Geo-engineering and Nature's Rights: An Ecocentric Critique
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"Geo-engineering and Nature's Rights: An Ecocentric Critique"

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Abstract

As consequences of climate change are becoming increasingly obvious, more and more risky practices are being considered to moderate its repercussions, such as geo-engineering. Climate engineering, however, carries many ethical questions to be considered before it can be deemed an acceptable measure. In this thesis, ethical considerations in regards to the rights of nature will be examined in order to assess its permissibility. The rights of nature seek to question the widely held instrumental view of nature, aiming at conceptualizing the natural world as an interconnected reality, rather than an available and exploitable resource. This is especially important when evaluating geo-engineering since it involves artificially altering natural processes, which may jeopardize nature's integrity. An ecocentric approach will thus shed light on the anthropocentric essence of geo-engineering and its harmful effects towards nature. In all, I will argue how these elements can be turned into a more considerate approach to the practice, should a shift in our conception of nature occur. This in turn will favor a modification of the aim of geo-engineering, whose scope will be expanded to include nature's rights.

Introduction

Climate change has been framed as the biggest present challenge and prioritized in most of the world's political agendas. The perpetual and intensified release of carbon particles in the atmosphere have transformed the climate processes that once governed Earth, causing inclement and unstable long-term shifts in temperature and weather-patterns to occur. The latest IPCC report informs, with a high level of confidence, that "the rise in weather and climate extremes has led to some irreversible impacts as natural and human systems are pushed beyond their ability to adapt" (IPCC, 2022 p. 11). Thus, the counter-measures that will be taken in response to this global emergency will strongly dictate the intensity of the repercussions and adversity that human and natural systems will have to confront from year 2040 onwards (IPCC, 2022, p. 16). Many ideas and global agreements have been made on the subject, albeit at a glacial pace and with little demonstrated efficacy. So far, the dominant rhetoric has been that of a collaborative effort to cut emissions and restore climate patterns to pre-industrial levels, with the Earth's surface staying around 1.5° and never exceeding 2° (UN, 2015, p. 3).

As these changes advance further, more tipping points are to be reached, thereby increasing the pressure on finding a fitting solution as a mean to avoid the most destructive consequences of global warming. Among these solutions, geo-engineering has been proposed as a possible 'last resort' measure, suggesting a "deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change" (The Royal Society, 2009, p. 1). Artificially engineering the climate, however, does not come with little risk. As little study has been undertaken this far, it carries significant danger, with the possible implications inflicting irreversible damage on a global scale. Furthemore, geo-engineering raises many ethical concerns, given that further manipulation of the climate does not necessarily account for the injustice of the prolonged overexploitation over Earth's resources.

Climate change should be conceived as a failing system that has been damaged by human conduct, not a mere threat to human existence only, since the target of such disruptions are "large scale physical and chemical environments of atmosphere, hydrosphere, and upper lithosphere, along with the climates that these domains contribute to forging, have been—for 3.8 billion unbroken years of life's existence—viable contexts for an ever-changing, increasingly complex, and most often abundant biota." (Christ & Rinkers, 2009, p. 4). Changing these natural regulations into artificial ones could therefore be seen as yet another

attempt of humanity to 'play God' against nature, with the result of a global catastrophe. The problem is in fact rooted in an anthropocentric understanding of nature, where humans are positioned at the center of the universe and assigned with a greater intrinsic value than any other life form (Stanford Encyclopedia of Philosophy, 2013).

Given the irreversible repercussions of climate change, such as biodiversity loss, increased natural catastrophes or global warming, the necessity for nature's rights is becoming increasingly clear. However, little progress has so far been achieved, and reaching consensus has been difficult, due to strongly opposed viewpoints. Consequently, it seemed more than logical to come up with a contingency plan, should climate change get out of control. While climate engineering is fraught with debate, it is nonetheless seen as a possible future reality. Nevertheless, considering the undoubted role of nature in the balance of the world, is climate engineering a good plan B? Is it compatible with an intrinsic view of nature? Or is this the missing piece to a complete dominance over Earth?

I believe that little literature has so far been devoted to an ecocentric investigation of climate engineering, despite climate and nature being strictly interconnected. Such analysis would be beneficial since it exposes the problems associated with geo-engineering, thereby also contributing to the development of an environmentally conscious solution. As a result, this thesis will challenge climate engineering from an environmental perspective by answering the following question: *Is climate engineering compatible with nature's rights?*

This thesis will be composed of three chapters. The first one presents a literature review on the definition and current discussion on nature's rights and climate engineering, which will serve as the theoretical framework for this thesis. The second chapter will explain my arguments for geoengineering's inconsistency with nature's rights, emphasizing its anthropocentric nature. Through an ecocentric lens, I will argue that geoengineering holds a utilitarian perspective of nature and continues to harm other species and ecosystems. The last chapter will then re-evaluate the previously taken position by considering counter-arguments, aimed at highlighting some beneficial aspects of geo-engineering in regards to nature's rights. Lastly, the final section will conclude with a summary of the suggested arguments, a final evaluation of the research question, and future research suggestions. Through this research, I will conclude that geoengineering is incompatible with nature's rights. Nevertheless, some elements can be deemed consistent with a biocentric account of nature's rights.

