Confronting Local and Global Tipping Narratives: Green Energy Development in the Arctic and Why Greenland Is Not for Sale

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Abstract This research addresses a confrontation of narratives usually overlooked in global-local discourses about green energy futures by focusing on the case of Greenland. On the one hand, the call for keeping the vast amounts of Greenland's fossil fuel deposits in the ground, as one of the most efficient and fastest strategies to limit global GHG emissions and avoid a climate catastrophe -hence preventing a negative global climate tipping point. And on the other, the need to exploit and provide alternative mineral resources for the global green energy transformation – hence enabling a global positive tipping point towards a sustainable development trajectory. For that, we trace the historical local conditions and events that eventually led towards green development trajectory pathways. These include indigenous groups' opposition to oil drilling in the Arctic waters and more recently, the consideration of alternative resource governance mechanisms in support of a low-carbon transformation. We argue that overcoming such confrontation requires reconciling both Natural Resource Justice with Earth System Justice principles that consider the rights, needs, worldviews, and institutional traditions of local communities. Among them, the impossibility of privately owning land across generations in Greenland stems as a possible example of disruptive tipping intervention on how Western societies could learn to relate to biophysical systems in more sustainable ways to cope with accelerated global environmental change.

Keywords Earth tipping points · Positive tipping points · Greenland · Justice

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1 Introduction

The Arctic is perhaps the region in the world that is most affected by climate change (Walsh et al., 2011). Due to its high latitude and proximity to the poles, it is warming at a much faster rate than the rest of the planet (AMAP, 2017; ACIA, 2005). This rapid warming is leading to the melting of sea ice and permafrost, which, in turn, is increasing access to previously inaccessible resources such as oil, gas, and minerals. The extraction and use of these resources can contribute to the acceleration of climate change, creating a cascade of feedback loops that further impact the Arctic and its communities. In addition, the melting of sea ice and the vast deposits of untapped mineral resources are also leading to increased geopolitical tensions in the region, as countries compete for access to resources and shipping lanes (AMAP, 2017; IPCC, 2019). It may thus seem, from a climate perspective, like a very dangerous idea to extract further mineral resources in the Arctic. However, the Arctic also holds various minerals necessary for the development and production of green technologies, which, on the other hand, may contribute to a green transition and the prevention of negative global environmental tipping points.

The Arctic region has often been viewed through an extractive lens, with a focus on exploiting its natural resources for the benefit of multinational corporations and global consumers. While this has benefitted some global actors and private interests, it has not always been the case for the Arctic communities impacted by the activities, as extraction, in many cases, has happened without proper consideration of the interests and needs of local communities (Stammler, 2010; Gover & Fenge, 2019; Westley & Miller, 2017). This raises the question of how the use of resources in the Arctic can be harnessed in a way that contributes to preventing, rather than promoting, negative environmental tipping points, and in a manner that ensures a just distribution of risks and benefits, both globally as well as based on local values and interests.

Greenland is an example of an Arctic nation subject to mineral extraction for the green transition. It presents a unique case study in this regard due to its remote location, harsh climate, limited infrastructure, and communities highly dependent on natural resources, all of which call for special considerations. In 2019, then President of the USA, Donald Trump, declared his interest in buying Greenland from Denmark, motivated by a desire to access the expected attractive undeveloped mineral resources and hydrocarbons in the region. It has been argued that the exploitation of Greenland's natural resources, including oil and gas, as well as green energy resources, such as minerals for green technologies has the potential to yield significant economic benefits for both local communities and multinational corporations (Hansen & Johnstone, 2018). While the resources in Greenland have the potential to play a significant role in avoiding the negative global tipping point of a climate catastrophe, the resource extraction of rare earths and other materials, if not managed wisely, can cause irreversible and devastating impacts on local environments and communities, and the country as a whole.

In this chapter, by focusing on the case of Greenland, we examine a confrontation of narratives that is mostly materialized at local level when confronting different notions of resource property and rights that usually overlooked in global-local

