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Review

Just Transformations to Sustainability

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Abstract: Transformations towards sustainability are needed to address many of the earth's profound environmental and social challenges. Yet, actions taken to deliberately shift social–ecological systems towards more sustainable trajectories can have substantial social impacts and exclude people from decision-making processes. The concept of just transformations makes explicit a need to consider social justice in the process of shifting towards sustainability. In this paper, we draw on the transformations, just transitions, and social justice literature to advance a pragmatic framing of just transformations that includes recognitional, procedural and distributional considerations. Decision-making processes to guide just transformations need to consider these three factors before, during and after the transformation period. We offer practical and methodological guidance to help navigate just transformations in environmental management and sustainability policies and practice. The framing of just transformations put forward here might be used to inform decision making in numerous marine and terrestrial ecosystems, in rural and urban environments, and at various scales from local to global. We argue that sustainability transformations cannot be considered a success unless social justice is a central concern.

Keywords: Just transformations; social justice; environmental sustainability; transformations; sustainable development; environmental governance; social–ecological systems

1. Introduction

Many of the world's ecosystems are unsustainable at current levels of human use [1–5]. If left unchecked, environmental declines and degradation can undermine both environmental productivity and human health and well-being. Thus, ensuring the well-being of current and future generations within the limits of a finite planet is one of the defining challenges of our time. In response to this challenge, the notion of transformations towards sustainability has risen to the forefront of global scientific and policy endeavors. For example, international sustainability initiatives, including Future Earth [6], the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) [4,7] and the United Nations' 2030 Agenda for Sustainable Development [8], explicitly seek to understand and support deliberate societal transformations. On the ground, there is also a recognized need to radically transform the way we manage numerous marine, freshwater and terrestrial systems in rural and urban environments to promote environmental sustainability. Deliberate actions taken to achieve environmental sustainability might take many forms, from strict preservation where human

use is curtailed to management actions that encourage more sustainable practices or reduce harvesting levels to environmental restoration or 're-wilding' activities [9].

When deliberate transformations to environmental sustainability are enacted, there will inevitably be social consequences both positive and negative relative to the status quo. Though there is the potential for improvements in human well-being, there is also a real danger that deliberate sustainability transformations will occur in an exclusionary manner or produce inequitable outcomes across time and space [10]. For example, fisheries management actions, such as the creation of no-take marine protected areas or reductions in fishing effort, can require short-term losses to produce long-term net economic gains [11]. However, even improvements in the aggregate benefits of environmental management alone may also not be enough to produce improvements in human well-being for all groups [12–16]. Furthermore, there have been significant critiques of the social justice implications of conservation and management efforts that aim to achieve environmental sustainability [17–20]. Many environmental sustainability decisions are made without adequate consideration of the rights, responsibilities, needs or perspectives of local people or processes to enable their participation [21–24]. Lack of consideration of local people's needs and voice can also undermine support of constituents and produce opposition, potentially undermining the long-term biological success of sustainability initiatives [25,26].

We contend that the social justice implications of sustainability transformations require greater attention and suggest that the notion of 'just transformations' to sustainability can fill this space. In general, there is often limited engagement with social justice in broader sustainability science and practice. Furthermore, the emerging scholarship on deliberate transformations to sustainability has only just begun to engage with themes of social justice [27–29]. From our perspective, then, the uptake and application of the just transformations concept to environmental decision making requires that further attention be paid to how justice is conceptualized, how it might be operationalized during planning and management of sustainability transformations, and how research can support these efforts. To address these gaps and promote greater engagement, this conceptual and methodological paper reviews the literature on sustainability transformations, just transitions and social justice to characterize just transformations and offer practical and methodological guidance on considerations that might be used to help facilitate just transformations. In doing so, we aim to bring recognitional, procedural, and distributional justice to the forefront of emerging sustainability and transformations discourse, policies and practice. In conclusion, we examine how this thinking might be applied to a case study and discuss the challenges of navigating just transformations to sustainability.

2. Literature Review: From Deliberate Transformations to Social Justice

2.1. Deliberate Transformations to Sustainability

The notion of transformation is increasingly promoted in scientific and popular discourse as a solution to unsustainable practices [30,31]. Deliberate transformation conveys something more substantial or radical than incremental change [32]. While "incremental" changes may rely on current modes of thinking and governance structures to modify social–ecological systems (e.g., changes to existing taxation or fines for polluting industries), "radical" change may require deep systemic and structural shifts that challenges our assumptions, beliefs, and values, along with government regimes, development paradigms, and power relations (e.g., moving away from government imposed protected areas to community-based management [22]). The Intergovernmental Panel on Climate Change (IPCC) Special Report on Extreme Events defines transformation as "the altering of fundamental attributes of a system (including value systems; regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems)" [33] (p. 3). A transformative response to climate change implies that limiting global climate change to 1.5 °C will require engaging with the root causes of inequality and environmental degradation, as opposed to simply pricing carbon or investing in renewables [27,34]. The IPBES recently released a summary report that calls for transformative changes to society, stating "Goals for conserving and sustainably using nature and achieving sustainability

. . . .may only be achieved through transformative changes across economic, social, political and technological factors" [4].