Chapter I :

Geo-engineering and Nature's Rights

Before any ethical consideration can be made in regards to nature's rights and geo-engineering, it is important to correctly define the terms associated with the two concepts, alongside with the debate around them. I will therefore start by presenting nature's rights to then focus on climate engineering.

Nature and its rights

Despite the fact that nature is commonly envisioned as including a wide range of domains such as plants, animals or natural resources, no clear and all-encompassing definition of nature exists. For the purposes of this thesis, I adopt a holistic understanding of nature, which encompasses all life and systems outside of the human one. This definition includes "the totality of the physical world subject to the ordinary forces described by physics and chemistry and evolutionary biology" (Vogel, 2011, p. 87). By relating nature to geo-engineering in the context of climate change, the scope of the implications are global, leading me to frame nature to its full extent.

  Although only few examples of legal rights of nature exist, the meaning attributed to this term have so far meant to define: "(1) a legal philosophy and (2) legal provisions that codify this philosophy by recognizing ecosystems as subjects with rights" (Kaufmann & Martin, 2021, p. 4). These rights arise from the philosophical assumptions of Earth Justice, which hold that all living species are interrelated in a "web of life", where balance must be achieved to maintain the system's existence.

  While these assumptions may make sense in modern day science, they certainly cause some tension with Western laws. As Kaufmann and Martin suggest (2021), the Western legal system is very representative of the seventeenth century notion of nature as a "fragmented machine" (Kaufmann and Martin, 2021, p. 5), whose resources were thought as independent from each other and available for humans to employ.

  This constructed power over nature derives from an anthropocentric understanding of nature. As suggested by Thompson (2017), ontological anthropocentrism is supported by

monotheistic faiths in which God allegedly gave humanity power over his creations. Because of their connection to the Creator, humans are regarded to be above nature, as they possess a higher moral worth. Natural capital is therefore valued based on the produced advantages and offered services, which are expressed in monetary terms according to economic theory (Adloff & Hilbrich, 2021, p. 171).

Anthropocentric assumptions are challenged by different ecocentric approaches, the most influential being sentiocentrism and biocentrism. Sentionsentists claim that non-human forms of life are entitled to rights since they are 'subjects-of-life', able to experience pain, from which basic interests can be identified (Reagan, 1983). However, biocentrism questions this view, suggesting that these interests are tainted by human bias, as they only speak from human experience. Instead, they advocate for the welfare of non-living beings to be rooted in beneficial interactions and prevention from harm, without any need to address specific interests.

Nevertheless, the absence of clearly defined rights contrasts the way law is codified in our system. Our law is made so that interests and duties need to be thoroughly assigned to individuals. However, when looking at nature, these are not as obvious as for humans. As suggested by Kurki (2021), this dilemma could be overcome if we simply looked at the problem from a solution-oriented perspective. According to the author, the interest theory of rights is a better approach when it comes to assessing the legal rights of nature, since it confies rights on the basis of well-being: 'Anne holds a right if Ben bears a duty that—very roughly put—typically benefits Anne' (Kurki, 2021, p. 51). Assuming that we can at least deduce that nature strives to survive, the rights to protection from unnecessary harm seem well fitting. That means that rather than thinking in terms of duty and rights, we should reflect on how to ensure protection of species, or as Wise (2019) puts it "immunity" from human harm.

The idea of 'protection' or 'immunity' has already started to show popularity in the legal world. In November 2020, a panel of experts lawyers drafted the international proposal for the crime of ecocide, stating that "international law has a role to play in transforming our relationship with the natural world, shifting that relationship from one of harm to one of harmony" (Stop Ecocide Foundation, 2021, p. 2). The proposal condemns international law for not protecting the environment enough in such dramatic historical unfolding, proposing an amendment to the Rome Treaty. The official definition goes as follows: "ecocide means unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and either widespread or long-term damage to the environment being caused by those

acts" (Stop Ecocide Foundation, 2021, p. 5). To this date, this proposal constitutes the most progressive attempt of criminalizing unnecessary and perpetual harm to nature.

Not every community has however lost track of their relationship with nature. Some indigenous communities are still attached to their natural heritage and seek to preserve it for their wellbeing. In Ecuador, for instance, an harmonious relationship with nature is what allows people to conduct a peaceful and good way of living, referred to as 'buen vivir': "a new form of coexistence, in diversity and harmony with Nature and others, to achieve good living, sumak kawsay" (ANC, 2008, p. 15). Similarly, in New Zealand, the river Whanganui has been recognized legal personhood and is now being defended by two guardians on legal matters, as requested by the Maori community (Charpleix, 2018). Because of the intrinsic value attributed to nature, its rights have been amended to be part of the constitution, thereby contributing to some of the few examples of rights of nature in history. Other more common examples of a legal protection of nature exist, such as national parks, which ensure the preservation of natural habitats, or pet trusts, through which pet owners legally ensure their animals (Kurki, 2021).

