# Ethics and materiality in environmental art



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### Introduction

This is an exploration of ethics and materiality in relation to environmental art within the context of the climate crisis. The ethical implications surrounding the utilisation of certain materials will be evaluated in light of the artist's concept, bolstered by contemporary artworks as evidence to substantiate the argument regarding the legitimacy of employing those materials. In instances when there exist critiques of the artwork, I shall employ these criticisms as a means to further elucidate the rationale underlying the selection and utilisation of materials. In the absence of existing critiques of the artist's goal I would construct my own interpretation of the artwork. I will examine each artist within the historical and geographical framework in which they created their artwork, ensuring my personal tendency towards environmental preservation does not bias the evaluation of their work. In this analysis, I will use a comprehensive approach to the evaluation of six key artworks, taking into account both their material characteristics and my subjective interpretation of their intended significance.

#### **Materiality**

From a simplified artist's perspective, the concept of materiality refers to the physical components that constitute an artwork, encompassing the tangible substances that contribute to its shape and essence. Materiality is a term that refers to the quality or state of being material. It is often used in academic contexts to discuss the term "physicality," which refers to the state or characteristic of being tangible or substantial. It encompasses the concepts of substance and matter (Oxford Dictionaries Staff, 2011). Nevertheless, the aforementioned explanation of materiality is no longer deemed adequate within artistic discourse and theory since it now necessitates a broader and more comprehensive understanding. The inherent nature of the material can serve as a significant aspect of the artwork, potentially constituting its primary intention. The defining characteristics of an artwork's materiality may encompass its texture, structure, colour, and, potentially, its sourcing location and method but also its conceptual, social, political, cultural, and economic dimensions in a wider ecology of relationships (Lange-Berndt, 2015), (Knut Astrup Bull and André Gali, 2018), (Malinowska and Karolina Lebek, 2016).

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The act of placing different materials in close proximity to one another in order to establish a novel discourse between them has the potential to advance the progression of a piece. Consequently, it is possible to produce a composite of materials that might elicit either tension or harmony within the artwork. As such, the material composition of the piece serves as a means of conveying a statement or may have been intentionally crafted by the artist to live independently and autonomously (Wagner, 2015).

The anthropological context of materiality encompasses both tangible and intangible aspects, such as the relationship between people, place, and material objects, as well as the cultural importance of art. Materiality encompasses both emotional and cultural dimensions. This is exemplified by the case of Arnhem Land in northern Australia, where the paintings of Wandjuk Marika, (c.1927/30–1987), a Yolngu artist and activist, are utilised for commercial purposes without acknowledging the artist's work or obtaining permission. Cultural misappropriation occurs when indigenous peoples' designs are only deemed valuable when they, "move through the Western art-culture system and the Western concept of property" (Myers, 2005)

In Marika's own words:



"They don't know what the painting is. They thought they are just pleasure paintings But it's the symbol, the power, experience and knowledge. After I found my own design on the tea towels I was shocked and I lose my power to paint, Lose my power for a number of years." (Myers, 2005)

Figure 2, Wandjuk Marika OBE in 1979 photo by Juno Gemes

#### <u>Ethics</u>

In this essay, ethics relates to the individual artist and their specific moral principles. Given the current environmental challenges, how do they view their art? They aim to make impactful points or comments that will be noticed by their audience. To achieve this, artists must thoroughly assess the materials used in their artworks, along with the processes of creation, transport, and display. Do the materials used in the artwork convey a message that enhances the visual impact of the piece? The artist's final masterpiece is heavily impacted by the art supply industry.

Art material suppliers are actively striving to provide environmentally friendly and sustainable products. As an example, Colart, possesses renowned brands including Winsor & Newton, and Liquitex. The Colart Impact Report contains a set of environmental criteria that they commit to and report on. The primary achievements in 2022 were:

- 16% of plastic used is recycled for packaging.
- 100% recycled plastic in all Cotman watercolour sets.
- Liquitex canvases are made from 100% sustainable, traceable textiles and wood.

