

FPIC and Geoengineering in the Future of Scandinavia

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Introduction: why geoengineer the Arctic?

Despite the 2020 dip in carbon dioxide (CO₂), its emissions are rising as fossil fuels continue to drive the post-COVID-19 economic recovery (Friedlingstein, 2021). This situation is being further compounded by warnings that the current climate change strategies are not being implemented at the speed required to save critical ecosystems like the Arctic (Rogeli et al, 2016). If this continues, the result could be a rise of planetary temperatures in excess of 3°C (International Institute for Sustainable Development, 2021), exceeding the 1.5°C aspirational goal of the Paris Agreement (The Paris Agreement, 2015). The Arctic forms a vital part of the cryosphere – which through surface albedo (reflectivity) is one of the ways the planet maintains its radiative balance and, thus, its temperature (Beer et al, 2020). Disruption or changes in this balance would have significant consequences on a global scale (Moon, 2021). As a result of anthropogenic global warming (AGW), the consequences of the melting Arctic icecap have become more visible (Vinnikov et al, 1999), and there are accelerated changes in the decline of the sea ice, glaciers and thawing of the permafrost (Beer et al, 2020) in a volume rate of around 3 per cent per year (Joannessen, 1999; Kashiwase et al, 2017). This decline compromises the radiative balance of the planet, resulting in increased warming and an ever-increasing risk of passing a global tipping point. Efforts at reducing both long- and short-term emissions, like black carbon and methane, are not occurring at the speed required to prevent irreversible changes (Yameinva and Kulovesi, 2018). Thus, there is a sense of urgency. The situation requires more unconventional methods like a technological intervention – geoengineering.

Research into geoengineering began to increase in the early 2000s, but it is a subject that is still relatively unknown outside academic and scientific circles – knowledge of what geoengineering precisely entails is relatively low amongst the general population – but with new developments, geoengineering is a theme that is recurrent through climate change but with some states handling novel technologies differently. The earliest adopted definition for geoengineering comes from the Royal Geographical Society. It is a ‘large-scale manipulation of a specific process central to controlling the planet’s climate for the purpose of obtaining a specific benefit’ (Royal Geographical Society, 2001). On the one hand, it has been suggested that a technological intervention like solar radiation management (SRM) through stratospheric aerosol injection (SAI) would alleviate the ‘symptoms’ of climate change. In turn, this would offer protection for vulnerable ecosystems like the Arctic, at least until global decarbonization can be achieved (Oxford Geoengineering Programme, 2020). But, on the other hand, there is still uncertainty over the negative effects of geoengineering and how to appropriately govern such a complex undertaking – the debate is nothing short of polarized between those in favour and those that are not. There is an increasing awareness that geoengineering the sea ice and the climate through technological intervention carries with it high risks, as the consequences will be far reaching. As Vidar Helgesen has noted: ‘What happens in the Arctic, doesn’t stay in the Arctic’ (NATO Parliamentary Assembly, 2017).

The chapter examines elements of this polarizing debate within the context of intergenerational justice in Scandinavia. For vulnerable Indigenous populations, even though mechanisms for engagement, such as the free, prior and informed consent (FPIC) procedure exist, the implementation of geoengineering governance has to the potential to perpetuate existing colonial governance mechanisms. This effectively places Indigenous peoples in a less than adequate position. The focus lays primarily in considering questions such as: how are the costs of geoengineering to be distributed in the event of its deployment and what of the benefits? If there is deployment, how can liability be assigned in the event of an error? What are the transboundary implications if an error occurs? And, crucially, who gets to participate in the decision-making process for geoengineering projects?

Geoengineering in the Arctic and Indigenous peoples

Broadly, there are two categories of geoengineering that have emerged. The first category, greenhouse gas removal (GGR), focuses on the removal and capture of gases with high global warming potential. This can be accomplished through industrial means such as carbon capture and storage (CCS) or carbon dioxide removal (CDR), or through natural means, such as reforestation or peatland management (Global CCS Institute, 2021).

However, CCS and CDR operations are still relatively small scale – for any significant impact on the climate these would need to be scaled up (IPCC, 2021). The second category, solar radiation management (SRM) has gained a more controversial status as, although it is fraught with uncertainty, SAI has become a more serious consideration within SRM (National Academies of Sciences, Engineering and Medicine, 2021). SRM focuses on increasing the albedo of the planet, even though research into these areas has not advanced much further than laboratory modelling and simulation (NASA Earth Observatory, 2001). But on the other hand, there is still uncertainty over the negative effects of geoengineering and how to appropriately govern such a complex undertaking (Carbon Brief, 2018). There has been some testing in the Arctic where ice-geoengineering and SRM are concerned: the Arctic Ice Project (formerly Ice911) has carried out some preliminary testing in north-western Alaska, attempting to increase the surface albedo and thickness of the ice, though it has been met with an unfavourable reception.