Indigenous communities adopt a holistic view of ecocentrism, in which ecosystems are valued intrinsically, so as to incorporate the totality of nature. This is an extension of biocentrism, since the rights of nature are extended to non-living natural beings, such as bodies of water or mountains (Thompson, 2017). The maximum extension of nature's rights can be found in Rolston's systemic value conceptualization. His view recognizes intrinsic value to Earth's nature due to its interconnected system of interactions, which regulate and generate life. As a result, nature is considered the starting point from which all values originate: "the creativity within the natural system we inherit, and the values this generates, are the ground of our being, not just the ground under our feet" (Rolston, 1994, p. 28).

A deliberate manipulation of nature

Climate Engineering, also known as geo-engineering entails artificial replications of natural processes, which aim at containing the warming of the planet and help maintain a habitable climate.

A distinction between its two main categories is usually made: Carbon Dioxide Removal (CDR) and Solar Radiation Management (SRM). The former category is more widely

accepted and immediate to the problem, as it aims at removing the accumulated emissions in the atmosphere and preventing new ones from collecting. An example would be the use of Direct Air Capture machines, which are meant to trap and store CO2 emissions underground; or more naturally induced ways, for instance through afforestation projects, ocean fertilization or enhanced mineral weathering, which speeds up the CO2 absorption. SRM methods, on the other hand, are meant to reflect the most harmful sun radiations before hitting Earth, so that solar energy could not be trapped in the atmosphere, but instead would be released in outer space, favoring a cooling of the planet (Gordijn & ten Have, 2012). Current proposals for this approach are white painting of buildings to reflect sunlight, aerosol injections in the atmosphere, marine cloud brightening or even the implementation of mirrors in outer space to reflect back sunlight.

Evaluating climate engineering

This thesis investigates the morality of geoengineering, which provides a very complex solution to an equally intricate issue. Preston (2013) advises that ethical problems connected to geoengineering be explored in phases, beginning with a study of the contemplation of the prospect of geoengineering, which is the focus of this thesis. Even though certainly more research needs to be devoted to deliberate climate modifications, rising concerns of these practices have formed in the academic community and beyond. Being able to manipulate the climate is not yet appealing to everybody, and while this could potentially extend the climate emergency deadline, it may just come off as another attempt to assert our superiority against nature.

  Critics of climate engineering look at the moral hazard behind such intervention, arguing that initiating an artificial outside option could be detrimental for the sake of finding other alternatives, as it would reduce the incentive to compensate for the harm done (The Royal Society, 2009). Not to mention that possessing such power could lead to future improper use to manipulate climate according to pure preference (Adloff & Hilbrich, 2021). Geo-engineering is perceived as an unknown, untested, and risky initiative, hence considered an arrogant and hubristic attempt to defy nature, or, as it is popularly referred to, 'play God' against it (Hartman, 2017). It therefore does not come as a surprise that a study conducted by Corner and Pidgeon (2014) showed that the public's agreeability with climate engineering grows stronger, the more these practices resemble natural processes.

Conversely, climate engineering enthusiasts suggest that these manipulations are no different from the ones we are already inflicting to the planet through CO2 emissions. Relying on geo-engineering could in fact contribute to amend our mistakes and help restore nature (Gardiner, 2017). As Jamieson (1996) also claims, these interventions need not be all unnatural, since the planting of trees to compensate for the rising accumulation of CO2 is a rather natural process. Furthermore, it is also unclear, from a philosophical perspective, what really counts as 'nature'. Considering that humans should respectively fall into that category, could these interventions then also be counted as natural? (Vogel, 2011).

Regardless of the noble intentions underlying geoengineering, climate change already poses a real threat to global systems and has been linked to serious physical and mental health problems throughout the world. This is due to an increase in extreme weather occurrences and changes, which are causing increased distress, fatality, and disease proneness (IPCC, 2022, p. 13). Yet, even if geo-engineering is not presented as a long-term solution, it is still regarded as an option that we may need to pursue. In order to avoid unintended and permanent outcomes, it is critical to evaluate the moral issues behind such a dangerous method against a problem that is now impacting the whole globe.

As a matter of fact, geo-engineering still raises many ethical concerns, which include a vast range of societal aspects, such as intergenerational justice, welfare, responsibility or the relationship with nature. However, as Gardiner (2017) points out, climate engineering "must benefit everyone" (p. 509) to be considered ethical. While numerous reports and studies have been devoted to a human-centered investigation of climate engineering's repercussions, little to no attention has been paid to the ethical effects imposed on nature. As a result, an ecocentric analysis of climate engineering is necessary to shed light on the moral hazard inherent to such actions against nature.

Chapter II:

Anthropocentric foundations of geo-engineering

This chapter will provide my case for geoengineering as an anthropocentric countermeasure to climate change. As a result, I will explain why it cannot be considered consistent with natural rights.