While still a nascent field, the scholarship on transformations to sustainability has been informed by three distinct literatures that offer important insights. First, the transition literature emphasizes the role of socio-technological innovations in catalyzing transformations towards low carbon futures in sectors such as transportation, agriculture and energy [35,36]. Research on socio-technical transitions has sought to understand how to accelerate long-term structural transitions through leveraging change at three levels: niche (i.e., technological innovations), regime (i.e., the socio-technical system), and landscape [37]. Though it emerged from somewhat different theoretical and academic origins, the transitions literature has informed transformations thinking regarding how to leverage change in systems in a stepwise manner [38–42]. Second, the transformational adaptation literature distinguishes between incremental adjustments and transformational responses [30]. This perspective emphasizes the importance of contesting dominant social and political structures, rather than accommodating change, to address the root causes of unsustainable systems and catalyze genuinely alternative futures [34]. This explicitly political perspective argues that market-based approaches or technological innovations are, in many instances, insufficient to produce sustainability transformations [43]. Third, the resilience literature conceptualizes transformations as triggered by crises, or abrupt non-linear change, in linked social–ecological systems [44–46]. Here transformations are understood to result in new regimes, defined by novel system properties and feedbacks between social and ecological components of the system [47,48]. Resilience thinkers have also collaborated with scholars from other fields to propose theoretical approaches for characterizing and navigating transformations, including transformational adaptation [49] and sustainability pathways [50,51].

2.2. Transformations and Justice

Transition scholars, in particular, have more explicitly engaged with themes of social justice. While early thinking on socio-technical transitions was criticized for underplaying the role of justice [52,53], more recent writing has paid closer attention to distributive processes involved in societal change. For example, Swilling et al. [54] (p. 650) explore the possibility for a 'just transition' in South Africa, which they conceive of as "a dual commitment to human well-being (with respect to income, education and health) and sustainability (with respect to decarbonization, resource efficiency and ecosystem restoration)". Through their analysis of the politics of energy transitions, Newell and Mulvaney [55] (p. 132) conclude that "issues of equity and justice will be intrinsic to whichever energy trajectory is pursued". This thinking on 'just transitions' has been informed by strands of literature on environmental and climate justice [56–62]. However, the notion of 'just transitions' has focused almost exclusively on the energy sector. While renewable energy transitions are an essential component of sustainable futures, transformations across multiple sectors and human activities are required if humanity is to live sustainably [63]. Indeed, "affordable and clean energy" (Sustainable Development Goal 7) is but one of seventeen areas understood to be critical for realizing the 2030 Agenda for Sustainable Development [8].

Perhaps because the scholarship on transitions and transformations have emerged somewhat separately [38,64], engagement with themes of social justice has largely remained confined to the transitions literature. Within the research on transformations to sustainability, little emphasis has been placed on the differentiated social impacts of such profound change or the level of inclusion of implicated actors in decision making [53]. For example, the word 'justice' is only used once in Karen O'Brien's [30] seminal paper on deliberate transformations and there is no mention of 'justice' on Future Earth's description of their transformation program [6]. Yet, we know that societal transformations at any scale are shaped by, and will shape, the distribution of wealth, opportunities, and privileges afforded to different social groups [10]. While notions of justice have recently started to permeate writing on transformations to sustainability [27–29], more attention is needed to both understanding and realizing social justice during sustainability transformations.

2.3. Conceptualizing Social (In) Justice

Past research has documented a number of the potential risks of sustainability practices from a social justice perspective. Potential social injustices have included: (a) lack of the recognition of pre-existing rights, needs and livelihoods of distinct stakeholders [65–67]; (b) exclusionary decision-making process that fail to include local people [26,68,69]; (c) negative social consequences of management actions that undermine human-well-being [70–72]; (d) unequal distribution of costs and benefits to different groups [73–75], and (e) elite capture of the long-term benefits, thus increasing social inequity during and after a transformation [76–79]. Recognizing that any sustainability initiative has the potential to be done in an exclusionary or inclusive fashion and to increase or decrease social justice, we argue that strategic thinking and planning is needed to manage deliberate transformations in a manner that is just. As shown in Figure 1, this implies addressing existing—though potentially avoidable—tradeoffs in policies that seek to co-achieve multiple social and environmental goals. However, there is still a need for the clear articulation of what is meant by justice and for practical guidance that can be applied to sustainability decision-making processes.