In Fenno-Scandinavia, there has been limited engagement with geoengineering. In northern Sweden, researchers are trying potentially less invasive methods – by using a wool and corn starch blend sheet to reduce glacial melt. This has been implemented in the Kebnekaise Glacier and there have been positive results from the test (DeGeorge, 2021). But it was in February 2021 that researchers from the Keutsche Group at Harvard attempted an SAI field test with the Stratospheric Controlled Perturbation Experiment (SCoPEX) in Kiruna, Sweden (Keutsche Group at Harvard University, 2010). The Keutsche Group and its attempt to conduct an SAI experiment in Kiruna thrust the issue of geoengineering into mainstream discussion again, more specifically, in considering how SAI would physically affect the Arctic environment over the long term. This experiment was met with strong opposition from non-governmental organizations (NGOs) and the Sámi Council over the lack of consultative dialogue and the long-term physical consequences ('Open letter requesting cancellation of plans for geoengineering related test flights in Kiruna', 2021). SCoPEX received heavy criticism from the Sámi Council, which stated that such a test would lead to 'mitigation distractions' that could lead to a cascade of disastrous environmental consequences and that it should be shut down ('Support the Indigenous voices call for Harvard to shut down the SCoPEX project', 2021). Here the Sámi Council alluded to the complex atmospheric dynamics and geopolitics involved in making such an intervention, which highlights some of the deeper concerns: if geoengineering is going to be a benefit, what are the benefits and who will it benefit? The Sámi Council raised questions as to whether it was morally acceptable to conduct such a test with unclear intentions regarding the eventual deployment – especially given there was a lack of dialogue beforehand and no definitive consultation procedures, which, the Intergovernmental Panel on Climate Change (IPCC) has

recommended (IPCC, 2021). This polarizing debate over the viability of governing something of this nature, like climate change mitigation, requires us to ask questions concerning the more vulnerable populations.

As engagement with these new technologies increases, there has been opposition from Indigenous peoples of the Arctic (Whyte, 2018). The Anchorage Declaration called for these ‘false solutions’ to be abandoned as they may be detrimental to existing participatory rights, and it further criticized the lack of affirmative action to decarbonize economies (The Anchorage Declaration, 2009; Carbon Brief, 2018; Schneider, 2022). Further, geoengineering could potentially preserve the status quo and existing power structures that have historically contributed to the subjugation of Indigenous peoples in the Arctic.

This is another part of the still polarized debate over the viability of deployment, and whether it is morally justifiable to make such an intervention given the level of uncertainty involved (McLaren and Corry, 2021), although it appears, to a degree, as though its acceptability is dependent on the level of control rather than the notion of any perceived benefits (Bellamy et al, 2017). Proponents of researching SRM have suggested that resolving these questions is not an insurmountable task, which does seem to be a valid assertion when we consider the range of mechanisms available in law (Reynolds, 2021). Further, it is thought that a more targeted application could help in maintaining the Arctic and its contribution to planetary albedo while limiting the global risks (Bodansky and Hunt (2020). There are no easy answers to these questions, as they are largely dependent on the method of geoengineering utilized, but as the Arctic becomes a focus for more concentrated efforts, we must be mindful of its impact on justice and how we can address it.

The significance of Sámi self-determination, consent and participation

So why does geoengineering pose a problem? Turning to the broader context within international law, the ability to ‘consent’ to any manner of relations or developments in international law is contingent on the recognition of a ‘sovereign space’, which is a prerequisite for the exercise of self-determination. Historically, in the crafting of sovereignty and statehood, Indigenous peoples were not granted such recognition. They were marginalized and subject to colonial rule – effectively classed as outsiders of the system (Shrinkhal, 2021). This system (and the lack of recognition of the place of Indigenous peoples) produced an inequitable distribution of social and economic benefits, which then produced injustice and claims for injustice that were seldom respected (Fraser, 2013). However, the post-Cold War Arctic saw a new world take shape. This new world would take

steps to promote greater Indigenous inclusion and recognition within the region (Fitzmaurice, 2017). Generally, within the Arctic states, Indigenous peoples enjoy benefits such as: welfare, insurance, employment, recognized property rights (although not directly related to their status as Indigenous peoples) and some cultural protections. Yet within the context of the ‘green transition’ that is, the shift away from reliance on fossil fuels, the legacy of these colonial power structures is still evident.