Human's interference with nature

Nature has for long served to define what humans are not. The human consciousness is what is thought to distinguish *us* from *nature*, empowering a sense of superiority over any other life form on Earth. Humans have been moving away from nature by artificially building their living environment, until everything that was originally 'natural' became 'wild'. And while any biologist would agree that humans are indeed animals, a lot of distance has been put between the natural world and the human one (Traïni, 2015).

However, is that true? Does the human rationale allow us to detach, even partially, from nature? As mentioned by Vogel (2011) this question is particularly relevant to the morality of geo-engineering because if humans were to be considered as part of 'nature', then any alteration or modification to the environment would have less moral weight. "The human species and its behaviors presumably evolved through the same sort of biological processes as other species. If this is so, it is unclear why the consequences of those behaviors deserve to be called unnatural" (p. 86). It could be considered a stage of evolution, in which the species that is able to adapt the most, does so, in a struggle for survival. If humans are thus conceptualized within nature, then any change would inherently be considered natural, even if detrimental for other species.

Nevertheless, humans are still embedded within an entire planet, which hosts many life forms. According to chemist Lovelock (1972), the world, referred to as 'Gaia', is a self-regulating system, in which all living components play an active role in ensuring the continuity of life on the planet. In other words, he believed that all living beings were fundamentally contributing to the adaptability of ecosystems and resources through a series of interactions. Thus, disrupting this cycle would also alter the life conditions of the system.

The vision of the Earth as a community of living beings rests as a baseline principle for an ecocentric view of the world, where all species play a fundamental role for the well-being of the planet: "The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals; or collectively: the land" (Leopold, 1949, p. 204).

This line of thought suggests that humans are in fact not all mighty as it looks. On the contrary, they are dependent on other beings and factors to ensure their survival, as climate change also seems to confirm. For instance, even before the Industrial revolution, humans and other animals were still emitting CO_2 on a smaller scale. These emissions were however contrasted by the presence of other 'natural beings' such as trees or bodies of water, which would absorb them in a balanced cycle, granting no side effects. Thus, assuming that humans are part of this life regulating mechanism, any form of human interference, depending on the degree, would dictate consequences both on other living beings and on humanity itself.

Because everyone has their role within the system, engineering these natural processes overtakes the role meant by different agents, limiting nature's freedom to exist and self-regulate. This then poses a question towards the necessity of geo-engineering, since why would one then engineer something that already has the power to fix itself? Moreover, even if humans were to compensate for the role of living beings, nature would then depend on human action, which may lead to a high chance of imbalance and error. We would then be re-creating something we have an idea on, but that may not completely entirely coincide to what nature needs or to what nature *is,* for as much as humans are capable to comprehend, "the biotic mechanism is so complex that its workings may never be fully understood" (Leopold, 1949, p. 205).

This is particularly worrying from an ecocentric perspective on nature. Acknowledging an intrinsic value of nature, i.e. a value detached from its contribution to human interests, the idea of engineering nature is quite controversial. It would inherently take away nature's intrinsic value, as the engineering would preclude a *need* or purpose for the object in question. Even if the purpose would be purely aesthetical, hence not aiming at any immediate benefit, the creation of a natural being such as a tree or a body of water instrumentalizes its creation. For instance, if afforestation occurs (one of the least controversial methods of geo-engineering), the tree that has been planted serves a purpose, which is that of absorbing CO_2 emissions. These trees are therefore planted not solely with the intention of protecting and invigorating nature, but rather with that of purifying the air from the emissions, contributing thus to the well-being of humans.

Hence, while the action of planting trees is per se not maleficent, the morality behind might be. Climate engineering assumes that nature can be replicated so as to respond to specific purposes and climate phenomena, which are supposed to be naturally counter-balanced, yet aren't in reality. It holds an instrumental view of the role of nature, which does not reflect a non-anthropocentric understanding of life. Nature should be allowed freedom to co-exist and fulfill its role in the self-regulating system of Earth because its members "have distinctive kind of value—inherent value—and are not to be viewed or treated as mere receptacles" (Reagan, 1983, p. 243). Geo-engineering could not allow that because it would continue to strive to govern nature by regulating its behaviors, suggesting "a hubristic attitude about the kind of capabilities that humans possess" (Preston, 2013, p. 26). Thus, even if climate engineering could perfectly mimic and regulate the expansion of nature, it would still not count as nature since its intrinsic value would be lost.

Technology as nature's enemy

Being climate engineering a technological innovation, one of the most pressing moral considerations relies on the many risks that these practices could create. Injecting aerosols in the atmosphere or enhancing existing natural systems carry an unpredictable component, which may result in worsening conditions only to be experienced at a future point in time. Despite having already discussed the fact that human intervention is partly already detrimental to nature's integrity, the technological essense of geo-engineering surely points towards the anthropocentric interest behind the measure.

