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To cite this article: Kyle Powys Whyte (2018) Indigeneity in Geoengineering Discourses: Some Considerations, *Ethics, Policy & Environment*, 21:3, 289-307, DOI: [10.1080/21550085.2018.1562529](https://doi.org/10.1080/21550085.2018.1562529)

To link to this article: <https://doi.org/10.1080/21550085.2018.1562529>



Published online: 29 Jan 2019.



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Indigeneity in Geoengineering Discourses: Some Considerations

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Introduction

Indigenous peoples are referenced at various times in communication, debates, and academic and policy discussions on geoengineering (i.e. geoengineering discourses). The discourses I have in mind focus on ethical and justice issues pertaining to some geoengineering research and (potential) implementation. The issues include concerns about potential inequalities in the distribution of environmental risks, research ethics, and abuses of social power. These issues are critical for many reasons, including the fact that some people advocate that certain kinds of geoengineering projects should figure as part of the portfolio of solutions pursued by people who stand to be most harmed by climate change impacts. I have been following some of the references to Indigenous peoples in geoengineering discourse in light of the work that I do. I have been invested for many years in the goal of advancing Indigenous peoples' self-determination in climate justice, both in mitigating and adapting to climate change.

Working primarily in North America, I have worked with dozens of Tribes, scientific organizations, and policy groups on climate change adaptation and resettlement planning. They include the Sustainable Development Institute at the College of Menominee Nation, the U.S. Global Change Research Program, and the U.S. Department of Interior's Advisory Committee on Climate Change and Natural Resources Science. In all of this work, I have rarely, if ever, heard Indigenous persons seek to organize any efforts to discuss geoengineering on their own terms. Yet Indigenous peoples have involved themselves in limited ways. Several Indigenous activists and organizations have denounced the very idea of geoengineering, including the Indigenous Environmental Network. The Haida Salmon Restoration Corporation recently participated in an ocean fertilization experiment at Haida Gwaii, which is considered to be a case of or analogous to some of the types of geoengineering projects being discussed today. There are also Indigenous peoples globally who have participated in or criticized the United Nation's (UN) Reducing Emissions through Deforestation and Forest Degradation (REDD) program. While I have not heard afforestation programs like REDD referred to as geoengineering, they are certainly similar or analogous. Indigenous peoples participated in a UN report, through the Convention on Biodiversity (CBD), that features Indigenous perspectives on geoengineering.

Based on my experience, I want to offer some considerations on the nature of geoengineering discourse as it pertains to Indigenous peoples. Indeed, Indigenous peoples and Indigenous issues are certainly considered as relevant topics in geoengineering discourse. Indigenous peoples have a long track record of taking leadership in addressing environmental issues, including climate change (Whyte, 2017, 2018). Indigenous peoples, now for many decades, have been leading advocates for the goal that they develop their own research, planning processes, public engagement and deliberative proceedings on issues that matter to them (Smith, 1999; Story & Lickers, 1997). However, I seek to raise some considerations in this essay that suggest that geoengineering discourse, as it stands now, does not articulate ethics and justice issues in ways that are salient to Indigenous peoples as they grapple with today's climate change ordeal. While some Indigenous persons may disagree with me, my tentative conclusion here is that most geoengineering discourses are not even setup in the first place to make it possible for Indigenous peoples to express and have an audience for many of their concerns about risk, research, and power.

Given how little Indigenous peoples come up, I hope in this essay to mainly contribute some basic considerations for why it is conceivable that geoengineering discourse is not entirely salient for at least some Indigenous peoples. I will cover these considerations in three different sections. While the sections overlap, they are also somewhat separate from one another. I will tie them together in the conclusion section. In the first section, 'Referencing Indigeneity in Geoengineering Discourse,' I discuss some examples from the discourse that resonate with me because they have to do with where Indigenous peoples (Indigeneity) have been explicitly or implicitly connected to topics of geoengineering research or (potential) implementation. I find that Indigeneity tends to be brought up when scholars and scientists are trying to learn about whether Indigenous perspectives offer insights or reasons that can weigh in on what is known or debated about the ethical acceptability and justice of geoengineering – especially the governance of geoengineering (research or implementation).

In the second section, 'Geoengineering and Colonialism,' I discuss the ways in which Indigenous voices frame climate change and how that relates to how some Indigenous peoples might relate to geoengineering if they created their own discourse on it. Indigenous histories and perspectives on climate change suggest the possibility that at least some Indigenous peoples would not see geoengineering as a discrete topic or solution to consider in relation to climate justice. Rather, geoengineering can only be understood through the idea that colonialism – its history and linear continuance today directly from that history – is a major factor of Indigenous vulnerability to climate change. In the third section, 'Indigenous Consent,' I focus on how it is hard to discuss Indigenous consent in relation to geoengineering precisely because Indigenous peoples never consented to any of global or local structures of colonial power that have generated the topic of geoengineering in the first place. I will conclude by making the point that for geoengineering discourse to be more salient to some Indigenous peoples, scholars and scientists will have to take up what Indigenous peoples have already conveyed about climate change and colonialism and the solutions for climate justice.