Both the International Covenant on Civil and Political Rights (ICCPR) and the International Covenant on Economic, Social and Cultural Rights (ICESCR) have been key in the evolution of Indigenous self-determination within international law (Art. 1(1)): ‘All peoples have the right to self-determination by virtue of the right that they freely determine their political status and freely pursue their economic, social, and cultural development.’

This did raise questions on how to adequately balance priorities. Moreover, in relation to the covenants, the United Nations Human Rights Council (UNHRC) has said that states would not be prejudiced by offering more protections under existing and future legal frameworks where Indigenous peoples were concerned – offering recognition of their place (UNHRC, 2014). In this respect, the International Labour Organization Convention No. 169 (ILO, 1989) has been a key part of this recognition as it does provide guidance on the definition of Indigenous and tribal peoples, within Art. 1(1)(b):

Peoples in independent countries who are regarded as indigenous on account of their descent from population which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonisation or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all of their own social economic, cultural, and political institutions.

With the added issues that have arisen through delayed decarbonization – development of geoengineering as a response represents another potential avenue of colonial activity, so consent is a core part of the discussion when attempting to reconcile any potential implications. For the Indigenous peoples in the Arctic, the relationship to the environment carries cultural significance. The Sámi have knowledge of snow and ice formations and it is an integral part of their culture (Riseth et al, 2011), for example in traditional activities such as reindeer husbandry that have a unique tie to their cultural heritage and identity. Further, concepts such as common property management, the relational world view and intergenerational equity all have a significant place in Indigenous culture (Fitzmaurice, 2017), and Sámi relationships are defined by these characteristics. The United Nations Declaration on the Rights of Indigenous Peoples, UNDRIP (UN, 2007)

further adds to the framework for the realization of Indigenous rights in this context. Nevertheless, the acknowledgement of these characteristics is a feature in the mandate of the Arctic Council. The Council sought to reflect these characteristics and honour these commitments when it was established in the 1996 Ottawa Declaration, noting its duty to ‘Promote cooperation and interaction with the involvement of the Arctic indigenous communities’.

It is implicit then within this obligation that adequate consultation should take place with the Sámi should any development occur on what is traditionally the territory of Sápmi. Thus, based upon the existing framework, their cultural links to the environment and their ancestral land, they are entitled to being consulted before there is any preliminary testing.

Geoengineering, justice and consent

The nature of harms caused by climate change is that they are unequally distributed across the globe, from both a spatial and temporal perspective. Examining these issues through the lens of justice is still pertinent to our consideration. Whether it is through SRM or through a more direct modification of the ice, before even engaging with geoengineering, governance will need to adequately address this inability to effectively meet the requirements of justice. We can effectively relate this to the preservation of economic and political self-determination of Indigenous peoples. The FPIC in this context could be instrumental in addressing how the costs and benefits are spread when we manage the shortcomings of geoengineering.

Intergenerational justice and geoengineering the ice

SAI as a method of geoengineering is fraught with uncertainty, but a more targeted application of geoengineering may be less ‘aggressive’. When it comes to geoengineering the sea ice, for example, in a manner akin to what the Arctic Ice Project is intending, there is a clearer legal framework. The basic principles of international environmental law and international human rights law form the basis of the obligations that are placed upon states. In the event of any intervention, states have the duty to ensure that both marine and human life are not adversely affected by any such activity that has the potential to cause long-term harm (UN, 1982). Further, each state has the obligation to implement appropriate environmental protection measures, including the inherent duty to consult with peoples that may be affected. From the perspective of participatory rights, human rights norms ensure Indigenous peoples have access to the necessary information so that they are aware of the risks and can informatively provide (or withhold) consent (Aarhus Convention, 2017), and this may adequately meet the requirements of intergenerational (and distributive) justice.