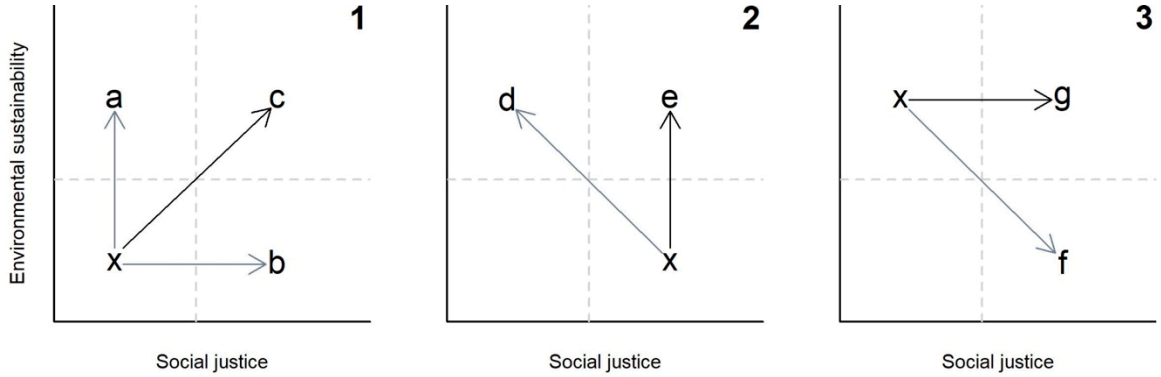

Figure 1. Heuristic models of transformations from initial social–ecological system states (x) towards future states. Just transformations are shown by the dark arrows where the outcome produced balances environmental sustainability (e.g., environmental health, ecosystem productivity, biodiversity, etc.) and social justice (e.g., distribution of wealth, opportunity and privileges). Lighter arrows show transformations that privilege either environmental sustainability or social justice as a rationale and outcome. The three panels show that the starting configuration (x) can be both unsustainable and unjust (**1**), unsustainable but just (**2**), or sustainable but unjust (**3**). The letters c, e, and g represent just transformations, whereas the letters a, b, d, and f fail to achieve just transformations towards sustainability.

Environmental justice literature, in particular, provides important insights and guidance here. A robust environmental justice literature emerged from critiques and empirical evidence of racial and social injustices in the siting of development projects that produce dangerous waste and pollutants [80–82]. While initially focused primarily on critiques of the inequitable distribution of environmental pollution and harms, the environmental justice literature has since been applied constructively to guide sustainability, conservation and adaptation decisions in a variety of geographical and environmental contexts [83–85]. While it is beyond the scope of this paper to review this extensive literature, here, we draw from the environmental justice literature, as well as conceptually linked literature on just transitions [58–61] and social equity [86–89], to suggest that recognitional, procedural, and distributional justice need to be taken into account during transformations towards sustainability (see also [90]). We derive from these literatures to suggest the following definitions for the three dimensions of justice:

- *Recognitional justice* refers to the acknowledgement of and respect for pre-existing governance arrangements as well as the distinct rights, worldviews, knowledge, needs, livelihoods, histories and cultures of different groups in decisions;

- *Procedural justice* refers to the level of participation and inclusiveness of decision making and the quality of governance processes; and,
- *Distributional justice* can be defined as fairness in the distribution of benefits and harms of decisions and actions to different groups across space and time.

3. Guidance to Manage Just Transformations towards Sustainability

Below, we provide practical guidance for pursuing just transformations. First, drawing from our engagement with a broad set of literature on transformations, just transitions, and social justice reviewed above, we define just transformations and just transformation management as follows:

- *Just transformations* refers to radical shifts in social–ecological system configurations through forced, emergent or deliberate processes that produce balanced and beneficial outcomes for both social justice and environmental sustainability.
- *Just transformation management* consists of deliberate governance processes and actions taken to shift systems towards environmental sustainability and social justice outcomes in ways that account for recognitional, procedural and distributional concerns.

These definitions are explicitly normative, and the idea of just transformation management is prescriptive. It suggests that we need to actively incorporate the three elements of environmental justice into environmental sustainability decision-making processes. But, how? What guidance can help facilitate just transformations during environmental decision-making processes? What information or research is needed to support the management of just transformations? We contend that the management of just transformations will be improved through engagement with research and knowledge from a variety of different fields. Below, we provide both practical and methodological guidance for how environmental and sustainability decision-making processes might incorporate recognitional, procedural and distributional considerations to facilitate just transformations (Figure 2).