Although there is progress being made within this particular company, there is still a considerable distance to be covered in order for artists to feel ethically satisfied with the ultimate outcome of employing their material in artworks. Colart currently incorporates cadmium in certain products, although they are actively exploring methods to eliminate this element. (Colart, 2022)

### **Environment Crisis of the Anthropocene and Artists Response**

The Industrial Revolution brought about a profound change in the interaction between humanity and the Earth's ecosystem. This was driven by the increased need for raw materials and the use of steam power, which facilitated the growth of industrial agriculture. Consequently, there was a surge in the demand for land, leading to widespread deforestation. This was exacerbated by the unsustainable extraction of timber without any regard for replanting. Extensive mining activities were carried out to meet the increasing demands of the expanding industries, namely for coal and iron. This is the Anthropocene where "Humans have become the single most influential species on the planet" (Pavid, 2019). An illustration of this can be seen in the numerous cotton mills located in the Manchester region throughout the 1800s, as emphasised in the following verse:

> "And was Jerusalem builded here, Among these dark Satanic Mills?"

from the poem Jerusalem by William Blake (Poetry Foundation, 2019).

Along with the foul odour emanating from the chimneys, Blake's primary focus revolved around the worker's exploitation, particularly in relation to their living and working conditions. As time progresses through the 250 years from the commencement of the industrial revolution, the exhaustion of the earth's natural resources is occurring at an accelerating pace. Earth Overshoot Day is the moment at which the worldwide population's consumption of natural resources and ecological services exceeds the Earth's ability to renew them within a single year. In 2023 the date was  $2^{nd}$  August, (Earth Overshoot Day, 2024a). Despite the seriousness of these environmental problems, climate change has emerged as the primary environmental challenge. While the relationship between carbon dioxide (CO<sub>2</sub>) and the greenhouse effect was understood through the work of Svante Arrhenius (1859 – 1927) (Arrhenius, 1896), there were two key events that projected environmental issues into the consciousness of artists and the public.

The first was Charles Keeling, publication of a paper on the seasonal variation of  $CO_2$  in the atmosphere (Keeling, 1956) which led to the establishment of the Keeling curve in the 1960's.



Figure 3, Keeling Curve

The second was the book "Silent Spring", published in 1963 by Rachel Carson, which brought attention to the harmful impact of human actions on the earth, particularly the destructive usage of hazardous chemicals and in particular the use of DDT to combat malaria, which ended up producing persistent pollution (Carson, 1962). The environmental movement mainly emerged as a response to the increasing awareness and concern about the state of our natural world. Artists and activists played a crucial role in reacting to this increase in environmental consciousness and its impact on our living ecosystem. Artists such as Joseph Beuys, Agnes Denes, and Robert Smithson, who were associated with conceptual, land and environmental art, are notable in this field. Two of these installations are Joseph Beuy's *7000 Oaks*, (see cover) and Smithson's significant creation is *Spiral Jetty*.



Figure 4, Spiral Jetty, 1970, Great Salt Lake, Utah.

"Smithson chose the site not only because of the vast surrounding landscape, but with reference to nearby abandoned oil rigs and the Golden Spike monument marking the 1869 completion of the transcontinental railway. He understood these as industrial ruins, or entropic residues." (Shapiro, 2019)

The environmental movement gained comprehensive geopolitical support when the United Nations Framework Convention on Climate Change was established at the Earth Summit in Rio de Janeiro in 1992, providing a global platform for addressing the planet's concerns. As Oppenheimer (2022) says "....the agreement was toothless because its emissions reduction obligations were unenforceable" which has spurred on a new generation of environmental artists or should they be more accurately know as ecological artists.

### **Environmental Artists and their works**

The following six artist activists I have selected to encompass the last 50 years each exemplifying an individual that operates within the realm of environmental art, spanning from its inception to the present day. I've arranged them by their date of birth, starting from oldest to youngest. Additionally, I've chosen mainly female artist, with the exception of Olafur Eliasson, due to their historical under-representation in art. These six artists also come from different cultural backgrounds hence will have a different lived experience which they bring to their art. I will provide a brief analysis of the artists and their artwork, specifically emphasising the materials employed and the underlying purpose of their work.