If we consider geoengineering in the context of the ‘green transition’, where a transactional paradigm has been adopted, we can draw a parallel – the idea of a cost versus a benefit. This raises concerns about the substance behind the FPIC and how we can address issues related to climate justice. With the Storheia windfarm (see [Chapter 8](#) of this volume) Norway prioritized a move to a more renewable energy generation under the auspices of ‘the green transition’. Storheia was built on what is the region of Sápmi against a background of protest which eventually led to a Norwegian high court ruling ([Sámi Council, 2021](#); [Supreme Court of Norway, 2021](#)). The long-term benefits here are energy generation for the state and a lower level of emissions overall (more favourable for climate policies and reduction targets). But what of the cost? There is an encroachment on Indigenous land traditionally used for cultural activities like reindeer husbandry, and as a result compensation has been suggested – which is reflective of this transactional paradigm when it comes to addressing the green transition. However, while this *may* prove to be an adequate redress in the eyes of the State, it is likely to be insufficient for Indigenous groups like the Sámi because it undermines the significance of cultural activity to their overall identity. This does little to reaffirm the substance behind the FPIC in redressing the balance of intergenerational/distributive justice. Therefore, before any geoengineering projects are undertaken there must be a more robust framework that does not undermine existing protections.

Intergenerational justice and using SAI

While the more transient issues pertaining to ice-geoengineering may be easier to navigate, SAI is comparatively more complex. The justification for intervention is that achieving a more immediate result could redress climate harms using technological intervention while still thinking of the distribution of costs and benefits. There is the question of benefits and how they align with the costs. There is a huge degree of uncertainty, with evidence to suggest that intervening in one could affect another ([Science Daily, 2022](#)). The costs of climate change have already potentially compromised this future, and the use of SAI could exacerbate the situation and become equally unjust by compromising environmental quality for the future and perpetuating residual colonial power structures ([Bodansky, 2020](#)). The very notion of intergenerational equity dictates that conditions in the present do not compromise the quality of the environment for the future and the generations unborn ([Brown Weiss, 2008](#)). Even though the use of SAI does have the potential to be of benefit, questions of acceptability are prominent: where and to what extent are such interventions acceptable? What are the long- and short-term costs, and how would ‘benefit’ be precisely defined? If a more robust FPIC is key, the understanding of what

the ‘benefit’ is would be crucial in any consultative dialogue. Consider the Keutsche Group and its attempted SAI experiment in Kiruna. There was a distinct lack of dialogue beforehand (Cooper, 2021).

The aim of using SAI is to bring the distribution of cost and benefits closer together, although this is not straightforward. SAI is relatively inexpensive and has the potential to effect a more rapid response with regard to atmospheric temperatures. But before it can begin to be accepted, a solution for the discrepancy between the cost and benefits needs to be distributed equally between the present and the future. This is something that is unlikely to be achieved in the current geopolitical landscape. The issues become evident when geoengineering is explored at scale. Here, there is discussion that it should be explored as a policy option. Within the geoengineering literature there are attempts to make a clear distinction between the research phase and the potential deployment (if it ever occurs) that begin to answer these questions, indicating that while research may be acceptable, deployment may not be – the lines are unclear. This is precisely why the introduction (and potential implementation) of SRM adds a further dimension to an already complicated relationship. Certain aspects of the Sámi culture are still at risk through ‘green colonialism’ and a ‘just transition’, and where consultation and FPIC are concerned, it appears that the existing legal framework is ill-equipped to deal with geoengineering, specifically SAI at this scale, especially if we are to address any potential negative consequences.

The free, prior and informed consent procedure within the context of geoengineering

Examining these questions within the context of the FPIC may nonetheless give us some direction. Considering this from the intergenerational perspective, intergenerational justice is often thought of as a form of distributional justice: the costs, harms and benefits are being dealt with over a length of time. Consider this within the context of Sen’s capability approach (Jacobson and Chang, 2019), one basic requirement for an individual (or group) is that there are sufficient means for them to meet their basic requirements. To meet the requirements of intergenerational justice, geoengineering needs to have robust oversight mechanisms. If anything, it may be a catalyst for reform in numerous areas in the Arctic. Researchers should strive to develop deeper frameworks of engagement with Indigenous peoples. Although the mandate of the Arctic Council does not extend to these novel technologies, they could be included in the science-to-policy developments that are a focus of the Arctic Council. If there were a formal acknowledgement of geoengineering within the Arctic Council, it could be enough to fulfil the requirements of the FPIC (as there

is a permanent voice in the form of the Indigenous permanent participants). However, there would still be concerns over how elements of justice in these circumstances would be addressed. In short, it would only solve part of the puzzle needed to resolve the intergenerational concerns. But developing its mandate to include these technologies (alongside existing legislative instruments) may facilitate the development of more robust requirements where consultation and dialogue are concerned (Smieszek, 2019). There may not be any definitive answers at this time; in fact there are many suggestions, but little by way of actualization (Corry, 2017). There will certainly need to be a robust public engagement procedure to ensure previous mistakes are not repeated.