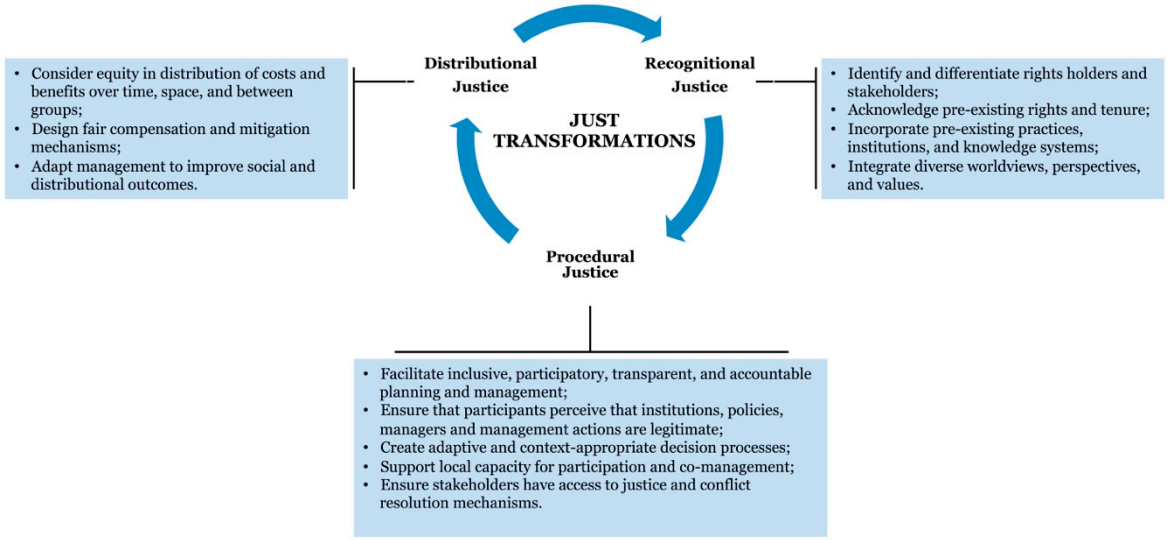

Figure 2. Key considerations and guidance for just transformation management.

3.1. Recognitional Justice

The recognition of all groups is the basis of all forms of justice; without it, neither procedural nor distributional justice will be possible for some groups. Recognitional justice requires first the identification of all interest groups and rights holders who are present in an area and who might be implicated by a sustainability initiative. Special attention needs to be paid to representing diverse interests and to ensuring the involvement of those who are often neglected or marginalized in decisions [91]. This might happen through a process of identifying and ensuring the salience of

stakeholders [92–94]. An important next step is the documentation of the historical and current tenure and rights of the different groups to both land and resources. For example, the rights of some groups to areas or resources might be given preferential treatment under law while for other groups resources might be considered integral to their right to food. Research methods such as legal and policy reviews, mapping of indigenous and property rights and participatory spatial mapping of historical and current uses and rights can help to identify the legal allocations and spatial configuration of rights [95–98]. The recognition of and respect for the traditional practices and institutions, knowledge systems, cultures and worldviews, and values of diverse interest groups and rights holders will necessitate that steps are taken to both understand and to meaningfully integrate these considerations into environmental planning and management. Methods such as stakeholder analysis, participatory action research methods or social analysis systems could facilitate documentation, discussion, and incorporation of these factors into decision making [99–101]. The documentation of local and traditional knowledge [22,102,103] and mapping of diverse social and cultural values [104–106] can enable the integration of this information with scientific knowledge and ecological values in management and planning of sustainability initiatives.