discourses about green energy futures. On the one hand, the international call for keeping the vast amounts of Greenland's fossil fuel deposits in the ground, as one of the most efficient and fastest strategies to limit global GHG emissions. Such goal is thus aligned with the UN Paris Accord of keeping global warming below the 2°-1.5 °C threshold to avoid a climate catastrophe and hence prevent a negative global tipping point. And on the other, the need to exploit and provide alternative mineral resources for the global green energy transformation, hence to support the enabling conditions to achieve a positive tipping point towards a global sustainable development trajectory. Local communities then confront the contradiction of not-extracting resources for one reason but extracting other resources for other reasons that may be perceived of little benefit at local level. To explain this, first we provide a brief introduction to the role of the Arctic region as a provider of energy resources for global consumption and its implications. On this, we discuss the cross-scale interactions and discourses among local actors, large international corporations, central national governments, and international agencies in preventing a potentially catastrophic global negative tipping point by letting transnational actors have unrestrained access to Greenland fossil fuels. Then, we also seek to contribute to the understanding of how Greenland can influence global positive tipping points by becoming a producer of green energy resources and technologies without compromising the interests and aspirations of their local populations. We argue that dealing with halting fossil fuel resources whilst also exploiting new minerals demands a serious consideration of the interplay and potential synergies that may be achieved by integrating both local natural resource justice perspectives with a Earth Systems justice one. Last but not least, we underline what can be learned, and particularly by Western societies, from the Greenland traditional institutional settings and recent developments with regard to integrating more sustainable equity and justice arrangements to support global transformations processes toward sustainability. These includes the fact that land in Greenland cannot be inherited across generations, an example that could be used to transform Western perceptions and traditions on crucial socio-economic mediating mechanisms such as property rights - often equated to exploitation and destruction rights -, that need to be adapted to cope with negative earth systems' tipping points.

2 The Arctic as a Source of Energy Resources for the Global Market

The Arctic has long been, and still is, a source of energy resources for the global market. Historically, whales were harvested for oil production and consumption in other parts of the world (Hacquebord, 2001). Later, oil and gas resources in the Arctic were developed and are still being exploited and exported globally for consumption. Today, minerals needed for renewable energy technologies are in high demand, so once again, the world looks towards the Arctic to exploit its resources for global needs.

Whales have been harvested in the Arctic for centuries, and this has had a significant impact on the communities living in the region (Hacquebord, 2001). In the

past, whales were harvested using traditional hunting methods by indigenous communities in the Arctic (Hovelsrud et al., 2008). These communities had a deep understanding of the marine ecosystem and the behavior of whales, and they used their knowledge to sustainably harvest whales for their meat, skin, and oil. However, with the arrival of commercial whaling in the nineteenth century, the hunting of whales in the Arctic changed significantly. The exploitation of whale oil for global consumption led to an overhunting of whales and the collapse of their populations.

The decline of whale populations in the Arctic had long-term impacts on the ecosystem and the communities that depended on them. The loss of whales as a food source forced indigenous communities to adapt their hunting practices and seek alternative food sources. Furthermore, the decline in whale populations had ecological impacts, as whales play a critical role in the marine food chain and help regulate the ocean's ecosystem. In the traditional hunting practices of indigenous communities, the harvesting of whales was done in a way that was sustainable and ensured the well-being of the community.

The complex interactions and tensions occurring between the local and global exploitation of natural resources are particularly materialized in the case of Greenland. Over the past century, the unprecedented growth of the global economy and consumption has been fed by the extensive exploitation of fossil fuel reserves, including coal from Svalbard and oil and gas from Norway, Alaska, and Siberia. The subsequent boost in carbon-intensive industries has been a primary contributor to the acceleration of climate change. The consequences of fossil fuel extraction in the Arctic and its contribution to climate change have been particularly pronounced in communities near Svalbard, Norway, Alaska, and Siberia. As the Arctic experiences some of the most rapid and extreme effects of climate change, indigenous and local communities are facing a myriad of challenges that threaten their traditional ways of life and cultural heritage. Furthermore, the extraction process itself has also caused adverse impacts on the nearby communities (see Kröger, 2022).

In the past decade, a global narrative shift towards a green energy transition, driven by the imperative to combat climate change, has sparked a heightened interest in mining operations for minerals such as lithium, cobalt, nickel, and rare earth elements necessary for renewable energy technologies, electric vehicles, and low-carbon solutions. The Arctic, known to possess substantial mineral reserves, has become a focal point for these mining activities. Thus, the hunt for energy resources in the Arctic continues. Various countries are trying to legitimize their Arctic interests by promoting their 'Arctic-ness' through narratives of historical relationships, typically related to transport, logistics, collaboration, presence, trade, or others. While the green transition represents a crucial step towards a sustainable future, it can potentially have significant negative implications for the Arctic region. The Arctic ecosystems are highly sensitive to disturbances, and increased mining activities can introduce pollutants and alter the natural landscape, affecting Arctic flora and fauna. The loss of biodiversity and the disruption of food chains can have far-reaching consequences for both wildlife and indigenous communities that depend on these ecosystems for their livelihoods (see Zimmermannm et al., 2023). Mining activities furthermore experienced to cause significant socioeconomic impact on indigenous communities residing in the Arctic, which often have deep cultural and

spiritual ties to the land (Hansen et al., 2016). Hence, there is a need to shift from narrow policy and technological discussions on energy transitions to broader full-systems transformations linking local interventions with a global systems' lens (Tàbara et al., 2021).