Referencing Indigeneity in Geoengineering Discourse

Discourse on ethics and justice issues is critical for geoengineering for key reasons. Scholars including Christopher Preston, Holly Jean Buck, Wiley Carr, Andrea Gammon, Martin Bunzl, Toby Svoboda, Nancy Tuana, Klaus Keller, and Marlos Goes, among others, demonstrate some of these issues on environmental risk. They show that the potential harmful environmental impacts of geoengineering projects will likely, across a number of cases, be suffered by people who already live under conditions of economic exploitation, racial and gender discrimination, and political powerlessness (Buck, 2012, 2018; Buck, Gammon, & Preston, 2014; Bunzl, 2009; Carr & Preston, 2017; Preston, 2013; Svoboda, Keller, Goes, & Tuana, 2011; Tuana, 2013). Nancy Tuana et al. raise a number of ethical concerns pertaining to research practices themselves (Tuana et al., 2012). Scholars such as Holly Jean Buck, Petra Tschakert, Stephen Gardiner, Ben Hale and Lisa Dilling, among others just referenced, have discussed moral challenges of social power. They have raised worries about careless argumentation about disaster avoidance, proposals for democratic engagement, and the possibility of genuine global consent (Buck, 2012, 2018; Carr et al., 2013; Gardiner, 2010; Hale & Dilling, 2011; Tschakert, 2010).

I first became aware of how Indigeneity was being discussed in geoengineering discourse when I went to a workshop at the University of Montana on the ethics of solar radiation management in Fall 2010. The workshop, sponsored by the National Science Foundation and producing two collections of publications, convened ethicists, social and physical scientists, and engineers (Preston, 2012; Scott, 2012). A main point for discussion at the workshop was whether it was ethically acceptable and just for governments and other parties to support early research on one specific type of approach to geoengineering: solar radiation management (SRM). If ethical and just in conception, many participants were also interested in what approaches to research ethics would be best given empirical testing could actually or perceivably alter local environments. While focused on SRM, the implications of the workshop's discourse on geoengineering relate to other approaches, such as ocean fertilization and carbon capture.

I remember, without recalling any specifics, several conversations about how research in SRM could pose disproportionate risks on Indigenous peoples living in the global south. There were also conversations, including after my own presentation, about whether Indigenous peoples would endorse SRM research given its connection to the possibility of the implementation of SRM in the future. In 2010, my main concern at the workshop was whether Indigenous leaders in North America were being adequately informed about the developments in different geoengineering technologies and the emerging research projects. I heard similar concerns from other parts of the world. Petra Tschakert claimed how 'So far, geo-engineering has been an almost exclusive debate in rich countries of the North' (Tschakert, 2010). In light of my main concern at the time, I learned a lot at the workshop about what geoengineering plans were unfolding, what is known about their range of potential impacts on the earth system, and what some of the benefits and burdens would be for many different populations. But what I also gathered was that there was, at least among some of the participants, something further at stake regarding Indigenous peoples beyond their vulnerability to either climate change or the rollout of SRM research. Of course, this is just my opinion having interpreted my interactions at the

workshop. It seemed to me that references to Indigeneity seemed largely to turn on whether Indigenous peoples would find geoengineering ethically acceptable and just. There was interest in determining and debating whether Indigenous peoples, taken as diverse groups or as a global movement, would seem to favor, critique, or engage further on the importance of early research on SRM.

For me, it seemed like the underlying stake had to do with what implication Indigenous acceptance would have for a variety of pro- and anti-geoengineering positions (whether these positions are about research or potential implementation). In cases where Indigenous peoples, say, go along with a geoengineering-related project or vision, that would provide support to extrapolate more broadly that Indigenous peoples have reasons for favoring it. In cases where acceptance is lacking, that would point out key issues pertaining to values, power, and other matters that are important to take into consideration for governance. Or, in cases where Indigenous peoples might express an interest in engaging further, that interest would suggest that ethical and justice issues about geoengineering itself are not pertinent to Indigenous peoples, but are pertinent to research and implementation processes affecting Indigenous peoples.

Since the workshop, I continually hear of people referring to the Haida Salmon Restoration Corporation's experiment in ocean fertilization at Haida Gwaii. Holly Jean Buck was among the first people I knew who was discussing this issue in some of the geoengineering scientific and scholarly communities, posing key questions about how it came to be framed as geoengineering in the first place. Due to media attention in 2012, including a piece in the *Guardian*, non-Indigenous persons are discussing this case more widely (Buck, 2014). In one study, Kate Elizabeth Gannon and Mike Hulme interviewed local residents of the area about their views on ocean fertilization. Their purpose for doing so was that 'the case of ocean fertilization off the islands of Haida Gwaii may, therefore, provide a useful benchmark for reflexivity in geoengineering governance. Our case study shows that engaging with the situated beliefs and values that underpin human attitudes and responses towards novel geoengineering technologies is a *sine qua non* for good governance' (Gannon & Hulme, 2018, p. 1). The purpose of the research then is to gain greater clarity on Indigenous 'beliefs and values' on geoengineering governance, which includes the ethics and justice issues, as they discuss inclusivity, equity, and social power (16-17).

Interestingly, Gannon and Hulme cite an argument by Howitt et al (2012, p. 48) that states 'global environmental challenges like climate change "should be addressed as opportunities for decolonization"'. Gannon and Hulme claim that: 'In the case of geoengineering, this [decolonization] can only be realized through a clearer focus on the beliefs and values that underpin different attitudes and responses towards different technologies. Such a focus would provide the opportunity for geoengineering interventions to be governed in a more creative, inclusive and equitable manner. Yet the case of the Haida Salmon Restoration Corporation shows how difficult this will be and how easy it will be for geoengineering technology deployments to perpetuate or reinforce existing asymmetrical power relations. This is a salutary lesson given the rapidly growing attention now being given to new carbon dioxide removal technologies in light of the hugely ambitious goals of the Paris Agreement' (Gannon & Hulme, 2018, pp. 16-17). In this work, Indigenous voices and perspectives are valuable for weighing in on a range of

ethics and justice issues associated with possible geoengineering governance, serving as 'benchmarks,' 'lessons,' and 'opportunities.'