#### Agnes Denes

Agnes Denes, born 1931, is a conceptual artist whose artworks centre around the anthropogenic influence on the environment. In 1982, she utilised a landfill location in lower Manhattan for her artwork titled *Wheatfield*. In order to create this artwork, a total area of 2 acres had to be flattened within the landfill site, and a substantial amount of soil was brought in to establish a suitable environment for cultivating wheat. This entailed the continuous tasks of watering, removing weeds, and applying fertilisers until the time of harvest, resulting in the production of around 450kg of wheat. Positioned in an area with some of the most valuable properties globally and situated near the World Trade Centre, the setting served as a backdrop to convey a message regarding mismanagement, wastefulness, global hunger, and ecological concerns. (www.agnesdenesstudio.com, 2012)



Figure 5, Wheatfield, ariel view - A Confrontation: Battery Park Landfill, Downtown Manhattan



Figure 6, Wheatfield, Blue Sky and World Trade Centre (WTC was destroyed by terrorists in 2001)

"My work is about helping humanity. Looking back on my work, I now see that each one of them is trying to help a major problem for humanity and trying to give it a benign solution. Every one of my works, when I'm looking back, becomes some kind of solution, or something to concentrate on. Something to pay attention to and maybe change direction." Agnes Denes (Pollack, 2015)

#### Olafur Eliasson

Olafur Eliasson, born in 1967, is an Icelandic-Danish artist known for his social practice. He is committed to creating positive social impact and prioritises the involvement of people in each

of his projects. His primary artistic disciplines are sculpture, painting, photography, and design. His project *Ice Watch* entailed the shipment of ice blocks weighing between 1.5 and 6 tonnes from Greenland. In 2014, the event took place in Copenhagen to align with the release of the UN IPPC's<sup>1</sup> report on climate change. In Paris in 2015, a total of 12 blocks of ice were arranged in a circular formation to symbolise a clock. This artistic installation was synchronised with the UN Climate Conference COP21<sup>2</sup>. After three years, the third version of this project took place in London, featuring 24 blocks positioned outside the Tate Modern and an additional 6 blocks placed outside the European offices of Blomberg (Eliasson, 2019).



Figure 7, Ice Watch, 2014, Installation London 2018. Photo by Matt Alexander/PA Wire

The ice blocks for the London installation were delivered in 9 refrigerated containers, going from the Nuup Kangerlua fjord in southwestern Greenland to Denmark, and then to Immingham before reaching their final destination in London. The ice was intentionally left to melt in real time, enabling people to engage with the ice blocks. The ice belonged to the Greenland ice sheet, which is the largest ice sheet outside of the Antarctic region. The Greenland ice sheet has contributed 2.5mm to the rise in sea levels from the time of Arrhenius' discoveries. The London event was scheduled to coincide with COP24.

<sup>&</sup>lt;sup>1</sup> United Nations Intergovernmental Panel on Climate Change's fifth assessment report on climate change

<sup>&</sup>lt;sup>2</sup> UN Climate Change Conference, Conference of the Parties, 21<sup>st</sup> meeting, Paris, from 30 Nov to 12 Dec. 2015

"Everything we do has a carbon footprint, and of course this includes the things we do to address climate change," Olafur Eliasson, (Rea, 2018).



Figure 8, Ice Watch, 2014, Photo: Group Greenland

#### Tea Mäkipää

Tea Mäkipää, a Finnish artist born 1973, whose artistic works encompass sculptural installations, films, and images that directly confront ecological issues such as the pervasive impact of global consumer culture, the decline of biodiversity, and the intricate relationship between humans and animals. She strives to achieve species equality and enable us to perceive ourselves as external observers in her artworks. Her artwork typically shows her profound passion for the preservation of the Earth, employing elements of humour and irony. *Atlantis*, a collaborative sculpture created with Icelandic artist Halldor Ulfarsson, portrays a small cabin situated in a lake or river as a cautionary symbol for the dangers of global warming. The house precariously remains afloat, half submerged. The windows emit light as the sounds of a typical family existence can be heard, yet the inhabitants appear oblivious to their impending doom (Brown, 2014).