In more general terms, technological innovations could be said to have laid the foundations of modern global society. Through technology, humans are able to simplify tasks and overcome problems, thereby furthering in many fields at an unprecedented rate. As progress is not finite, technologies keep on being more and more sophisticated and responsive to people's needs, thus gradually being implemented in society. Although the implementation is gradual, once technologies have been 'naturalized' it is a commodity which is very hard to renounce. It would indeed be hard to think about a reality in which we would not be able to access a computer or use a refrigerator. As suggested by Van Mensvoort (2012), some technologies are already considered 'vital', such as the invention of the alphabet, without which we would not be able to communicate or the invention of the clock, without which time could not be measured. The philosopher believes that all technologies experience stages

of evolution, in which they travel from being envisioned to becoming invisible, such as time or speech.

However, despite the undeniable positive impact of technology on humanity, it also poses an unprecedented challenge towards nature. As Thompson (2017) explains:

> It is indeed difficult to imagine an environmental crisis on the magnitude of our present situation without the mechanical, power, biological, and chemical technologies that have proliferated since the industrial revolution. Although human impact on the natural environment may be caused as much or more by expansion of the global population as by technologically based pollution and resource consumption, technological advances in agriculture, medicine, and energy are themselves largely responsible for the growth in human population (p. 438).

That being said, the driving justification behind climate engineering lies in its implementation to be adopted only in the event in which no other solution could be found, where no other option could be advanced to save the planet. In other words, the control over the environment in the form of geo-engineering is considered a necessary measure, should modernization not be fast enough (Preston, 2013). Nevertheless, is that a risk we are advancing for the benefit of everyone? Is that inclusive of nature? If the solution to climate change is that of reducing our impact on Earth, is engineering our way through it a risk we are taking in the name of collective salvation? Or is it merely a safety net in which we can be reassured to be making the transition without any abrupt changes for us?

In the case of geo-engineering, the technological-fix that is being proposed is simply not aimed at having a permanent effect, as that would be extremely costly and risky. The purpose of geo-engineering would then only be that of slowing down a process, which would otherwise "demand massive social and behavioral change" (Preston, 2013, p. 26). Our adaptation would be more gradual, as we would 'optimistically' not be rushed to reach a zero emission system. Therefore when geo-engineering is framed as a risk to be taken in the event of a complete failure, we assume that we would take that risk so as to postpone the shift from dirty to clean technology.

However, recurring to climate engineering as a last resort is not a risk weighted on nature's account. Serious consequences are in fact overlooked because of an inability to renounce consumption habits at the *expense* of nature, not for its benefit. The moral hazard that is taken with geo-engineering goes beyond any immunity or protection being granted to nature, as it

only seeks to ensure the continuity of the same standard of comfort for humans, without any compromise being made. Through geo-engineering, humans "manipulate nature in order to make it conform to our desires rather than forming our desires in response to nature" (Jamieson, 1996, p. 331). To provide an example, the injection of aerosol in the atmosphere alters natural features, as it causes the sky to whiten. Moreover, an early termination of the practice might have a negative effect on global warming, as sun radiations could be filtered back again all at once, thus creating a dependency mechanism (Niemeier et. al, 2010). These risks can therefore not be framed as an attempt to save nature from sun radiation, but rather a strategy to keep maintaining the same harmful level of emissions for a longer period of time, in the hope of a lower impact of climate change. As a result, risks encountered through climate engineering as a last resort cannot be deemed as accountable for nature's rights. This is rooted in the anthropocentric objective of technology, which seeks to fulfill human interests, disregarding, however, other life forms.

Geo-engineering as a projection of future harm

One of the most contested issues when advancing the proposal of nature's rights is the difficulty at identifying valid interests or desires in natural beings. While some authors argue that this is completely deductible: "the lawn tells me that it wants water by a certain dryness of the blades and soil-immediately obvious to the touch, the appearance of bald spots, yellowing, and a lack of springiness after being walked on" (Stone, 1972, p. 471), others fail to see the need to define these interests for the recognition of rights to nature (Wise, 2019).

In scientific terms, evolutionary biologists observe that species try out adaptation methods in the struggle to survive. In a recent study, bedbugs have manifested increased tolerance to pesticides thanks to their newly produced enzymes (Mamidala et. al, 2011). Other research has shown how salmon are changing behavioral patterns due to climate change. Not only have the animals reduced in size to easily escape intense fishing, but they also changed their migrating cycle, as a result of ocean warming (Mote et al., 2003). Thus, from these observations we could at least deduce that species wish to survive.

In order for them to endure in this world, diverse habitats should be protected so that different species would be allowed to exist. Many species will be unable to adapt as quickly as climate change advances. Their existence will be heavily reliant on human intervention, since "future vulnerability of ecosystems to climate change will be strongly influenced by the past, present and future development of human society" (IPCC, 2022, p. 14). Therefore

nature's ultimate interests and the rights that should be conferred to it are those of protection from further worsening of durability conditions and pollution.

In the academic community, there are two main terms that contribute to the idea of protection of nature: conservation and preservation. The former carries some anthropocentric connotation, as it refers to the sustainable maintenance of natural habitat, whose resources may be accessed by humans, but sustainably. The latter on the contrary refers to the complete safeguarding of a habitat, free from any human interference, such as national parks (Rowlands & Varner, 2000).