In a recent study by Wiley Carr and Christopher Preston, they sought to see whether populations vulnerable to climate change expressed differing or similar ethical perspectives on geoengineering to those of ethicists. The perspectives of the ethicists occur largely in what I am referring to as geoengineering discourse. They interviewed people in three different regions, the Solomon Islands, Arctic (Alaska) and Kenya, some of whom are Indigenous. They write that 'One goal of this project was to bring the ethics literature into dialogue with empirical data documenting the hopes and fears of members of vulnerable populations, it is notable that the perspectives expressed by the interviewees corresponded to a surprising degree with many of the concerns articulated in the ethical literature examined above.' Carr and Preston see the results as '[indicating that] members of vulnerable populations shared concerns about their own particular vulnerabilities and about potential moral corruption in developed nations. However, interviewee perspectives also extended the arguments found in the ethics literature by revealing an overarching concern, namely that climate engineering could further erode the already weakened self-determination of vulnerable populations due to a long history of oppression. Indigenous peoples expressed diverse answers about whether they, in fact, endorsed different types of geoengineering or not' (Carr & Preston, 2017, p. 764). For Carr and Preston, there are a diversity of Indigenous perspectives, among the other persons they interviewed. What comes through in their essay is that collective self-determination in the face of climate change, an issue I will discuss further later in this essay, is at the forefront of their concerns.

The work of Gannon and Hulme and Carr and Preston fits in with the general guidance offered by the United Nations on emerging technologies and Indigenous peoples. A 2012 report from the Subsidiary Body on Scientific, Technical and Technological Advice, pertaining to the Convention on Biodiversity, claims that 'It is necessary for decision-makers and scientists to understand the wider multidisciplinary concerns expressed by indigenous peoples, to root their geoengineering proposals within this broader framework and to set aside part of their investigation to understanding how to incorporate a holistic approach into their work' (Subsidiary Body on Scientific, 2012). The idea in this report is that now that geoengineering is inevitably on the table as a potential solution, there needs to be more 'understanding' among those who can advance research and implementation about Indigenous perspectives, which are portrayed as adding a 'broader framework' and '[holism]' to geoengineering plans.

Another place in which Indigenous peoples are brought up is in discussions of the history of the very idea of geoengineering. Advocates of early research on some types of geoengineering often seek to move beyond hasty negative reactions to the idea of humans exercising landscape and earth systems scale environmental interventions. David Keith, for example, has appealed to Indigenous histories of fire management and hunting to show that human-alterations of the environment to suit pressing needs are not unusual for all humanity. In an online published version of a manuscript that was revised later and published elsewhere, he writes that 'Humans transform their environment. While global-scale transformations are a recent consequence of industrial civilization, human transformation of nature is

ancient. Some transformations are deliberate, such as the use of fire by aboriginal peoples who altered landscapes to suit their needs or even the modern use of dams to create new lakes. Other transformations occur as an unintended side effect of resource use, such as the mass extinctions of indigenous fauna by early hunters in Australia and the Americas or the more recent threat of climate change caused by our use of fossil energy' (Keith, 2010).

Keith's position is used to suggest that it is precisely Indigenous peoples' histories (among others) that show us how normal it is to deliberately change the environment at large scales. Apart from geoengineering discourses, Indigenous peoples have long advocated for the idea that their societies cultivated landscapes in ways that promoted their sustainability and resilience in the face of environmental change (Whyte, 2017, 2018). Indigenous leaders and scholars point out that it is not always correct to say that there is such a thing as 'wilderness' since Indigenous economies and cultures had regional impacts on ecosystems and landscapes (Trosper, 2002). Myself, among others, certainly reject Keith's tone if it is taken to level off different types of human-induced environmental change, which may or may not be Keith's intention (Harkin & Lewis, 2007). Yet, nonetheless, the point being made here, by Keith, is that geoengineering should not seem like such a stretch given humans, including Indigenous peoples, alter the environment as business as usual and to respond to environmental crises.

Expressing different views, some Indigenous leaders and organizations have engaged in geoengineering discourse and denounced all forms of geoengineering. These denunciations arise in a context where Indigenous peoples globally, from activists to (Indigenous) government leaders, have criticized the failure of the international community to adequately respond to the need to lower carbon footprints for the sake of future generations (Tauli-Corpuz, 2017). The Indigenous peoples' 'Anchorage Declaration' calls geoengineering a 'false solution' (The Anchorage Declaration, 2009). The declaration states 'We challenge States to abandon false solutions to climate change that negatively impact Indigenous Peoples' rights, lands, air, oceans, forests, territories and waters. These include nuclear energy, large-scale dams, geo-engineering techniques, "clean coal", agro-fuels, plantations, and market-based mechanisms such as carbon trading, the Clean Development Mechanism, and forest offsets. The human rights of Indigenous Peoples to protect our forests and forest livelihoods must be recognized, respected and ensured.' Ben Powless, Mohawk from Six Nations, representing the Indigenous Environmental Network, explains that 'For too long our peoples' bodies and lands have been used to test new technologies. Now, in response to climate change, these same people want to put Mother Earth at risk with geoengineering technologies. We cannot afford to threaten our planet in this way, especially when simple, just and proven solutions are at hand' (ETC Group [ETC], 2010).