The growing influx of mining operations can lead to socio-cultural disruptions, increased pressure on resources, and potential conflicts over land use. It is essential to engage and consult with these communities to ensure their rights, traditional knowledge, and well-being are respected throughout the mineral extraction process. Acknowledging the unique challenges faced by Arctic communities in relation to the development and extraction of the resources for the green transition and the need to recognize their unique role in supporting global sustainability futures, it is crucial to prioritize their inclusion in decision-making processes and policy formulation. Empowering these communities with resources and knowledge to adapt to and mitigate climate change while preserving their cultural heritage and traditional knowledge, is of paramount importance. On the one hand, transitioning to sustainable energy alternatives can bring opportunities for economic diversification and reduce greenhouse gas emissions. Investments in renewable energy projects and sustainable infrastructure can create new green jobs and promote local economic growth. But on the other, traditional settings and new actions taken by local populations towards realizing their own green development futures can also generate new reflexive spaces for mutual learning and transformation of those 'foreign' societies and organizations that in the past have solely taken an extractive dominant role.

3 Greenland's Resource Confronting Narratives

Greenland's population of 56,000 is spread through in 18 towns (87% of population) and approximately 60 settlements (13% of population). The towns and settlements are geographically disconnected, so transportation takes place by air and/or sea (Statistics Greenland, 2020). 89% of the population is native to Greenland, and the majority of natives form the Government. An ongoing demographic trend is emigration from smaller towns and settlements to bigger, urban towns. The majority of the population livelihoods continues to be largely based on food from hunting and fishing. Food from wildlife accounts for half or more of the diet for 32% of the population (Greenlandic Perspectives, 2019). The public sector is the largest employer in Greenland (Greenland Statistics, 2020) where it employs 40% of the workforce. The GDP per capita is about 50.000 USD and 95% of exports come from the fishing industry. The economic grant from Denmark and from Europe constitute approximately 60% of Greenland's GDP (Greenland Statistics, 2020).

Greenland relatively small and sparsely populated country has also a unique cultural and institutional heritage built often on ancestral practices of traditional resource exploitation. Among these, there is a crucial tenet that have to do with the impossibility in Greenland of privately owning land across generations. Such principle is of particular importance given that often property, in Western countries, is often equated to the right of private exploitation -even though such exploitation

could harm future generations. Thus, many residents are concerned about the potential social, cultural, and economic impacts of large-scale resource development projects driven by international actors who may disregard such cultural diversity. There are also concerns about the fairness and transparency of resource governance, and questions about how to ensure that local communities benefit from resource revenues in a meaningful and sustainable way. This conundrum requires careful consideration of the trade-offs involved and the development of innovative and inclusive policies and practices that can help to mitigate risks, maximize benefits, and promote long-term sustainability and resilience.

Hence, Greenland and its interactions with other international energy actors can be understood as a complex socio-energy system operating at multiple scales of action with potentially diverting tipping points that could unfold in a near future towards both positive and/or negative trajectories, not only locally but worldwide. Greenland, also shows a case in which relatively 'small' positive decisions taken at local level or by a relatively small number of people taken right now can have beneficial consequences at global level, so there is no need to wait for large international concerted actions (Ostrom, 2012). On the one hand, locally, Greenland is implementing hydropower solutions for electricity supply in most towns and experimenting with solar and wind power for smaller settlements, aiming to replace fuel-based energy supply. The national energy company, Nukissiorfiit, is actively working towards substituting fuel-based heat supply with electricity heating from hydropower and, to a smaller extent, heat from waste-incinerators. Moreover, like many Arctic communities, Greenland is an example of a place where off-grid electricity and heat solutions are prominent due to the remoteness and lack of infrastructure. However, globally, there are also expectations that huge oil deposits are located off- and onshore in Greenland. International companies are interested in accessing these deposits which could potentially meet the growing demands for international consumption, even though Greenland is aiming to become free of the national need for a carbon-based energy supply. Interest in exploiting minerals for the global green energy transition has been growing for several years, but it particularly accelerated in recent years as the world has become more focused on transitioning to renewable energy and reducing greenhouse gas emissions (Hansen & Johnstone, 2018). The challenge of developing Greenland's resources to support global climate action shows then the multiple tensions arising from the need to ensure an equitable distribution of benefits and risks between local communities and global consumers. In economic terms, it is argued that developing Greenland's minerals for export to other countries has the potential to generate significant revenue and create jobs, which could supposedly benefit local communities economically and support sustainable development. And supplying renewable energy materials to other countries could help halting the increase of global greenhouse gas emissions and mitigate the impacts of climate change, benefiting people worldwide.