The preservation of natural habitats has however become almost impossible since natural systems can no longer be considered independent from human influence. Given that human artifacts can be found almost everywhere, it would appear that nature no longer exists. "We never thought that we had wrecked nature. Deep down, we never really thought we could: it was too big and too old; [...] We have produced the carbon dioxide—we are ending nature." (McKibben, 1989, p. 41)

In the previous section I have argued that technology is created with the purpose of accommodating human interests, within which category climate engineering falls into. Considering that rights of nature seek to protect nature from any unnecessary harm, an ecocentric climate change intervention would aim at removing the cause of harm from the root. Consequently, in order to be at least justifiable from an ecocentric perspective, geo-engineering should aim at preserving, i.e. protecting nature in the long term.

Climate engineering however, does not entirely fix the problem of climate change, but in most cases it only postpones it. CDR methods, such as the capture of CO_2 emissions to be stored underground replicates the same function of a tree, aiming thus at reducing the amount of emissions present in the atmosphere and stabilizing temperatures. In a similar logic SRM methods, such as aerosol injection seeks to reflect the sunlight before it reaches the atmosphere, so that further warming could not take place. This, however, does not take into consideration the emissions that will be released into the environment throughout time before transition to renewable energy is complete. Bearing in mind that the reason why climate engineering is still being considered is so that countries could continue emitting for longer, emissions would stay at the same level as before, since geo-engineering would merely try to maintain a balance before transitioning to clean technologies.

Geo-engineering fails to account for future harm since future emissions would remain in the atmosphere for a long time before being fully absorbed, therefore inflicting ulterior damage to nature. Thus, while the deployment of geoengineering methods is a good time-buying

instrument, it does not contribute to environmental preservation, as the continued emission will disrupt nature for years to come. Geo-engineering is then only masking the apparent problem by prolonging the due date for a change, without intentionally making an effort to protect nature from harm, thus remaining an anthropocentric solution.

Chapter III:

A shift in perspective

I have previously stated that climate engineering should be considered anthropocentric, as it 1. strips nature of its intrinsic value; 2. benefits human interests only and 3. cannot prevent future harm towards nature. While I am still convinced of these affirmations, further reflections might shed a positive light in regards to geo-engineering.

Human interference aimed at protection

Scientific enquiry shows that ecosystem adaptability to climate changes will significantly decline as global temperatures rise. "Additional warming, e.g., above 1.5°C during an overshoot period this century, will result in irreversible impacts on certain ecosystems with low resilience, such as polar, mountain, and coastal ecosystems, impacted by ice-sheet, glacier melt, or by accelerating and higher committed sea level rise" (IPCC, 2022, p. 21). The risks associated include "increased wildfires, mass mortality of trees, drying of peatlands, and thawing of permafrost, weakening natural land carbon sinks and increasing releases of greenhouse gasses (medium confidence)" (IPCC, 2022, p. 22).

Environmentalism is concerned with the protection of nature from dangerous human activity, which could permanently damage the integrity of its components. Holistic ecocentrism puts ecosystems as the primary subject of rights, stating that its protection is fundamental for the wellbeing of all nature: "a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise" (Leopold, 1949, pp. 224-225).

Some geo-engineering practices, however, seek to refine the ability of ecosystems to absorb CO_2, thereby altering its natural conditions. Examples of this would be an enhanced weathering of ocean's silicate minerals or enhanced photosynthesis of plants, which increase

the chances of survival for most habitats and species. While this could be interpreted as an attempt to improve nature's resistance and adaptability to climatic changes, it still hurts the integrity of the ecosystem by modifying its structure. As a result, this cannot be deemed compatible with a holistic understanding of nature, as it would not preserve its integrity.

On the other hand, enhancing ecosystems' ability to adapt grants the survival of those ecosystems by artificially strengthening its resilience. Even though the primary natural conditions would be altered, human intervention would be in this case aimed at protecting that environment from extinction. Therefore, geo-engineering can be deemed compatible with a biocentric account of nature's rights, which is concerned with the "welfare of living things, that is, how they may be benefited or harmed, that does not require a living organism to be consciously aware of its interests in order for these interests to be morally relevant" (Thompson, 2017, p. 80).

Human interference, in this sense, could therefore also have a positive impact by ensuring the protection of nature under extreme weather conditions. Thus, geo-engineering could provide physical protection in the account of nature, as long as climate change poses a threat to it. For instance, reflecting back harmful solar radiations would be beneficial to the biora, as temperatures would be prevented from rising. Stable climate would also impede the disappearance of vulnerable species, such as polar bears.

It should also be mentioned that not all practises of geo-engineering are indeed 'risky' for the environment. Some solutions involve the multiplication of natural agents such as trees (afforestation) or phytoplankton (artificial upwelling) that naturally absorb carbon dioxide and store it underground (Corner and Pidgeon, 2014). These practices are not as invasive of nature and aim at restoring balance on the planet. Climate engineering could therefore be considered a positive interference with nature, in which artificial alterations are used to increase nature' resistance to global warming, thus prolonging its durability on the planet. In this case, human interference would be justified, should weather conditions be no longer favorable to the survival of nature.