At the same time, and this is conveyed in Carr and Preston, but also in Gannon and Hulme, there are diverse perspectives on geoengineering among Indigenous peoples. The United Nations report on geoengineering and Indigenous peoples for the Convention on Biodiversity claims that 'Geoengineering has received little support from indigenous and local communities who are acknowledged as being among the world's most vulnerable populations to climate change. Indigenous participants have called for greater involvement of indigenous and local communities in the development of proposals for geoengineering. Not all indigenous and local communities have called

for a total ban or for modeling work or controlled in-laboratory experimentation to cease. In fact, some see it as useful in further understanding the complexities of the Earth's ecosystems and in better understanding the potential benefits and harms of geoengineering proposals. On the other hand, there is certainly a strong reluctance to see geoengineering experiments being carried out on a significant scale in the natural world.' (Subsidiary Body on Scientific, 2012)

Scientific reports, including the Arctic Climate Assessment (in 2004), Intergovernmental Panel on Climate Change (AR4 and AR5), and multiple U.S. National Climate Assessments (including 2001, 2014, and 2018), state that Indigenous peoples are among populations most vulnerable to climate change. This work is important given that advocates of geoengineering research often cite, as a strong reason in favor of doing so, the benefits to vulnerable populations. In this way, references to the vulnerability in geoengineering discourse can be taken as referencing some Indigenous peoples by implication. Though often not named, Indigenous peoples include, as evidenced in the above reports, many millions of people living in the global south. Advocates of early geoengineering research, such as Joshua Horton and David Keith, '... contend that a *prima facie* moral obligation exists to research SRM in the interest of developing countries, because SRM appears to be the most effective and practicable option available to alleviate a range of near-term climate damages that are certain to hurt the global South most of all' (Horton & Keith, 2016, p. 89).

Horton and Keith claim that "Fundamental principles of justice require that, all things being equal, the disadvantaged should not suffer from the results of actions benefiting the better off. Opponents of research into the possible benefits (*and harms*) of solar geoengineering threaten to violate this requirement in at least two ways. First, failing to conduct research puts the global South at risk of paying the highest near-term price for rich-world industrialization and the historical emissions associated with it. And second, stopping research may advance some rich-world political agendas in which geoengineering is at most a tangential issue, but it would come at the cost of assured suffering for poor countries confronting immediate threats that are largely absent from such agendas. Supporting research on solar geoengineering offers the best way to avoid these unjust outcomes (Horton & Keith, 2016, pp. 90–91). For these authors, this is important because 'One of the very few things that nearly all participants in the climate change debate agree on is that the effects of climate change will disproportionately affect the poor, for the simple reason that poorer people will have fewer resources available to them to manage climate risks and adapt to unavoidable changes compared to their wealthier neighbors. This simple fact applies both to disadvantaged people in every country and more broadly to the developing world in relation to rich, industrialized nations' (Horton & Keith, 2016, p. 79). They go on to say that 'The rich have got richer doing things that hurt the poor most of all' (80). In this way, the situations of Indigenous peoples and other groups – taken as urgent and pressing – factor into geoengineering discourse as reasons in favor of doing research on different types of geoengineering.

The references to Indigeneity in geoengineering discourse that I have just discussed, whether explicit or implicit, show how Indigenous perspectives and histories figure into discussions about whether to invest in early research and potential implementation. Gannon and Hulme suggest that understanding Indigenous perspectives in the case of

Haida Gwaii support decolonization if we take it to mean getting a 'clearer focus on the beliefs and values that underpin different attitudes and responses towards different technologies.' Carr and Preston see it as important to compare the views of ethicists with Indigenous persons and persons of other groups who are vulnerable to climate change, and show how Indigenous and other persons add substantial points to geoengineering discourse, such as the importance of self-determination. Keith seeks to contextualize concerns that geoengineering is novel (and hence not controllable), by showing how humans, including many Indigenous peoples, have always modified the environment, for better or worse. Well-meaning advocates of geoengineering could be seen as referencing Indigenous peoples indirectly when they claim that perhaps the primary goal of geoengineering is to support people who are vulnerable to some types of climate change impacts, and where vulnerability is primarily looked at as rooted in economic inequality.

Geoengineering and Colonialism

I cannot think of any Indigenous peoples who have ever had a workshop, event, or major meeting on how to address the prospect of geoengineering research or implementation. That Indigenous peoples do not have their own geoengineering discourse is not because Indigenous peoples never grasp or embrace nonIndigenous concepts and projects. Indeed, Indigenous peoples have not had a problem gravitating around 'climate change' and 'climate justice.' In North America, and beyond too, Indigenous peoples fund their own scientific staff and collaborate with nonIndigenous scientific institutions on climate change planning. They lead and actively participate in local and global advocacy on climate justice. The U.S. 4th National Climate Assessment in chapter 15 documents over 800 Indigenous-led climate actions just in the U.S. sphere. Indigenous peoples often want to highlight their heritages and histories of cultivating landscapes and shaping ecosystems. So it is not as if Indigenous people have some kind of intolerance to science, engineering or the idea anthropogenic environmental change (and taking responsibility for such change). I have my suspicions regarding the broad radio silence, which has to do largely with how geoengineering discourse is not yet open to Indigenous engagement. The key point I want to highlight in this section is that, I would argue, Indigenous peoples do not approach the topic of geoengineering through precisely the same narrative as I have seen in geoengineering discourse.