Figure 9, Atlantis, Copenhagen, 2007, Outdoor installation for sea / lake / pond, etc.

The cabin of *Atlantis* has dimensions of 450 × 450 cm when placed on the ground, with a height of around 500 centimetres. The artwork made its debut at Wanås, Sweden in 2007. Mäkipää's project was a visionary endeavour that artistically conveyed the major environmental difficulties faced by humanity. It aimed to provide a voice alongside the dominant economic, political, and scientific information in the media. She has consistently included these themes across her whole body of artwork and purposefully chosen to tackle important subjects, such as global warming, since the inception of her career. (Wachtmeister, 2015).



Figure 10, Atlantis, Wanås, Sweden, 2007.

#### Angela Tiatia

Angela Tiatia born 1973, is an Australian artist who specialises in creating videos, which by its very nature is a low carbon activity. She was born in Auckland, New Zealand, and has a mixed heritage of Samoan and Australian origins. As a result, her art frequently incorporates elements of her Pacific cultural background. Tiatia examines modern culture in her work, with a particular emphasis on concepts such as representation, gender, neo-colonialism, and the commercialization of the body and location. Tiatia's meticulously crafted video and performance pieces frequently serve as depictions of both an individual's personal journey and a facet of modern society (Queensland Art, 2015).



Figure 11, Holding On (2015). Single-channel high definition video, 16:9, colour, sound, 12:11 minutes.

Tiatia created the film *Holding On*, in response to the challenges encountered by Tuvalu as a result of the destruction caused by the tropical cyclone. In March 2015, the weather system's extensive circulation and its slow movement caused coastal flooding in multiple nations, including Tuvalu. As a result, the islands saw a storm surge of 3 to 5 metres, resulting in flooding of homes, destruction of crops, and saltwater intrusion. Furthermore, as a result of the storm surge, waves transported debris onto the islands (Holbeck, 2015). The purpose of her video is to highlight the risk of sea level rise to low lying Tuvalu. "Think about water. It's the giver of life but also the great remover of life" Angela Tiatia (QAGOMA, 2015).

### Mary Mattingly

Mary Mattingly born in 1978, is an American artist skilled in both sculpture and photography. She constructs expansive participatory projects worldwide, focusing on creating sculptural ecosystems that emphasise the availability of food, shelter, and clean water.

"Art as a system, re-evaluates things. It is necessary that in places like the United States the natural environment, built environment, extracted materials, and objects are re-evaluated. Art is particularly important to environmentalism in this regard" Mary Mattingly (Lodewick, 2017).



Figure 12, Vanishing Point, floating sculpture.

*Vanishing Point*,2021, comprised a dual public art installation, with a floating sculpture tethered in close proximity to an educational centre located on Southend Pier. Both studies investigate the evolutionary and adaptive reactions of plant life in the Thames Estuary to prolonged climate change and analyse how this knowledge might be used to make predictions for the upcoming future. The present CO<sub>2</sub> content in the Earth's atmosphere is the highest level ever documented in the annals of human existence. If industrialised nations fail to reduce their CO<sub>2</sub> emissions, climate models project that by the end of this century, their CO<sub>2</sub> levels will resemble those of around 50 million years ago, Cenozoic Era. The learning facility located on the Pier provides visitors with a chance to examine the plant life of the Estuary throughout history, featuring both the flora that thrived during the Eocene epoch<sup>3</sup> and the ones that still exist today. By analysing fossil records of plants that have encountered substantial temperature variations in past epochs, we can unravel similar occurrences in the current era (Mattingly, 2021).



Figure 13, Vanishing Point, learning centre, Southend Pier.