The lesser evil

The controversy of geo-engineering has mainly revolved around its unknown risks and the global scope of its consequences, should mistakes be made. Public opinion is diffident of climate engineering because in the event in which something were to go wrong, we might not

be able to reverse the consequences. In addition to that, being Earth a very complicated but self-sustaining system, multiple chain pieces need to be accounted for, if the process is to work as it should (Preston, 2013).

Climate engineering, as many other technologies before, creates fear because it detaches us from the 'usual' or 'known', which is upsetting, since it projects an uncertain future (Hall, 1897). Moreover, the consequences of modern technologies have so far built a negative perception on the relationship of technology and nature, which, as explained previously, are thought of as enemies. It is common then to believe that technology cannot be matched to nature and that the more distance is put to what is natural or 'known', the more complications one could encounter.

The fear that is produced by this uncertainty is therefore logical until proven wrong. For instance, when the train was first invented by Richard Trevithick in the early 1800s, people were afraid that traveling at such speed would be detrimental for the human body and would melt internal organs (Hall, 1897). As silly as this now sounds, geo-engineering could one day be another example of how the fear of the unknown is preventing humanity from progress. Consequently, the fear generated from geo-engineering could eventually become illogical, as more research is done on the matter. The real question would then turn to *when* would geo-engineering be safe, or if we have *enough time* to make it safe.

Nevertheless, proponents of climate engineering, while acknowledging the risks it may endorse, consider geo-engineering as the lesser evil: a method to be accepted should no more option be available. The employment of ge-engineering rests on a precise conditionality, which states that "[w]hile such geoscale intervention may be risky, the time may well come when they are accepted as less risky than doing nothing" (Launder and Thompson, 2010, p. 15).

This is also consistent with both a biocentric account of harm prevention and nature's rights call for corrective justice against the harm being caused to nature. "If the intention to lessen human suffering, to protect non-human species, and to preserve environmental values, then it is not clear that geoengineering adds to the blight. Some might even view climate engineering as an admirable attempt at ecological restoration, providing a possible argument from environmental ethics in its favour, despite the presumptive argument against it" (Preston, 2011, p. 470). Should geo-engineering be one day the only way to ensure the survival of nature, why not make use of it? The fact that geo-engineering looks into a preservation of nature suggests that this practice does acknowledge its intrinsic value, instead of only reducing it to human interest.

Adolff and Hilbrich (2021) describe this as a 'good Anthropocene' (p. 117), whereby humans hold control of nature only insofar its preservation is at risk. While recognizing the intrinsic value of nature, human intervention is then left as a last resort option, in the event in which nature's survival would be threatened, thus also accounting for the harm caused to nature.

The evolution of nature as a form of culture

I have previously argued that nature and technology appear to be enemies, the former being what we are born with, while the latter being what men created. The more we distance ourselves from nature, the more we grow independent from it, and in doing so we transfer that independence to technology, to which we are now reliant on.

When conceptualizing nature, we immediately attribute a sense of loss, especially when a wild conception of nature comes to mind. With the beginning of the Anthropocene, the human race left its footprint on all corners of Earth, so much that the world of the pre-industrial times can no longer be imagined and will probably never exist again in the same way. In reality, however, the derived feeling of calmness and serenity that is now attributed to nature began after the Industrial Revolution took place. Before this historical turning point, humans were struggling for their survival against a rather brutal nature, filled with inclement events, pests and famines. Thus the idea of nature as a benevolent entity is rather a cultural evolution, instead of a 'natural' change.

As Van Mensfoord (2012) illustrates in his book *Next Nature,* nature is not as static as we imagine it to be, but it is a dynamic force that continues to change and shape itself as we do, a force with which we will have to deal with forever. In this sense, nature can be seen as a social construction, instead of a product of human error. For instance, as the philosopher mentions, the disaster of Cernobyl indirectly created what is now the biggest involuntary natural reserve (p.16).

He disagrees with the green notion of 'nature bats last', as he believes that technology 'bats as well' (p. 16). According to him, technology is slowly winning over nature and becoming assimilated as the new nature.

> "Nature, or whatever we mean by it, is getting more and more governed by man. Nature, in the sense of trees, plants, animals, atoms, or climate, has turned into some sort of cultural category. At the same time, products of culture, which we used to be in control of, tend to outgrow us more and more. [...]Our next nature will consist of what used to be cultural, even

though this does not alter the fact that this is still a "real" kind of nature" (Van Mensfoord, 2012, p. 32).

Ecocentric claims suffer from bias "in favor of what is important from the human perspective, and that the interests of sentient beings or a conscious awareness of one's own welfare may not exhaust the field of morally relevant interests" (Thompson, 2017, p. 80). They are based on a human experience of the world, thus assuming what an intrinsic value of nature would entail from a human perspective; yet intrinsic value is associated with a detachment of nature from human existence.