However, there is also a risk that exploiting these resources could lead to a number of negative social and environmental impacts for local communities, such as displacement, pollution, and habitat destruction. Such negative effect could be abrupt, structural and irreversible, which constitute core characteristics of tipping

points. Following exploitative institutional arrangements, the benefits of such resource extraction are likely not to be distributed equitably, so private multinational companies and consumers in other parts of the world may capture most of the economic benefits while local communities bear the social and environmental costs. Thus, the governance challenge of developing Greenland's resources and its role in supporting global climate action represents a normative clash in terms of balancing the potential benefits and risks for different stakeholders and social scales. It requires careful consideration to justice principles on how to ensure that local communities are involved in decision-making processes, that their rights, worldviews, traditional resource regimes, and interests are respected; while at the same time, that they benefit equitably, if eventually decided by fair procedures, from the extraction of rare earths for green energy development. It requires innovative approaches to governance and the implementation of resource management principles that can help promote sustainable, low-carbon development while minimizing negative impacts on local communities and the environment, that take also in to account both global and local considerations.

Box 1 Timeline for Key Events in Greenland's History of Natural Resource Extraction for Global Energy Consumption

1700s-1800s: Commercial whaling in Arctic waters led to the near-extinction of several whale species.

1968: The first offshore oil exploration well was drilled in Greenland's waters by Pan American Petroleum.

1973-74: A major oil crisis led to increased interest in Arctic oil reserves, and several new companies began exploration in Greenland.

1979: Greenland gains limited autonomy from Denmark, giving the country more control over its own natural resources.

2001: The Inuit Circumpolar Council and other indigenous groups declared their opposition to oil drilling in Arctic waters.

2009: Greenland gained self-rule with the Self-Rule Act, giving it greater autonomy from Denmark

2010: Greenland opened its mineral resources to international investment, leading to a surge in mining exploration.

2013: Cairn Energy's exploration in Greenland's waters failed to find significant oil reserves, leading to a slowdown in oil development in the region.

2019: The US governmental administration expressed interest in purchasing Greenland, sparking widespread criticism and opposition.

2021: Greenland's ice sheet experienced record-breaking melting due to climate change.

2021: The Inuit Ataqatigiit-led government made the decision on June 24 the Greenland will halt all oil exploration. This decision was taken despite the large ice cover retreat that makes the vast amounts of oil available. The government stated that it "takes the climate crisis seriously".*

* https://www.euronews.com/my-europe/2021/07/16/greenland-to-halt-all-oil-exploration-as-it-takes-climate-change-seriously.

4 Positive Tipping Points, Natural Resource Justice and Earth System Justice

In general, tipping points refer to thresholds or moments in time in which a relatively additional small force of change in a given system can lead to abrupt, structural and irreversible changes in its whole dynamics or development trajectory. At Earth systems scale, this can be translated in the collapse of large ecosystems, and global changes in patterns such as the North Atlantic current, as cascade of changes in other system, further reinforced by the current increasing release of large amounts of greenhouse gases. Recent assessments of negative Earth tipping points (Armstrong McKay et al., 2022; Willcock et al., 2023) indicate vast challenges for governance (Young, 2012) and indicate that some of them may be approaching sooner than expected; and that out of sixteen dangerous tipping points, five of them may have already been exceed due to the 1.1 °C global warming -being the collapse of the Greenland's ice cap one of the latter.

All these impending changes and increased risks of natural disasters have significant impacts on human societies, that at global level translate in additional pressures for human displacement, as well as mounting shortages in basic resources such as food and water. The consideration of tipping points calls for precautionary approaches and adaptive management strategies that can respond quickly to such global challenges. Finding ways to integrate the knowledge on tipping points both from the natural and social science has therefore important implications for the implementation of robust strategies that can avoid the worst effects of negative Earth System points. Most notably, such integration entails however a moral and ethical challenge. The implementation of fair and engaging development trajectories that link both local and global demands requires place justice at the core of social-energy transformations. New transformative approaches need to be guided by principles of fairness, equity, and social and environmental responsibility that ensure that the impacts of Earth tipping points are shared fairly and that marginalized communities are not disproportionately affected.