#### <u>Tan Zi Xi</u>

Tan Zi Xi born in 1985, is an artist and illustrator living in Singapore who received her training in London. She is also recognised by her artistic pseudonym, MessyMsxi. Tan, explores a range

<sup>&</sup>lt;sup>3</sup> The period when modern mammals came into existence between 58 to 40 million years ago.

of artistic mediums. In addition to her commercial endeavours with businesses, Tan has engaged in collaborations with graphic designers, fashion labels, and museums for many projects, encompassing public art. (Tan, 2023)



Figure 14, Plastic Ocean, Singapore, 2016.

Her installation, *Plastic Ocean*, was part of the Singapore Art Museum exhibition called Imaginarium: Under the Water, Over the Sea, from May to August 2016. The artist's extensive installation of repurposed marine waste is a hauntingly immersive installation consisting of more than 20,000 stationary pieces of recycled plastic, serving as a powerful reminder of the lasting consequences of human actions on the oceans. The concept for this installation was based on her early collection of illustrations, *An Effort Most Futile*, 2008, showing scenes of overwhelming environmental challenges in the oceans. One of her most notable experiences in the process of developing *Plastic Ocean*, (which she found rather distressing due to the substantial workload) was involved in collecting, cleaning, and organising 26,000 pieces of discarded plastic for the exhibit. Thus, giving an indication of the magnitude of everyday rubbish production. (Oceanic Global, 2017)



Figure 15, An effort most futile, illustration, 2008.

"I wanted to recreate a physical manifestation of the Pacific Garbage Patch<sup>4</sup>, where children and adults could experience being immersed in a space covered with trash, simulating the environment of the 'plastic pool.'" Tan Zi Xi, (Oceanic Global, 2017)

### **Discussion of the Artists Materials**

While Beuys, Smithson, and Denes' artworks fall under the category of land art, Smithson's *Spiral Jetty*, created in 1970, stands out as a quintessential representation of the core of this artistic movement. The construction project does not consider the environmental consequences, except for the expectation that it will naturally degrade over time, symbolising the collapse of industry in the region. The pathway is composed of rocks, forming a walkable trail "a curl of bulldozed rocks....projecting a quarter mile into the brine" (Hughes 1991, p.384). In contrast, Denes places great importance on the message transmitted through the implementation of *Wheatfield*, 1982, despite the fact that it involved the movement of large amounts of rubbish and soil, as well as agricultural cultivation. Notwithstanding this it is regarded as one of the most notable environmental artworks of the last 50 years.

<sup>&</sup>lt;sup>4</sup> Pacific Garbage Patch, is a collection of marine debris in the North Pacific Ocean, covering 620,000 Sq. Miles

(Greenberger and Greenberger, 2020). Beuys adopted a distinct method to create something of lasting significance, as evidenced by the ongoing growth of the *7000 oaks* project since 1982. Their acorns have been distributed to various cities to sustain the initiative (Public Delivery, 2023). Beuys and Denes prioritise the exploration of the living realms and seek to enhance them by demonstrating the necessary steps to ameliorate the human condition. In contrast, Smithson's focus is the concept of impermanence. These artworks were created during the 1970s and 1980s, however, since the year 2000, there has been a notable increase in awareness of environmental concerns, particularly when it comes to projects aimed at highlighting issues related to the natural world.