3.2. Procedural Justice

More than just participation and inclusion, procedural justice requires engaging in a manner that ensures a broader set of qualities of good governance, such as transparency, accountability, legitimacy, responsiveness, capacity, and access to justice, are available to all actors [88,107–111]. Principles of participation and inclusion asks us to consider who will be included in decision making and how they will be included. Genuinely participatory decision making requires the development of governance structures that adequately represent all stakeholders and marginalized groups and well-facilitated processes that ensure that a diversity of voices and perspectives are heard [109,112]. Being truly inclusive may also necessitate designing contextually appropriate governance and collaborative management processes that consider capacity and timing needs, develop information sharing protocols, incorporate pre-existing governance structures and respect cultural differences. The autonomy and sovereignty of different nations, local communities and indigenous groups also need to be acknowledged, and respect for the right to self-determination provided through ensuring Free, Prior and Informed Consent (FPIC) [113–115]. The timely and accessible communication of scientific research and other information, of the way that decisions are made, and of the rationales for decisions to all parties provides transparency [88,109,116]. Upward and downward accountability mechanisms can help to ensure that parties are responsible for fulfilling their assigned duties and for other actions [109,116]. As a general rule, environmental sustainability initiatives need to be responsive and adaptable to different social contexts and to local people's needs [117,118]. Legitimacy is provided by law but can also be conferred by actors based on their perceptions of, trust in and support for sustainability actions [109,118]. Providing support for local capacity, as well as active development of local skills, ensures that local people can effectively participate in decision making and management [119,120]. Finally, access to justice and conflict transformation mechanisms can help to mediate differences between more and less powerful groups, and can help to redress for past wrongs [21,28,114,121]. Research can help to understand and enable procedural justice through descriptive assessments or normative evaluations of current governance institutions, structures and processes to document their current status, diagnose issues and aid in the re-design of more just governance processes [107,109,118].

3.3. Distributional Justice

The concept of distributional justice refers to fairness in how different groups of people benefit from or incur the harms of environmental decisions and actions across space and time. As a management norm, distributional justice necessitates that we understand how different groups will be impacted by changes to resource access, allocations, benefits and harms during and after sustainability transformations. At the very least, facilitating just transformations will require identifying the potential

economic costs and benefits of environmental and sustainability initiatives. Understanding net economic effects can be accomplished through a basic cost-benefit analysis [122]. However, to truly understand distributions this should be complemented by an analysis of how these economic costs and benefits of implementing a policy are dispersed: (a) between and within groups using, for example, indicators such as the Gini coefficient [123,124]; (b) both across space (i.e., to proximal and distant groups) using Gini coefficient as applied to analyze the distribution of high seas benefits under different management regimes in Sumaila et al. [125]; and (c) over time (i.e., before, during, and after the transformation, to current and future generations) by employing intergenerational cost-benefit analysis and discounting [126–128] and Gamma discounting [129]. These analyses can be useful as the basis for deliberations on what actions to take to facilitate just transformations. However, deciding what constitutes a fair or just distribution is complicated by underlying philosophies and 'equity criteria' (i.e., utility, equality, proportionality, needs, merit, and rights; defined in Table 1) that are often implicit in environmental and sustainability decision-making processes [18,89,130,131]. In Figure 3, we demonstrate how more explicit consideration of these different criteria might change the allocation of fisheries' catches to three different groups (i.e., indigenous or subsistence fishers, small-scale commercial fishers, and industrial scale commercial fishers) before, during and after the rebuilding of fish stocks. This scenario also demonstrates how both current distributions and historical rights and trends may need to go into the calculus of just distributions. Thus, a critical first step might be needed to right past wrongs through restitution.

Understanding the distribution of benefits and harms can be further complicated by the fact that sustainability initiatives impact not just economic, but also other social, cultural, physical and political aspects of human well-being that are valued by people [72,132]. For example, fisheries management successes as defined by economic (and sometimes ecological) objectives can be viewed negatively by communities due to an inequitable distribution of benefits, risking increased conflict and negative social outcomes [15]. This can be problematic given the non-monetary values—e.g., culture, identity, food security, and social cohesion—that are associated with fisheries, and that are particularly strong in the small-scale sector that comprises the vast majority of fisheries around the world [72,133]. There are numerous integrative frameworks and decision-making tools for characterizing and understanding the impacts of decisions on the different aspects of human well-being that groups receive from, for example, an environmental resource, ecosystem service or natural area [24,134–137].

Table 1. Implicit philosophies and equity criteria influence what is judged to be a fair or just distribution of outcomes.

Criteria	Descriptions
Utility	Just actions are judged to be those that produce increases in aggregate goods and that improve overall human well-being. Distribution is not considered.
Equality	All parties are deemed to be the same, and assumed to have equal opportunity, and thus should be treated in exactly the same way.
Proportional	Assumes that future losses and gains should be proportional, but not equivalent, in value based on current claims and allocations.
Needs	Preferential treatment should be given to the poorest, most vulnerable, and most in need.
Merit	Different parties ought to receive what they deserve—both reaping benefits and suffering costs—based on effort (e.g., work) and inputs (e.g., capacity, investments). Also referred to as just desserts.
Rights	Treatment of different groups should ensure that minimum thresholds of basic human rights are respected and depends on pre-existing rights (e.g., Indigenous people rights, historical tenure).