In contrast, positive tipping points can be defined as those moments in which due to the cumulative effects of previous deliberate social actions or policy interventions, a new better-off structural situation eventually emerges in a way that leads to subsequent self-propelling cycles of improvements in social-ecological systems' relationships. Such improvements can be assessed by the relative realization of explicit principles and goals, such as the Sustainable Development Goals (SDGs) or in more absolute terms, by examining net-positive gains and synergies achieved between improved capacities to deal with common problems and improved conditions our life-support systems (Tàbara, 2023; Tàbara et al., 2018; Milkoreit et al., 2018; Winkelmann et al., 2022).

Therefore, in social systems, justice is both a main driver and outcome of positive tipping points. The drive for a more equitable society by those groups often excluded or underrepresented in a system can create the conditions for systemic change -such as the case of the right to universal access to education. And at the

same time, if the new fairer conditions are achieved, these can also create new forms of action and institutional reform conducive to new forms of deliberate transformations. For this reason, natural resource justice and earth system justice are important considerations in tipping points research because they highlight the need for fair and equitable management of natural resources and the protection of the earth's systems to prevent or mitigate the negative impacts of tipping points, whilst considering the possibilities for positive ones.

For a structural positive transformation to happen, the people conforming a social-ecological system must develop and implement new institutional long-lasting arrangements that ensure the redistribution of existing rights, responsibilities and power arrangements, e.g., according to new emerging interests or moral principles. Early gains in justice at local level, create the necessary transformative conditions for achieving positive tipping points at larger scales and also help to trigger chains of positive changes in other domains. Addressing inequalities from the start and providing possible mutual gains derived from tackling climate crisis, are can help local agents and decision-makers, even previously marginalized ones, to support energy and climate policies, and function as demonstrators for other places, showing that cross-scale positive transformations are possible (see Amundsen et al., 2018).

In particular, multiple dimensions of justice need to be considered in processes that have to do with the interlinkages of global decarbonization that have very clear local impacts and vice-versa. These include aspects of distributive justice, entailing an equitable distribution of resources and benefits, as well as of compensation of the burdens caused by the energy transition among the different groups. However, on the one hand, a more integrative approach to justice would entail moving beyond compensation approaches in dealing with (in)justices to local populations. That is, to consider those perspectives that, besides the traditional notions of distributive, representative and procedural justice, also into account a more ideal, radical or transformative notions of justice that aim to achieve a much broader cross-scale systems' transformations, in terms of redistributions of rights, harms, benefits and responsibilities. On this, capability approaches stand out as they emphasize the need to foster and transform the necessary means, such as political or community power of agents, necessary influence inclusive decarbonization decisions, relevant to climate change mitigation, adaptation or more broadly tipping processes towards systems' transformations.

On this, and at global level, an imperative may be considered to avoid trespassing planetary boundaries and to ensure a safe and just corridor for humanity. This entails the adoption of more nuanced conceptions of justice, which also consider intergenerational, intra-generational as well as interspecies dimensions of justice.

Natural resource justice and earth system justice are therefore closely related. They both focus on the fair and equitable distribution and management of resources and the impacts of human activities on the environment. Earth system justice is concerned with how to achieve in a fair way the long-term stability of the earth system and ensuring that a world population moving toward a possibly ten billion people by 2050 can have access to sufficient resources to ensure dignified levels of well-being. It recognizes that human activities, such as the burning of fossil fuels,

deforestation, and pollution, are causing widespread harm to the Earth's systems and this impinges especially upon marginalized communities and future generations, who are likely to bear the greatest burden of these impacts. Similarly, natural resource justice addresses the distribution and management of resources critical to the health of humans and the planet. For example, access to clean water, air, and land is essential for human well-being and ecosystem health so the equitable distribution of these resources is a key component of natural resource justice. Ensuring that these resources are managed in a sustainable and equitable way at local level is therefore crucial to understanding how to contributing to meeting the basic needs of growing world populations, and thus to achieve both for resource and earth system justice.