The adaptability of Earth, its habitats and ecosystems are composed of interruptible changes and constant evolutions. As the Gaia hypothesis states: the Earth is a self-regulating system of constant interactions, though it never actually mentions these interactions to be static. It would be limitative to consider it otherwise, as nature evolves in the same way humans do. Following this logic, geo-engineering may be a futuristic idea of what nature will look like. Nature has for long evolved and adapted throughout time, leading to believe that "perhaps a geoengineered Earth is little more than a grander version of the European experience that simply needs to be accepted as the new normal" (Preston, 2011, p. 462).

The physical properties of the planet are complexly interwoven with its social, economic and political properties (Orlikowski & Scott, 2008). Thus, just as societies and ecosystems evolve, new methods of thinking and behaving toward the environment are required. As Allen et al. suggest: "this is key to considering human embeddedness in sustainability so that we can explore possibilities for changes in theory and practice, as well as the potential for a shift in paradigmatic thinking in sustainability" (2017, p. 785)

The goal of geo-engineering is that of maintaining the planet Earth at livable conditions by fighting the harmful changes that were created. The introduction of technology therefore only means that humans could assist nature, thereby also amending for their mistakes. Geo-engineering could then be interpreted as evolving nature itself, bringing Earth to a next phase. It can be conceived as a process through which we are able to protect nature by modifying its features, which is still consistent with a biocentric account of nature. The cultural representation of nature would result in the value of nature evolving together with its form and meaning, thus rendering climate engineering a transition to new nature

Conclusion

This thesis has shown that while geo-engineering so far remains an anthropocentric solution to climate change, some considerations can be advanced, in order to make it more compatible with nature's rights. The incompatibility of geo-engineering with nature's rights stems from the fact that engineering nature instrumentalizes its value, as it automatically assigns a specific purpose to nature, a reason for its existence. It is in fact the perpetual emission of harmful substances in the atmosphere by men to be found at the root of the problem, which is aggravated by a slow transition to green technology. Furthermore, these measures do not seem to be focused on a permanent resolution of the problem, nor set to relieve nature from harm. Geo-engineering puts nature in a co-dependent position to men, for if men were able to govern climate, then nature would no longer exist outside of human intervention. It also aims at extending the time frame in which men are still able to pollute, thus resulting in future accumulation of harmful substances in the atmosphere. Given that climate change is to be solved by a direct and immediate intervention in our impact over natural resources, geo-engineering is a mere strategy so as to keep these operating systems in place, with little regard for nature's rights.

That being said, some aspects of geo-engineering can be considered compatible with nature's rights by changing the justification behind its implementation. For instance, geo-engineering could be used in order to fortify and protect nature by enhancing nature's ability to absorb and counteract harmful substances. Even though the integrity of the ecosystem would still be hurt, the ultimate purpose is to ensure nature's survival against harsh climatic changes. Protecting living species is already compatible with a biocentric account of nature's rights, as living beings are seen as carriers of moral values. As a matter of fact, it will become increasingly hard for species to adapt quickly and endure in an inclement climate. Should geo-engineering one day become the only chance these species have at surviving, then its employment could be justified under a biocentric account of nature. Lastly, what would make geo-engineering compatible with nature is a shift in perspective. Nature's value has so far been conceptualized from a human perspective, thus limited to a human experience. Because of the inevitable link between the physical properties of the world and the material one created by men, the value of nature can be said to be socially constructed, since nature is a dynamic force, which cannot be limited to a human understanding. This would suggest that climate engineering would serve as a transition to a new nature.

This conceptualization helps integrate ecocentric values within our society. Building respect and appreciation towards nature allows for more carefulness in assessing solutions and a considerate development of technology, more projected into the future. Nature's rights should be interpreted as a request to change the so far adopted mindset, where mankind is not alone against nature, but rather works with it, acknowledging the complicated bond that connects the two. Nature would then co-exist with humans, worthy of respect and valued as an essential component to the planet. Relevant methods of sustainable interactions of nature can be found in indigenous communities, which have devoted their generation lifetimes in order to find the perfect balance between nature and humanity. Constructing nature as an ally strengthens the chances of successful development, as the survival of humans is ensured as long as nature exists. Nature evolves with us, changes features to adapt and progress as we do, which highlights its strongest feature: its resilience.

Limitations and research recommendations

This thesis contains significant limitations as to a time and word limit constraint. More research could have been done on the intrinsic value of nature and a rights' of nature approach, which is only marginally presented here. Moreover, the analysis on geo-engineering is limited by ecocentric assumptions, thereby not presenting the globality of the debate around it. The thesis has also not included a proper consideration of the scientific reports of the risks associated with different geo-engineering practices, but has merely dealt with the ethical considerations in regards to geo-engineering. Further research could be devoted to a deeper understanding of what the rights of nature should entail and what this implicates in regards to geo-engineering, particularly in relation to the indigenous communities practices, which hold many insights.

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