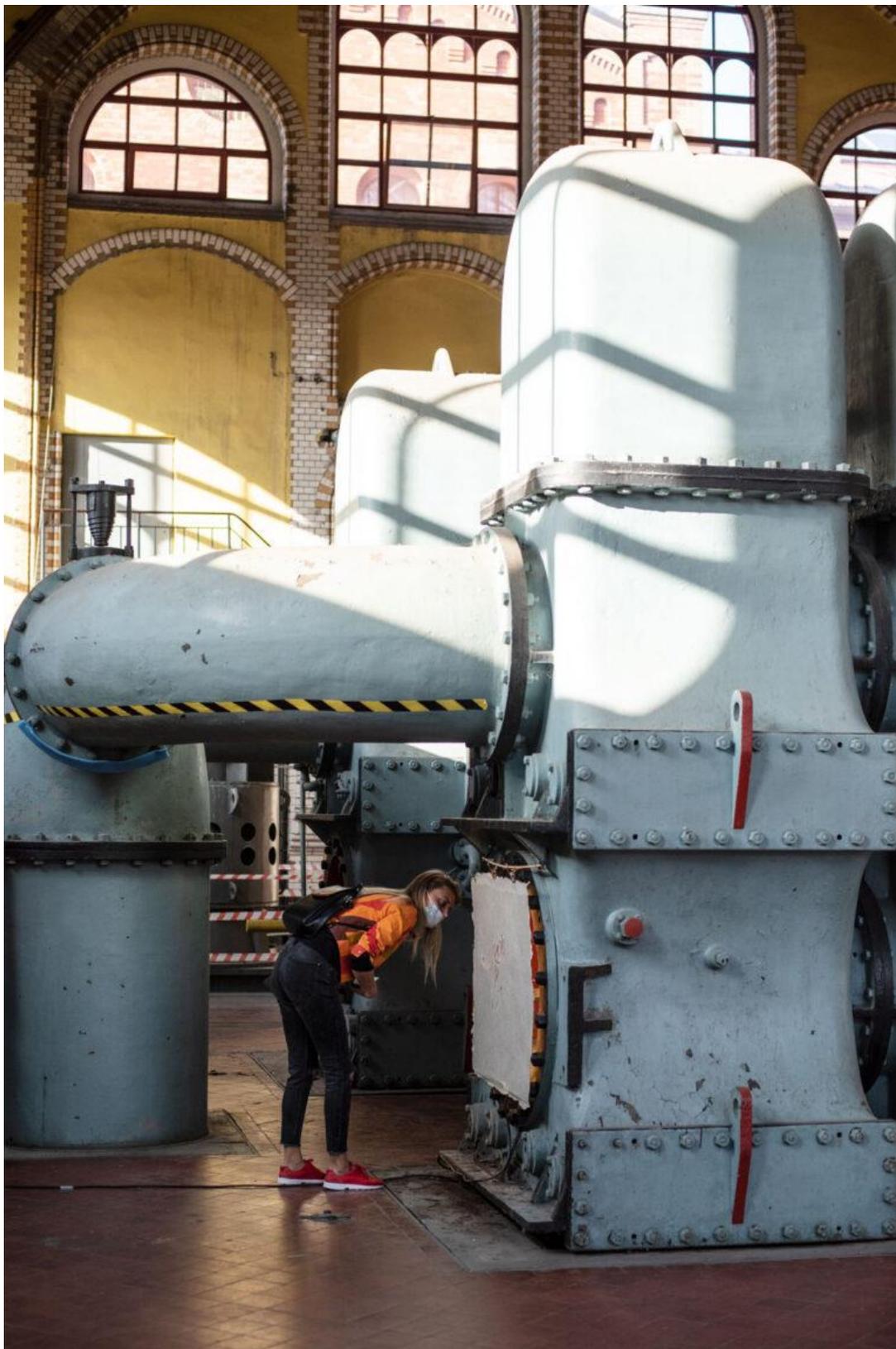
Ulva Prolifera Paper samples, natural green (left) to white (right), 2020

²⁴⁸ *ibid.*



Test prints on the ulva prolifera paper, etching, 2020

(finding: paper withstood soaking in water, and going through the press with a high level of resistance and strength, it held the ink and the integrity of the image)



“The Resonance of Waste”, 80 x 80 cm, Sarah Epping + Charlotte Biszewski, Seaweed paper speaker at Survival Festival Wrocław, PL 2020

The Finalized Body of Work:

Through combining the drawings, prints, and the *Ulva prolifera* paper the images themselves took on a new meaning. The Narcosis prints were created as a spectrum, on top of digital printouts of the "red tide" illustration, each background was hand-painted so as to have an original colour palette.

The most crucial research element of this doctorate is the *Ulva prolifera* paper that worked beautifully for printing purposes. Though the creation of the prints was not made solely using this paper when looking through the prints, it is almost impossible for the viewer to decipher which paper was which, a testament to the incredible workability of the *Ulva prolifera* and other recycled materials in this new process.

Thus, a doctorate focused on nitrogen recycling in the seas also actively removed nitrogen pollution from the Baltic and turned it into something artistic and valuable. Perhaps the most important role of the artist in the modern world is to help meld how we have constructed the world around us with artistic movements. Then hopefully, we may reconstruct our processes to be more sustainable so that future generations may continue to live in a world of plenty.

The prints, a collage of hundreds of small prints done on different types of handmade seaweed and rice paper, had finally reached their conclusion.



Narcosis 1-4, 210cm x 70cm, etching, watercolour, chine-colle, 2020 - 2021



Narcosis 4, watercolor/etching/chine-colle, 2020, detail shot



Narcosis 1, watercolor/etching/chine-colle, 2020, detail shot



Narcosis 2-3, watercolor/etching/chine-colle, 2020, detail shot

Closing Statement:

When faced with hyperobjects (defined by Timothy Morton as things that seem too massively destructive to comprehend) such as the climate crisis, one becomes overwhelmed with the feeling that the end is bearing down.²⁴⁹ What is the point then of trying, if the climate crisis is already spiralling out of control? What becomes our rudder to lead us in our limited lives in a time where the concept of the future becomes convoluted and blurry? If one uses the pandemic as an example, a time when the whole world struggled with a disaster, human adaptation to a new reality shows how quickly lifestyles can change. Xavier Cortada, the artist of Underwater HOA, stated, "in the face of the real and present danger of the coronavirus, we have the ability to adapt as soon as our governments almost unanimously deemed it necessary".²⁵⁰

Yet in the current epoch, the impending climate disaster is dispatching our oceans, and thus the entire planet, back towards a pre-Cambrian heat. This heat, and growing levels of nitrates is creating dead zones that are destroying areas of tourism and commerce.

Therefore each one of us should plant a tree yesterday, build a home for bees, ride a bike instead of driving, but most importantly, demand change from governments and industrialists. Changing our ways of creating, such as using papers made from nitrate pollution rather than from trees, is merely one of the 1,000 steps forward society should take to adapt to the new reality, and art can be a rudder for creating positive social change. Should our great-great-grandchildren be able to peel up the Earth and look at the fossils of our generation, we should leave them the message that we wanted them to experience a planet better than the one full of the issues we inherited. Society should leave the message that we unanimously chose for life to persist.

²⁴⁹ Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World* (University of Minnesota Press, 2017), [chapter 1]

²⁵⁰ (Epping, Sarah. "Xavier Cortada". *Revive, Kunstimaja Estonia*, revive.kunstimaja.ee/xavier-cortada-2/.)

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