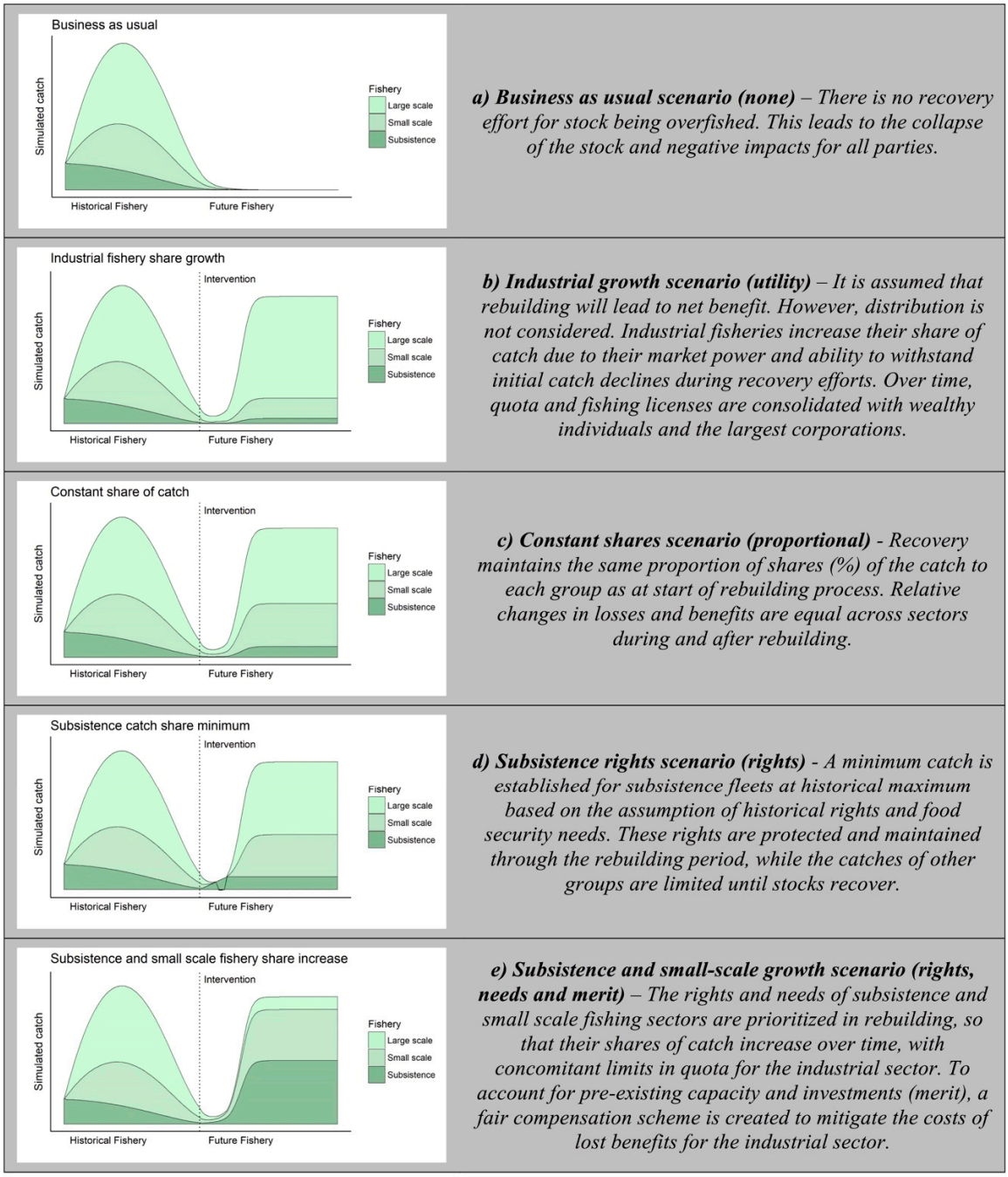

Figure 3. Hypothetical scenarios of modeled distributions of fisheries' catches to three different groups (i.e., indigenous or subsistence fishers, small-scale commercial fishers, and industrial scale commercial fishers) before, during and after a transformation period (i.e., rebuilding stocks) based on the different equity criteria. Note that total catch after recovery is assumed to be equal for all scenarios (except business as usual); changes are to the allocation of catches during and after stock recovery.