5 Trump's Attempt to Buy Greenland, from a Resource Justice Perspective

In 2019, then president of the USA, Donald Trump, declared his interest in buying Greenland from Denmark, referring to it as a real estate deal, motivated by a desire for access to its expected attractive undeveloped mineral resources and hydrocarbons there. Although such attempt sounded like a bad joke to many, it can also be taken as representative of a particular colonial and extractive worldview, which in itself is reinforced by dominant institutional arrangements, as those that relate to the understanding of property rights. There is however a growing recognition that such worldviews and mechanisms that mediate our human interactions with the biophysical world require deep questioning and transformation if humans are to cope with accelerated global environmental change.

Despite its senseless and disproportionate character, Trumps proposed purchase of Greenland raises many questions that are relevant in our discussion on how to prevent global tipping points and enact positive ones in terms of substantial and long-term improvements in justice. It points out the impacts on the Earth's systems of the role of private markets in regulating the access and appropriation of resources that are critical both for Earth systems stability as the future of humanity in the face of negative earth tipping points. Hence, Trump's attempt to buy Greenland can also be examined in terms of its justice implications globally and at the long term, including the geopolitical and economic factors involved. From a natural resource justice perspective, the proposed purchase of Greenland raises questions about the legitimacy of the private ownership and management of global natural resources. The hypothetical purchase could have enormous local consequences for the indigenous communities who live in Greenland and depend on these resources for their livelihoods. It is very unlikely that only through market rules and deals, prioritizing profits and short-term gains over long-term sustainability, the indigenous rights, their autonomy and sustainable management practices would have been respected or enhanced. Whilst Greenland is, as mentioned, rich in natural resources, including

oil, gas, and minerals, the proposed purchase could have potentially significant implications for corporate appropriation and distribution of these resources at global level. Given that Greenland is home to the second-largest ice sheet in the world, the proposed acquisition could have potentially further triggered the extraction of fossil fuels and have significant climate impacts globally and especially on the Arctic region. The negative tipping cascade would have accelerated by the melting of the Greenland ice sheet, contributing even more to rising sea levels.

Trump attempt to buy Greenland may be surprising for a number of reasons. But on the other hand, it may also show another conflict that occurs when local and short-term logics of trade are translated at the global level: a moment in which the irrationality underpinning the global commodification of the Earth achieves its more extreme expression. It may well be the case that if humanity is to decisively cope with negative Earth tipping points and move to creating the conditions for the emergence of positive ones, we may fast need start reconsidering some of these fundamental assumptions and contradictions that withstand our current forms of development -in which property rights constitutes a central pillar.

6 Final Reflections: Navigating the Narratives Confrontation

Coping with the challenge of minimizing the impending impacts of negative earth tipping points while redressing the current forms of development to create the necessary conditions for the emergence of positive tipping points entails confronting a series of potential narrative conflicts that often remain understated in dominant policy narrative on green energy developments. To address such confrontations, putting justice at the core of the discussions on tipping points could help to reframe the kinds of key questions that need to be asked when thinking about alternative futures towards global sustainability: because the challenge is not only about energy transitions or particular access and exploitation of minerals. Instead, the unavoidable challenge might better be conceived as to how reconstruct the social contract for a global society transformation upon criteria that merge both global principles of earth system justice and stability with those of local resource justice; and do so in ways that local communities are not only represented, have access and are involved in decision-making processes to benefit equitably from resources development, but they can also contribute to cross-scales transformations and sustainability learning at the global level.

Greenland could become a beacon of hope for sustainable development and natural resource justice, setting an example for other regions facing similar challenges. By harnessing its renewable energy potential, empowering and respecting the rights of indigenous communities, and engaging in responsible resource management, Greenland could successfully navigate the multiple tipping dissonances and contribute to preventing global negative environmental tipping points. The Arctic region, particularly Greenland, stands at a critical juncture, where local decisions about natural resource extraction and energy development can have large,

irreversible and significant impacts on global sustainability and justice. By recognizing, reconciling and understanding the complex interactions of both biophysical and social tipping points in this context, we are in a good place to gain valuable insights into the potential global consequences of our local choices and decision in other contexts.

In short, transformative governance toward sustainability at the global level can strongly benefit from considering the value of the diversity of local worldviews, resource use arrangements and visions for a better world. Our research shows that full-systems transformations towards green futures are however not free: dealing with these perceived contradictions between local and global narratives face serious trade-offs and calls for rapid forms of institutional innovation. It also shows a clash between various worldviews regarding how humans ought to relate with biophysical systems and how many irrationalities emerge when certain logics of trade and appropriation of the Earth are extended at the global level.

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