The installation Atlantis, utilises wood to construct a cabin of modest size, accompanied by a soundtrack. This artwork effectively addresses the issue of increasing sea levels and its underlying factors, while having a minimum impact on natural resources. In contrast, Eliasson's Ice Watch only uses ice in his installation. However, this involved a substantial logistical operation to transport large quantities of ice from Greenland to cities in Europe. Considering this, Eliasson commissioned the NGO<sup>5</sup> Julie's Bicycle to analyse the carbon footprint of the project. Additionally, Eliasson generously gave an amount three times greater than the purchase of carbon credits to the Woodland Trust (Rea, 2018). The possibility exists that the transit of this ice may have been circumvented by utilising locally procured ice in each location, if feasible, as opposed to the lengthy shipment from Greenland. In relation to Paris, the NGO determined that this released 30 metric tonnes of carbon dioxide (Phaidon, 2024), while I have calculated that the production of ice in Paris would lead to the emission of 1 metric tonne of  $CO_2$ , Appendix 1. Can the installation have an equivalent effect with locally sourced ice? It is plausible that the interpretation could allude to the Greenland ice sheet melting. I would answer yes to both questions. In comparison, Holding On, exemplifies the immateriality of art by solely employing Tiatia's body and a video camera to produce a piece centred upon the emergence of rising sea levels. Furthermore, it possesses a prominent cultural component derived from her own ethnic background, adding an additional depth of emotional significance. However, it is very much a passive experience for the viewer, in contrast to *Ice Watch*, where the public is encouraged to engage with the ice by touching.

<sup>&</sup>lt;sup>5</sup> Non-Governmental Organisation

Tan's *Plastic Ocean*, incorporates retrieved plastic from the ocean, which sets it apart from the other works reviewed. Creating a thought-provoking-pieces that aims to convey the hardships faced by marine life due to our disposable culture. This is achieved by engaging the audience in walking underneath the plastic refuse, suspended from above, thus giving the sensation of being under the waves. Thus allowing the visitor to appreciate the marine environment we are collectively destroying. *Plastic Ocean* has made a positive contribution to the environment by the removal of human made rubbish from the sea. In comparison with *Holding On* which has an equally important environmental message, this could have been filmed anywhere. Did the artist need to fly to Tuvalu to create the video? Tiatia harboured some scepticism over the authenticity of the documentaries depicting the destruction of Tuvalu. Her perspective appears peculiar when considering the efforts of her fellow film producers. (QAGOMA, 2015)

In *Vanishing Point*, Mattingly takes a different approach to Eliasson, Tan and Tiatia by having a floating artwork made from CorTen<sup>6</sup> steel to mimic an aged appearance, along with an onshore instructional centre. The structure is designed to represent ancient plant life, the Nipa palm from the Cenozoic Era. The palms are supported on a barge with scaffolding hence the only manufactured items are the metal palms. This sculpture is distinguished by the inclusion of an onshore learning centre, likewise the learning centre is constructed of scaffolding and scaffold boards therefore reusable. Both elements collaborate to prompt the visitor to ask the question posed by the sculpture, "What is the meaning?" This can be elucidated through interpretation at the learning centre to aid individuals in comprehending the impact of humanity on the earth. There could be a challenge as to why the sculpture had to be offshore and not part of the centre. Perhaps this is a style that the artist prefers to use as can be seen in her previous works (Mattingly, 2021). While the partially submerged form of *Atlantis* plays a crucial role in conveying the environmental message of rising sea levels.

As artists, we strive to create artistic works; nonetheless, are we concerned about the potential environmental ramifications? In relation to this matter, it can be observed that *Holding On*, except for airmiles, and *Plastic Ocean* exhibit the least significant ecological

<sup>&</sup>lt;sup>6</sup> CorTen is a steel that is corrosion-resistant and has tensile strength, referred to as a weathering steel.

footprint. Regarding transportation and air travel, each artist has undertaken considerable journeys to promote their artistic endeavours. The collective impact of transport and air travel constitutes a substantial factor in the phenomenon of climate change (Ritchie, Roser, & Rosado, 2020). During my investigation of each of the artists I examined, I have not observed any evidence of their efforts to minimise their travel. In the contemporary interconnected world, this should be highly attainable, especially for artists with global renown. However, does the pursuit of fame and ego overshadow all other considerations? I propose that artist activists should strive for a more ambitious environmental approach, considering all facets of their work and their individual carbon impact. Notwithstanding this, each of the reviewed artist has successfully created a powerful environmental message.