Both economic and integrative assessments can help to guide decision making to identify actions, both during and after the transformation process, that may need to be taken to mitigate negative socio-economic impacts (e.g., compensation schemes, impact benefit agreements) and/or to promote socio-economic benefits (e.g., develop new opportunities or alternative livelihoods). Yet, the questions of who and how much to compensate different groups can be a challenging one, particularly for public resources such as fisheries, water and forests. When economic efficiency or environmental conservation are the overarching policy goals, issues related to who should benefit from resources may be considered

less important. Compensation questions are usually limited to calculating an appropriate amount, for example, the net present value of fish quota in quota-based management systems, or estimated habitat or biodiversity values (i.e., carbon sequestration rates, fisheries or ecotourism revenue) in payments for ecosystem services programs. 'Fairness' in these cases is addressed by computing the values that different users are currently deriving from natural resources, or the average amount from recent years (e.g., average fishing revenue in the last five years for a given company). However, true transformations may create novel "losses", producing lost profit for historically privileged or wealthy groups (see Figure 3e). Should these additional losses be considered, and these groups be compensated during transformations? This is an ethical question that will need to be addressed in every case. Implementing ongoing programs to monitor the social impacts of environmental and sustainability initiatives, can also help to facilitate adaptive management of sustainability policies and practices for distributive justice [138]. Finally, throughout discussions of distribution, recognitional and procedural justice considerations would suggest that representatives of all rights- and stake-holder groups need to be included in selecting the indicators for valued components, in choosing the assumptions that go into allocation models and in deliberating on the management decisions that are ultimately taken.

4. A Case Study of Fisheries in British Columbia, Canada

To demonstrate how this thinking might guide environmental and sustainability decision-making processes, we turn our attention briefly to a case study of fisheries on the Pacific Coast of Canada. Our aim here is not to propose the solutions—but rather to provide a general description of the context and explore how the three social justice considerations might be taken into account. The current situation in coastal British Columbia (BC) might be characterized as follows: (a) historical declines in fisheries have led to a situation where many stocks are considered overfished or unsustainable and there is a recognized need to rebuild many fisheries [139–141]; (b) Indigenous fisheries were historically side-lined in favor of commercial fisheries [142], and although indigenous rights were enshrined in the Constitution Act of 1982 [143], court cases are still being fought and negotiations are taking place to ensure adequate allocation for cultural, subsistence and livelihood rights [144,145]; (c) While fisheries were an economic mainstay for many coastal communities during the 20th century, over recent decades fishing licenses, quota and benefits are becoming increasingly centralized and consolidated with less profits going to active fishermen and serious implications for coastal communities [124,146–149]; and (d) Governance and decision-making processes regarding fisheries management on the Pacific Coast are consultative rather than truly participatory [150–152], though a comprehensive evaluation of ocean governance processes in BC is lacking. In short, this is a challenging policy scenario that might be broadly characterized as approaching, if it is not already, a situation that is both ecologically unsustainable and socially unjust.

This brings us to the difficult question of how a just transformation towards environmental sustainability might occur. Incremental change will be insufficient to ameliorate the overlapping social and environmental issues in BC fisheries, a more radical transformation is required. Currently, some groups are advocating for better management and the rebuilding of fisheries while other groups are promoting actions to reallocate fishing licenses. We concur with the argument of both groups. Indeed, many fisheries will need to be rebuilt, and this may require decreases in overall fisheries harvests. However, fisheries management and marine conservation decisions will also need to struggle with questions related to recognitional, procedural and distributional justice. The question of how fisheries' catches will be distributed during and after the transformation to different groups, as well as how different groups might be compensated for losses incurred, will require discussion and negotiation based on a balanced consideration of utility, proportionality, needs, rights and merit (Table 1 and Figure 3). An important first step in this process will be to develop a solid understanding of the historical context and current status of both the fisheries and how catches were distributed to different groups—including indigenous fisheries, small-scale (owner-operator) fisheries, and commercial fisheries—who have actively fished on the coast. A subsequent step will be to recognize the pre-existing tenure and rights of

these different groups and to examine how distinct circumstances and needs, governance institutions, local knowledge systems, cultural values and practices might be taken into account in decision-making. Procedural justice suggests that these different groups ought to be able to participate and have a say in the decision-making processes that employ good governance practices such as transparency, accountability, responsiveness, capacity and access to justice. Given the lack of past evaluations, the current governance processes may need to be first evaluated against indicators for good governance from the perspective of different stakeholder groups to identify necessary improvements. As will be discussed below, new spaces, governance processes, and capacity may be required (and indeed are already being created [144,153]) to navigate this transformation.