It is important to begin with where something like geoengineering shows up in certain Indigenous accounts of climate change. While Indigenous peoples certainly appeal to their own heritage, such as in the case of fire management, what often goes missing is an account of the recent wave of European and settler colonialism (e.g. U.S. and Canada) that has produced, in a short period of time, a dramatic terraformation and hydrological engineering of Indigenous territories. Heather Davis and Zoe Todd call such terraforming and engineering 'seismic' in its impact, to highlight both its rapidity and physical effects (Davis & Todd, 2017). Candis Callison, relating to Arctic Indigenous peoples, writes that we need to recognize what 'climate change portends for those who have endured a century of immense cultural, political and environmental changes' (Callison, 2014, p. 42). Callison's work emphasizes that the harms many nonIndigenous persons dread most of the climate

crisis are ones that Indigenous peoples have endured already due to different forms of colonialism: ecosystem collapse, species loss, economic crash, drastic relocation and cultural disintegration. Dan Wildcat claims that Indigenous vulnerability to climate change today is part of previous removals occurring through U.S. colonial expansion: ‘geographic’ (displacement, e.g. Trail of Tears and the forced occupation of reservations); ‘social’ and ‘psycho-cultural’ (such as through removal of children to boarding schools) (Wildcat, 2009, p. 4). Leanne Simpson discusses how ‘Indigenous peoples have always been able to adapt, and we’ve had a resilience. But the speed of this – our stories and our culture and our oral tradition doesn’t keep up, can’t keep up... Colonial thought brought us climate change’ (Klein, 2013). Sheila Watt-Cloutier claims ‘Climate change is yet another rapid assault on our way of life. It cannot be separated from the first waves of changes and assaults at the very core of the human spirit that has come our way’ (Robb, 2015; see also Watt-Cloutier, 2015)

As these voices express, Indigenous peoples do not always see climate change as a future of potential environmental impacts that will threaten their current ways of life such that those impacts must be curtailed as much as possible. Rather, climate change impacts are an intensification of entangled processes of colonialism, capitalism and industrialization that continue to inflict violence and harm on Indigenous peoples. Consider, in more detail, what I mean by this. Different forms of colonialism, from forced relocation, to the creation of reservations, to property dispossession and land grabs, can be looked at as human-induced (anthropogenic) environmental or even climate change (in some cases) (Whyte, 2016). For these changes either forced Indigenous peoples to adapt rapidly to new climate regions (in the case of relocation) or they shrunk or fractionated Indigenous land tenure to situations where it is impossible to plan effectively how to anticipate environmental change. In these examples, there is really no such thing as an isolated climate change impact (Haalboom & Natcher, 2012; Whyte, 2016). Colonial domination, for example, continues to be the problem that generates – to a large but not exclusive extent – the risk. Moreover, solutions to climate change, when they do not deal with colonial domination, also inflict harm. Current hydropower or forest conservation solutions to climate change still displace Indigenous peoples, for example (Beymer-Farris and Bassett, 2012; Campbell, 2015; Cooke, Nordensvard, Saat, Urban, & Siciliano, 2017).

In line with what I am saying, in Carr and Preston, an anonymous Alaska Native interviewee discussed how: ‘Eighty-five percent of our communities here are coastal communities, and... people really are having to consider moving their communities. A lot of these villages and their location where they’re at now – they’re in those particular areas not of their choosing. The Bureau of Indian Affairs located them, because they’re on navigable waters. It was easy to barge freight and other stuff into those communities. Our communities were either nomadic or semi-nomadic, moved depending on seasons, on whatever food sources were available. Living by the water is not one of the things that we would have probably chosen for a lifetime commitment, because we recognized that there are issues that are bound to happen... the problem is that no one accepts the responsibility for having located these communities in the areas that they now find themselves’ (Carr & Preston, 2017, pp. 765–766).

For this interviewee, colonialism and other forms of oppression are at the heart of the problem. Yet often geoengineering discourses isolate geoengineering as a topic and

only add in colonialism, capitalist exploitation, imperialism and other forms of domination later as governance challenges or stakeholders' values or views that must be understood and weighed. Yet for many Indigenous peoples, similar to what the person cited by Carr and Preston shows, colonialism is among the central topics. Colonial domination is not a frame for geoengineering. Geoengineering is itself an ethical or justice issue that arises in situations where Indigenous self-determination is disrespected via ecologically disruptive colonialism, among other forms of domination. So, for each Indigenous people, there is usually a rather clear path forward that they have been calling for, and for years, to address colonialism. For example, the Treaty Tribes of Western Washington associate many different environmental threats to salmon populations, including climate change, as stemming from decades of failures of the U.S. and state of Washington to honor their treaty rights (Treaty Indian Tribes in Western Washington, 2011). Indigenous peoples of the Isle de Jean Charles in Louisiana have long worked to secure recognition as sovereigns in the eyes of the state of Louisiana and the United States. Some people from the island cite both its vulnerability to sea level rise, but also injustices in the resettlement process, as due to continued lack of respect for Indigenous self-determination (Maldonado, Shearer, Bronen, Peterson, & Lazarus, 2013). Many other environmental injustices are traceable precisely to ongoing laws, policies and practices of colonialism (Grijalva, 2008; Whyte, 2011).

In this way, the focus on geoengineering itself as an isolated topic must be contextualized. Some Indigenous peoples would not, I would argue, isolate geoengineering so discretely. They have not put on the table geoengineering, no matter what form, as a solution that must be deliberated on in terms of its pros and cons and in terms of how it relates to localized interests, values or beliefs. Consider what this means. Regarding the ocean fertilization project at Haida Gwaii, among those Native people who have heard of it, they would *prima facie* associate it more with the decades of environmental injustices at the hands of the Canadian settler state that, among other factors, have affected salmon and other habitats. Gannon and Hulme document some of the histories of colonialism in the region and the current challenges. Buck brings up the issue that the Nation's rights have not been extinguished in the area, the relationship between the two councils (Old Massett and Skidegate), and that the Nation has explored numerous scientific and political solutions, including a multi-use marine planning process lead by the Council of the Haida Nation (Buck 2014). The Old Massett Village Council's engagement in the ocean fertilization project occurs, for an important part, in the context of colonially induced declining salmon runs. The declining salmon runs do not arise only or primarily from the looped back effects of recent anthropogenic climate change. They are due to factors including land dispossession, disrespect of rights and ecological degradation. Many of these factors can still be addressed by settler Canadians today in ways beyond ocean fertilization, and the Haida are known for some of their recent efforts in protecting their lands, such as forest protection. There is still much political reconciliation work that needs to be done between Indigenous peoples and Canada. So to say that those Haida persons who advocate for ocean fertilization see it as a potential solution to domination is a strange proposition since there are so many other solutions they have been advocating for across generations that historically would have curtailed habitat degradation and are still relevant solutions today.