### Conclusion

Over time, artists have shown an evolving awareness from the 1970s to the present, with a consistent environmental theme. As time has passed, there has been an increased focus on the materials and execution of their projects. Over the past 50 years, there has been a transition from using earthmovers for material transportation to incorporating carbon footprint analysis, recycled materials, and performance art. Eliasson refrains from purchasing carbon credits to mitigate the effects of his art, as it may be seen as detrimental, especially concerning indigenous peoples in cases when; "Most of the celebrated climate solutions, such as land-based carbon removal, biofuels and many forms of so-called green energy, are in fact forms of CO<sub>2</sub> colonialism" (Kui and Andreotti, 2021). Contemporary artist activists need to consider how to convey the environmental message while reducing the ecological footprint. The current average global temperature rise is approaching the threshold of limiting the temperature increase to 1.5°C above pre-industrial levels. (United Nations, 2023). A worldwide limit was established by the Paris Agreement<sup>7</sup> in 2015. The yearly temperature increased by 1.35oC in 2023, with December 2023 recording the highest temperature at 1.43oC (NOAA Staff, 2024). The Greenland ice sheet is melting rapidly causing enormous repercussions and generating fears about the potential breakdown of the gulf stream (Carrington, 2023). Commentators are cautioning about the possibility of a 6th mass

<sup>&</sup>lt;sup>7</sup> Paris Agreement is a legally binding international treaty on climate change. Adopted at the UN Climate Change Conference (COP21) in Paris, on 12 December 2015. It entered into force on 4 November 2016.

extinction catastrophe if we do not intensify our efforts to mitigate climate change (World Wildlife Fund, 2022). The artist activist faces the significant task of creating work that may inspire and effect change. Artists must be cautious about the materials they employ to avoid being challenged by climate change-denying media and neoliberal organisations. They should carefully consider the source, manufacture, and utilisation of their resources. However, it is possible to create an artistic statement utilising non-sustainable materials if the goal of the art is to provoke people into taking action. Despite the common belief that efforts to raise awareness about environmental issues have been completed, a survey in the USA (a leading emitter of CO<sub>2</sub>), found that only "37% of Americans say addressing climate change should be a top priority for the president and Congress in 2023" (Tyson, Funk and Kennedy, 2023). Artist activists continue to have a crucial role in promoting a constructive environmental message.

Currently, the United States has a country overshoot date of 24 March 2024. This date signifies the depletion of the world's renewable natural resources within a year, if the global population were to adopt the lifestyle of Americans (Earth Overshoot Day, 2024b). As people throughout the world strive to emulate American lifestyles, it is crucial for artist activists to focus on creating art within their local communities. This strategy enables them to directly influence their community and initiate a profound change at the local level. Grassroots activity is the only way to challenge the influence exerted by multinational corporations that are only motivated by profit and unrestricted expansion. It is imperative that we harness the fervour of Agnes Denes and her colleagues, who were trailblazers in environmental art activism, therefore, it is essential to become Ecological Artists to protect our natural environment, which supports all forms of life on our planet.

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## Appendix 1



Calculation for Carbon Dioxide equivalent emitted by freezing water to -18°C

		Units			Units
No. of Ice Blocks	12		Heat from 0 to 15 °C	3765600	KJ
Mass per Block	5000	kg	Q = M x Hcp x delta T		
Total Water mass required	60000	kg	Freeze Ice	20160000	KJ
Temperature of Water	15	°C	Heat from Ice to -18 oC	2276640	КJ
Temperature of Water Phase Change	0	°C			
Ice Temperature for Transportation.	-18	°C	Heat required for process	26202240	KJ
			W = J/s	0.277777	Wh
Heat capacity of water	4.184	kJ/kg °C	Plant efficiency*	30	%
Heat capacity to freeze ice, Phase change only	336	kJ/kg	Energy required for process	24,261	kWh
Heat capacity for Ice	2.108	kJ/kg °C	French Electricity Carbon Intensity	44	CO <sub>2</sub> g/KWh
			Carbon emitted	1,067	kg CO <sub>2</sub>

1.07 t. CO<sub>2</sub>