5. Discussion: Addressing the Challenges of Navigating Just Transformations

In this paper, we aim to bring recognitional, procedural and distributional justice considerations to the forefront in sustainability and transformations science, policy and practice. This implies that sustainability and environmental decision-making processes will need to ask: Who is implicated in sustainability decisions? Who should be included in decision making? How should decisions be made? How should distinct worldviews and cultures be considered? What will be the short and long-term impacts of decisions? Who will the winners and losers be? Engagement in sustainability transformations research and management, in particular, calls for reflection on the distribution of wealth, power, opportunities, and privileges within our societies. This is essential because all actions taken to shift towards environmental sustainability can have both positive and negative social implications for different groups relative to the status quo. Lack of consideration of local people's voice or needs in the pursuit of sustainability can also lead to lack of legitimacy, opposition and the active undermining of environmental sustainability policies. While the theoretical literature on sustainability transformations has touched on justice, it has not been adequately conceptualized as to be practicable. We consider this paper to be an extension of the past literature on transformations, just transitions, and social justice. It provides a novel contribution by bringing together these various strands of literature to characterize and provide practical and methodological guidance to support the pursuit of just transformations. Yet, we caution that this guidance should not be thought of as a blueprint, but rather as a flexible input into deliberations for how to navigate just transformations to sustainability in diverse social and ecological contexts.

Meaningful engagement with the principles associated with recognitional, procedural and distributional facets of social justice has the potential to be transformative for sustainability practice. Still, we are not naïve to the significant challenges that a social justice framing poses to those engaging with the daunting task of shifting society radically towards a more sustainable trajectory. Sustainability transformations are political, rife with power imbalances, a site of conflict and a source of social struggle [10,28]. International and national actions taken to promote environmental sustainability have been implicated in human rights abuses and other negative social consequences for indigenous groups and local communities [17,21,70,154,155]. Furthermore, the uncritical and ineffective application of collaboration and participatory approaches may simply reproduce previous injustices, namely inappropriate representation, uneven power dynamics, and the resultant lack of equity and legitimacy [69,156,157]. Explicitly engaging with social justice in environmental decision making may bring to the forefront challenges and issues that were previously simmering beneath the surface. We argue that the "airing" of these types of grievances and concerns may be necessary to proactively and properly address the structural imbalances, power differentials, race-based inequalities and other social justice challenges that could otherwise undermine sustainability initiatives in the long run.

Despite these challenges, scholars and practitioners are making intellectual and practical advances in moving social justice considerations into the heart of transformation research and management in several key areas. First, addressing the unique challenges posed by just transformations requires novel methods for engaging with entrenched inequality and marginalization. These can take the form of transdisciplinary methods, informed by multiple communities of knowledge, which generate

problem-based and solution-oriented data to inform decision making [158]. Alternatively, recent research highlights collective imaginaries [159] and futures methods [160] as creative approaches for envisioning radically alternative, and co-created, futures. Novel analytical tools, such as the Inequality and Transformation Analysis (ITA) framework, enable explicit engagement with broad structural drivers of inequality and open the possibility for more equitable societal transformations [161]. Similarly, the Socio-environmental Conflict Transformation (SCT) framework [28,162] seeks to confront and subvert power relations that are interfering with more radical transformation processes. Second, the creation of transformative spaces is emerging as a promising mechanism for navigating equitable transformations. Transformative spaces refer to deliberately created environments (physical or metaphorical) where excluded or marginalized voices "shape normative agendas, assert alternative cognitive frames and visions, engage with and influence the social processes of governance, knowledge production, and practices, and alter the material conditions (e.g., ecological stocks and flows, infrastructure)" [163]. Transformative spaces can take many forms, including transformation labs [164] or novel conceptual and communicative spaces that are sensitive to power and gender dynamics [165]. Third, transformation thinkers are exploring how to enhance the transformative capacity of marginalized groups, whose voices have often been excluded from decision-making processes. Building transformational capacity can include actions such as accounting for the uneven distribution of transformative agency [166] or enlarging the capacity of marginalized groups to change or transform entrenched injustices [167].

6. Conclusions

In conclusion, we suggest that sustainability transformations cannot be considered a success without social justice. Indeed, one of the core tenets of the UN Sustainable Development Goals is to "Leave no one behind". Achieving this laudable aim will require that social justice is a central concern of sustainability practice. The road to environmental sustainability can be pursued in an inclusive or exclusionary manner and increase or decrease distributional justice. Our aim here is to inspire greater engagement with recognitional, procedural and distributional justice considerations during efforts to pursue transformations to sustainability. The framing of just transformations put forward here might be applied to guide decision making in a myriad of policy realms across marine, freshwater and terrestrial ecosystems, as well as urban and industrial settings and at various scales from local to global. Embedding the consideration of social justice at the heart of transformations research and management is our best way of ensuring more inclusive and just pathways towards sustainability.

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