Indigenous peoples, then, often share perspectives on climate change that emphasize issues of systematic injustice that are local and global. Buck sheds light on this in her work on people in Finland's perception of geoengineering. Though this work does not pertain to Indigenous peoples, it is nonetheless illustrative. She writes that the 'assumption is that people will look at geoengineering as a local concern, or through an individual utilitarian lens. However, these respondents – in part because of a systems view, but also due to empathy – understand the interconnectedness of the world's economies and peoples. (This might seem counterintuitive in a time that seems to be marked by rising nationalism, but these could be simply two sides of a coin.). These respondents did not read the issue through the prism of their local interests' (Buck, 2018, p. 85). Buck's work opens up that how geoengineering is constructed as a discreet topic needs further interrogation.

In my analysis so far, it is important to consider some of the differences in the narrative that Indigenous peoples might have. It is not a given that today's social-ecological systems are ones that are important to conserve. For the state of these systems today is already, for some, an Indigenous dystopia. So, what are Indigenous peoples being asked, then, when some people try to persuade them to adopt geoengineering as Indigenous people's best available solution to climate change impacts (that Indigenous peoples did not cause)? It is also the case that Indigenous peoples have been arguing for decades and even centuries for certain reforms from colonial nations, such as the U.S. or New Zealand, that would improve Indigenous peoples' capacities to adapt to climate change and would hasten mitigation efforts. These solutions should be on the table in discussions about geoengineering, even if many who are involved in geoengineering discourse do not initially see these solutions as on topic. For Indigenous peoples, I would argue, they are exactly the topic.

If I extrapolate more speculatively, I think the concern is that the construction of geoengineering as an issue to be debated regarding its governance and acceptability can create a powerful form of obfuscation of ethics and justice. For decades, Indigenous and allied scholars in areas like Indigenous studies have argued for 'Indigenous erasure' as one of the strategies of colonial domination. Erasure includes the erasure of colonialism in discourse. Scholars and writers such as (among many others) Lee Maracle, Glen Coulthard, Audra Simpson, Megan Bang, Ananda Marin, Tsianina Lomawaima, Theresa McCarthy, Eve Tuck and K. Wayne Yang have shown how conversations about Indigenous participation may occur in the name of ethics and justice, but actually serve to obscure (erase) the full implications of what colonial nations' responsibilities actually are to Indigenous peoples (Bang et al., 2014; Coulthard 2014; Lomawaima & McCarty, 2006; Maracle, 2015; Simpson, 2014; Tuck & Yang, 2012). In geoengineering discourse more recently, Stephen Gardiner refers to an analogous moral problem. The problem occurs when people 'emphasize and endorse strong ethical concerns that we are otherwise unwilling to act on, and which would, if earnestly and coherently embraced, lead us to approach both climate policy in general and geoengineering in particular in very different ways. In short, the worry is that even if ethically serious people have reason to support (some forms of) geoengineering research and perhaps even deployment in the abstract, their approach would look very different from anything currently under consideration, let alone actually likely to transpire' (Gardiner, 2013a, p. 12).

When confronted with the issue of geoengineering, it should not be surprising that Indigenous peoples have different views on its acceptability regarding ethics and justice. Calling for greater attention to Indigenous issues on geoengineering involves centering and acting to address relevant forms of domination, instead of obscuring them. And, if it is true that Indigenous peoples have long legacies of explicitly seeing their histories and cultures as modifying the environment, then they would have a lot to say about climate change as a form of environmental modification that has rendered us into the situation we are in today. If we look at colonialism, we can see that it is not accurate or factual to see Indigenous peoples, and perhaps other populations too, as primarily burdened by lacking financial resources for adapting to climate change. It is the legacy and ongoing practices of colonialism, and other forms of domination, that hamper mitigation of and adaptation to climate change.

Indigenous Consent

The topic of consent has been raised as a major issue in geoengineering. Consent is considered to be an important topic for at least two reasons, one general for any actions, and one more specific to geoengineering. First, consent invokes the idea that those parties, human or nonhuman, affected by the actions of others should have opportunities to self-determine their acceptance of or opposition to those the actions. In cases where affected parties oppose harmful effects on them, their wishes should be honored with the cessation of the harmful or risky actions or the modification of the actions to end harm and reduce risk. Affected parties' opposition or provisional acceptance can often be followed by their engagement in processes that seek to end harms and reduce risks. Second, the particular context of geoengineering is rife with scenarios where more powerful or sovereign parties, from scientific organizations to nations, could – in morally problematic ways – engage in research or implementation without securing the consent of the affected parties. Moreover, geoengineering is a global scale issue that cannot possibly be directly consented to by everyone who will be affected. Indeed, some ways of thinking about potential geoengineering implementation affect everyone on earth. For this reason, there are approaches to consent that do not require the securing of direct acceptance, such as tacit or implicit consent. Scholars such as Benjamin Hale, Lisa Dilling, and Pak-Hang Wong document a range of work and issues in the literature on consent in relation to geoengineering that explores some of these options for consent, such as implicit consent in cases where direct consent is impossible (Hale & Dilling, 2011; Wong, 2016).