The effects of climate change have already exposed inequities and Sweden, Finland, Norway and Russia have made commitments concerning their obligations under UNDRIP (Semb, 2012) – though there is still a reluctance to fully implement their obligations under the ILO Convention No. 169, making participation in some ways symbolic rather than substantive (Semb, 2012). Though there have been great strides in inclusion and recognition, the changes occurring due to climate change have been a catalyst for the implementation of policies and transitions that show that the colonial hierarchies still define the relationships between the state and Indigenous peoples. The FPIC has been key in mitigating some of the influence that state sovereignty possesses over Indigenous peoples – consider how the rights in Article 27 of the Covenant (ICCPR) protect the link between territory and the realization of Indigenous self-determination. The social and environmental dimensions of geoengineering will have far reaching effects beyond the atmosphere (Parker et al, 2020), so addressing the inadequacy of the current consultation steps is required. Yet, the exercise of Sámi autonomy through the rights laid out in the legal framework is often contingent on the priorities of each respective state: land-use and sustainable development initiatives under the auspices of the ‘green transition’ have already placed a strain on the ability of the Sámi to maintain traditional cultural activities (Sámi Council, 2021).

These links are precisely why the principle of FPIC has been vital in the exercise of self-determination. ILO, UNDRIP and the Convention on Biological Diversity (specifically through the Nagoya Protocol) have been key in establishing a formal right to consultation and cooperation. Further, where consultation is concerned, the Aarhus Convention has been vital in adding further robustness to procedure through the access to information, participation in decision making, and, crucially, the right to access justice in matters concerning the environment. But where to begin in devising a process that would adequately provide consultation? Governance implications within the context of geoengineering are uncertain and threaten to subordinate Indigenous peoples in the decision making process.

Conclusion: Can a more robust FPIC provide a solution?

The protection of these rights is directed towards ensuring the survival and continued development of the cultural, religious and social identity of the minorities concerned, thus enriching the fabric of society as a whole.

Human Rights Committee, 1994

In short, it is unlikely. This chapter has focused upon raising awareness of these complex issues. Human civilization is unique in that in most cases our presence in an environment is immediately apparent, and we can make large-scale alterations to the environment to suit our needs. Climate change and global warming is a consequence of an excessive ability to change the natural world. Overall, it is a scenario that has been created by the behaviour of a group of nations that since the industrial revolution has continued to benefit a distinct group of individuals. Now is a time where the relationship between nature and the human race is being redefined. But how this relationship evolves is often dictated by our social values and technological development. It has been shown that technology interacts with our value and belief systems; it alters behaviours – both conscious and subconscious. In this context, regardless of the whether geoengineering is an inevitability, it is not an exceptional concept that geoengineering could provide a novel technological solution to a problem.

There is a great degree of apprehension around geoengineering and how it could potentially preserve this status quo (practically and legally) – effectively leading to the perpetuation of the colonial hierarchies which have essentially laid the foundations for the situation we see with geoengineering (and its inability to cope with the requirements of justice). While we could potentially stave off the more serious consequences of climate change, we are still allowing the highest emitters of greenhouse gases to continue (Zhen et al, 2021). The green transition on the whole has been somewhat of a detriment to the participatory rights of the Sámi. Even though there is some recognition (in terms of guaranteeing economic and cultural self-determination) it is still quite limited. The Scandinavian states have not fully implemented their international obligations when it comes to the protection of Indigenous groups. In terms of success stories there is little that could be provided when it comes to engagement and benefit sharing. Communicative planning scholars often claim that forms of participatory planning centred on public deliberation can facilitate more equitable decision making by overcoming power differentials between citizens and stakeholders. The FPIC as a procedure is ineffective and its implementation rests upon the cooperation of the states involved, which is contingent upon the balance within the states. Consequently, the emphasis here is on the construction of a robust system to

tackle these challenges. Intergenerational justice depends upon laws designed to hold states and corporations accountable for pollution and rights violations and their enforcement by courts willing to acknowledge public alarm about global heating. For the Arctic, when it comes to geoengineering, it must tread carefully when engaging with these tools.

Study questions

1. Given that the emergence of geoengineering could detrimentally affect vulnerable, Indigenous groups, how can FPIC within the context of geoengineering help further develop restorative justice within the portfolio broader climate change solutions?
2. What can be done to redress the issues caused by the cost/benefit paradigm within the context of geoengineering?
3. How could an intergovernmental forum akin to the Arctic Council regulate consultation and dialogue on the research and development of geoengineering in the Arctic?
4. Why, and how, could this be an opportunity for Arctic Council reform?

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