In the literature cited previously in the last two sections, one of the issues that keeps arising is that some Indigenous peoples endorse geoengineering research and implementation. But I am not convinced that there is much of an issue to discuss regarding *whether* Indigenous peoples, some or all, consent or dissent to geoengineering. Rather, we need to reflect on what it means to even narrow in on the idea of Indigenous consent to geoengineering, to begin with. I have two points to make here. First, when Indigenous consent or acceptance is discussed, I often do not see very much clarity in what it means in the first place to say that Indigenous peoples can even participate in the politics of science and international relations meaningfully in relation to geoengineering, and many other topics too. Second, Indigenous peoples never consented to the various global and local orders in which geoengineering emerges as an issue anyways. This raises the question of what it

means for groups of people to have an opportunity to consent when the very opportunity itself arises from conditions they did not consent to. While it is perhaps the case that all consent situations are ones in which it is imaginable that the consenter did not consent to the surrounding conditions, there is still a difference here. For the conditions, I am discussing are conditions of domination, as described, in part, in the previous section. These conditions were not setup or intended to support Indigenous well-being or self-determination. Unfortunately, in this essay, I cannot focus more space on discussing when the status of consent to any conditions is morally relevant and when it is not.

Starting with the first point, the problem concerns the fact that Indigenous peoples globally are not in the position relative to any potential geoengineering research or future implementation to give meaningful consent or dissent. Much of why this is the case has to do with the impacts of colonialism on Indigenous diplomacy both locally and globally. Indigenous worlds are diverse. While all Indigenous peoples trace their sovereignty and collective self-determination to origins prior to or separate from the formation of nation-states, they have been denied ethical and just capacities to represent themselves in international, regional, national and local fora. For example, the United Nations does not include Indigenous peoples as members, though, based on years of activism, Indigenous peoples have become a major 'non-state' force in the U.N. In terms of political representation, it is hard to convey just how different Indigenous peoples can be from one another, which I will discuss briefly in what follows.

In many regions, neighboring nation states do not recognize Indigenous peoples as sovereigns or semi-sovereigns. Indigenous peoples in this situation often form or work with non-governmental organizations and send representatives to human rights bodies at the United Nations. Often the U.N. or the International Labour Organization are their main avenues for gaining relief from human rights abuses given they are not recognized as sovereigns locally. In other regions, settler states like the U.S. recognize *some* Indigenous peoples as having political sovereignty, for example, the 573 U.S. federally recognized Tribes. But there are many Indigenous peoples the U.S. does not recognize. Moreover, many Indigenous persons do not feel that Tribal governments represent them because many federally recognized Tribes are forms of government the U.S. forced Tribes to adopt to promote extractive industries. Hence, they are often times not governments that some people feel represent some of their constituents, interests in morally acceptable ways. There are many Indigenous NGOs that represent interests politically that are often ignored by 'recognized' Tribal governments. In the case of the U.S., colonialism has also diminished Indigenous capacities to participate on equal terms in consultative (e.g. consent) processes. Often U.S. agencies and corporations have a larger staff and greater financial resources to participate in consultative processes, whereas the Tribes who may be affected by the U.S. and corporate actions have far fewer staff and financial resources. Historically, we know that North American Indigenous peoples, among others, had tremendous diplomatic capacities, as evidenced in eras such as the fur trade (White, 1991; Witgen, 2011). But over time colonialism works to strip Indigenous peoples of these capacities, which then opens them up to criticism when they cannot follow through in participatory processes at the same level as a nation or corporation.

In terms of geoengineering research or future implementation, then, there is no way to suggest something like Indigenous consent or dissent. Imperialism and settler colonialism

have rendered a situation in which many Indigenous peoples do not have local leverage to consent or dissent to any projects that might affect them. Indigenous leadership at the U.N. cannot possibly cover the different forms of political representation that Indigenous peoples have to use to put their issues on the table. Moreover, while the U.N. Declaration on the Rights of Indigenous peoples enshrines *free, prior and informed consent* (FPIC), it is unclear whether most nation-states are institutionally setup to make that possible. For example, with U.N. REDD policies, a forest conservation program, there may be many of Indigenous peoples living near a nation-state that have not enjoyed good diplomatic relationships with the nation-state and local communities, making jurisdiction unclear. So to suggest that it is even doable to implement policies of FPIC is deeply problematic. For the needed relationships are not present to facilitate FPIC. Or in the U.S. and Canada, while both nations have consultation policies with Indigenous peoples, they do not actually ensure Indigenous peoples can dissent in terms of a veto power. Consultation policies that would provide the possibility of Indigenous dissent have been dismissed as not being politically feasible given Indigenous peoples rarely have population numbers to sway national voting trends.

So, in this context, it is interesting to hear discussions about Indigenous consent or dissent to geoengineering and attempts to persuade vulnerable populations like Indigenous peoples for several reasons. At one level, the ways in which the world is stacked up politically against Indigenous representation and diplomacy makes it inevitable that whoever has the capacity to propose geoengineering research or implementation will not require Indigenous support. While there are certainly groups of people out there who could oppose geoengineering with political force, Indigenous peoples are unlikely to be one of those groups. At another level, I have yet to see advocates of geoengineering learn about the different aspects and problems of Indigenous political representation, and attempt to offer a solution to securing consent that at least tries to grapple with the very real challenges Indigenous peoples have to endure every day regarding their consent.

Second, Indigenous peoples did not consent anyways to the global and local orders for which geoengineering becomes an issue in the first place. Some Indigenous peoples do not invest in geoengineering qua geoengineering. That is, if an Indigenous people goes along with a geoengineering research project or potential implementation, that is not the same as saying that group or many other Indigenous peoples consent or endorse geoengineering more broadly. For Indigenous peoples have not consented to the very conditions that give rise to the opportunity to consent to something like geoengineering. Let me explain, in more detail, what I mean by this. In the climate justice literature, it is often stated that groups like Indigenous peoples have done little to cause anthropogenic climate change, yet they will bear many burdens from climate change impacts. Moreover, scholars, such as Chris Cuomo, note that anthropogenic climate change emerges from the crucible of inequality. As Cuomo would add, this is just the very beginning of understanding the relationships between power and climate change relating to Indigenous peoples (Cuomo, 2011).

For Indigenous peoples, there is a continuing and very direct connection between anthropogenic climate change and their struggles with colonialism. The fossil fuel industry and climate-altering land use change are largely possible because of Indigenous dispossession from the lands where those activities first took place. Those

activities were made possible through laws, policies, and practices that opened up Indigenous territories; they were also made possible through colonial cultures that made colonialists feel it was morally acceptable (or morally inevitable) to do so. Critically, current laws, policies, practices and cultures that descend from the original ones (or are literally still the same ones today) are largely responsible for what makes Indigenous peoples vulnerable to certain climate change impacts today (Whyte, 2016). Over the years, Indigenous peoples have been offered a range of solutions to climate change and environmental problems, including the privatization of their lands, the installation of large-scale dams, among others. Each of these solutions rarely engaged with the ultimate change of the laws, policies, practices and cultures that are responsible for the bad aspects of Indigenous peoples' situations today. Indigenous peoples did not consent to these conditions, whether historically or today, where conditions refer to the laws, policies, practices and cultures I have just described – the local and global orders based on colonial domination.

Gardiner has also covered the argument about desperation. 'In conclusion, the desperation argument misses much of what is at stake, ethically speaking, in geoengineering policy. As far as justification is concerned, neither the consent nor the self-defense interpretations clearly license geoengineering, and they may even count against it. Moreover, the contextual question reveals more about the live threats and ethical import of geoengineering...'. (Gardiner, 2013b, p. 31). Gardiner's views echo Marilyn Frye's original contributions to defining oppression, which is an ethical problem of people being put in a situation where the optional actions each have consequences (Frye, 1983). Here, context refers to the conditions that put somebody in a dilemma. Gardiner claims that "The argument suggests that we can approach the plight of the desperate from some distance, thinking only 'who can blame them?', 'wouldn't we do the same?', and 'shouldn't we help out?' However, if desperation is over invoked, the powerful countries are unlikely to be in this situation. Instead, they are likely to have played a substantial role in reducing the desperate to the point of begging. This is a horrifying moral territory. In my view to bring others to the point of desperation, and especially to put them in a situation here they are forced to make a tragic choice, constitutes a special kind of moral wrong (32)."

For Frye and Gardiner, what matters are the conditions under which a situation arises in the first place in which somebody has the option of consenting or dissenting. Some Indigenous peoples, such as those cited in this essay, claim it is the laws, policies, practices and cultures of colonialism, among other forms of domination, that play a crucial role in exacerbating climatic vulnerability. The literature on climate change resettlement demonstrates that it is not so much about having the financial resources to relocate that supports adaptation; rather it is territorial mobility and collective self-determination. Territorial mobility and collective self-determination, which for many Indigenous peoples have been curtailed exponentially, are issues of colonialism. Hence, to suggest that some Indigenous peoples should consent to geoengineering because it is their best option to adapt to climate change is to, again, take off the table the anti-colonial and decolonial reforms that Indigenous peoples have been calling on nations and corporations to do for years. Indigenous peoples did not consent to the conditions of colonial domination having such a sway over their lives.

Conclusion

Holly Jean Buck asks whether it is ‘possible to imagine geoengineering being driven by a desire for social change, as a means to transform society? This does not place geoengineering in the box of “environmental issues”, but acknowledges that geoengineering is coupled to complex social, cultural and economic systems’ (Allenby, 2010; Buck, 2012, p. 266). Indigenous voices *should* be involved in scientific and policy discussions of different types of geoengineering. But, context matters. Geoengineering discourses cannot just be associated with geoengineering to the exclusion of topics and solutions that Indigenous peoples value. A conversation about geoengineering that, say, disallows or is silent on, treaty rights or colonialism, is not a space for Indigenous voices to matter, in my opinion. Or a discussion where Indigenous peoples are asked to trust non-Native people again, this time, is problematic if there are not direct reasons given for why trust is an appropriate attitude. For the conversation must address *why* distrust occurred in the first place, which has to do with legal and policy frameworks, social and culture norms and economic systems that are anti-Indigenous.

Forces of domination render even the most well-intentioned solutions ineffective. Indeed, Indigenous peoples face environmental risks from all sides, from encroachment on their territories, pollution and pollution drift, land-grabs and global climate change, among many others. Whether Indigenous peoples accept any geoengineering research or implementation will mean very little if Indigenous territories are not rematriated (Maracle, 1996) and political reconciliation with colonial states remains lacking. In some ways, the future of geoengineering discourse should be to bring back into focus why it may be problematic in the first place to isolate geoengineering as a discrete topic. Ethics and justice issues pertaining to geoengineering perhaps emerge most clearly when we question how it came to be that some people see the best path forward as involving the weighing of different perspectives, beliefs, values, and interests.

Disclosure statement

No potential conflict of interest was reported by the author.

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