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Editorial

Environmental Policy Design and Implementation: Toward a Sustainable Society

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1. Introduction

> "No matter how complex global problems may seem, it is we ourselves who have given rise to them. They cannot be beyond our power to resolve." —Daisaku Ikeda, Japanese Buddhist philosopher

The science could not be more emphatic, as a spate of hard-hitting assessments have indicated, achieving prosperous societies, climate stability and a flourishing biosphere requires urgent global action across scales and sectors [1–9]. Meeting the ambitions of the post-2015 Sustainable Development agenda, Paris Climate Agreement, and the Convention of Biodiversity's post-2020 Biodiversity Framework will require radical change in the design and implementation of environmental policies (SDG 17.14), especially those that intersect key goals of economic development (SDG 8, 9, 11) and production and consumption (SDG 2, 7, 12). Such policies must enable transitions towards knowledge-based economies grounded in evidence-based policy making. Here, the cooperation of city governments, the private sector, development practitioners, conservationists, communities, urban planners, and others will be key.

The question then becomes how, under these conditions, can policies be effectively designed and implemented in a way that will steer societies towards more sustainable, inclusive outcomes in the short- and long-term future? This is a complex question and an enormous challenge, and in this Special Issue we only begin to scratch the surface. We do so in two substantive ways by advancing our understanding of: (a) the present state and effectiveness of local, national, and regional policies engaging with, and transforming, the climatic, environmental, social, and economic impacts of development activities; and (b) how environmental policies might be designed and embedded into future development planning to encourage coordination and coherence across policy domains.

To accomplish this, we present a collection of ten papers (Table 1) focusing predominantly on sub-Saharan Africa, including two papers from Europe and Asia for wider relevance. Collectively, these studies work across spatial and temporal scales from local communities, to municipal, national, regional, and international levels and from recent decades up to the mid-21st century. These studies are situated in a range of systems, from urban to rural, dryland to tropical climates, and employ both qualitative and quantitative methodologies. While covering diverse themes, all studies relate to policy implementation, participation and equitable representation in decision making. Crucially, in an era where decolonization is an increasingly important matter to address in academia and beyond, many article authors primarily live and work in the contexts they are researching.

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Table 1. Brief description of the papers included in the special issue.

Paper	Issue	Focus	Approach	Methodology	Thematic Areas	Scale	Country
Mbidzo et al., 2021 [10]	Efficacy of community-based conservation for sustainable resource management and local benefits	National natural resource management policy implementation and local-level impacts	Appraisal of common pool resource management under different governance regimes (i.e., conservancies and communtiy forests)	Policy analysis using Ostrom's CPR framework and key informant interviews	Land use, biodiversity protection, common pool resources, institutional interactions and decision making	Sub-national (regional)	Namibia
Sigalla et al., 2021 [11]	Participatory effectiveness of multi-stakeholder platforms for cross-sector water governance	Participatory representation and engagement of stakeholder groups in decision making platforms to inform water resource management	Examination of gender equality, stakeholder composition and managerial mainstreaming in MSPs	Literature policy review, key informant interviews and focus groups	Water governance, participatory decision making, representative pluralism	National and sub-national (basin)	Tanzania
Angula et al., 2021 [12]	The role and extent of gender responsiveness in international climate change financing instruments	Green Climate Fund and gender responsiveness	Programme level analysis of gender inequalities and differentiated impacts in Green Climate Fund ecosystem-based adaptation initiatives	In-depth interviews and groups discussions	Communtiy-based natural resource management, ecosystem-based adaptation, climate financing, gender representation	National	Namibia
Beauchamp et al., 2021 [13]	Appropriate incorporation of resilience and human wellbeing concepts and indicators into evaluation frameworks	Climate adaptation interventions to build resilience and enhance human wellbeing of local communities	Assessing the interplay of local predictors of resilience and human wellbeing and indicators of resilience in relation to the Devolved Climate Finance mechanism	household survey, participatory discussions and statistical analysis	Local-led adaptation, resilience and human-wellbeing, policy evaluation, local compatibility	Sub-national (regional)	Tanzania

Table 1. *Cont.*

Paper	Issue	Focus	Approach	Methodology	Thematic Areas	Scale	Country
Johnson 2021 [14]	Unravelling the policy discourses embedded in the translation and implementation of international green market mechanisms	National implementation of REDD+ practices and impacts	Narrative assessment of national policy discourse and relationship with local policy implementation	Discourse analysis (critical political ecology), qualitative interviews, and focus groups	Climate mitigation financing, policy implementation, State power, neoliberalism	National	Ghana
Wijesinghe and Thorn 2021 [15]	Governance of urban climate resilience	Integration of urban green infrastructure into local urban governance and spatial planning in informal settlements to enhance resilience and human wellbeing	Assessing the benefits and trade-offs of urban green infrastructure, analysing the institutional arrangements for urban green infrastructure governance, and highlighting desirable pathways for urban governance	Case studies, key informant interviews, focus groups, and participant observation	Urban governance, climate resilience, informality, green infrastructure, local participatory stewardship	Municipal	Namibia
Wakdok and Bleischwitz et al., 2021 [16]	Climate change consequences for human security in resource insecture regions	Examining the climate–security–resource nexus and implications for the implementation of the SDGs	Explore land use and grazing policies in relation to security and conflict pathways concerning shared resources between farmers and migrating herdsmen, and the role of climate change as a stress multiplier	Literature review, comparative case study, and scenario approach	Resource conflict, climate change, migration, sustainable development, land use and livelihoods	International	Nigeria and Chad
Scheren et al., 2021 [17]	Balancing development and ecological integrity futures	Highlighting sustainable pathways for Africa's ecological resource base over a 50 year time horizon	Develop collectively owned scenarios that can be used to explore key drivers of change and system level responses to steer sustainable social-ecological futures	Participatory scenario planning, DPSIR Framework	Sustainable development, participatory planning, decision-support, social-ecological futures	International	Pan-Africa
Franco et al., 2021 [18]	Utility and effectiveness of spatial modelling of national sustainability metric	Mapping municipal level sustainability indices based on the supply and demand of natural resources (i.e., their footprint)	Assessment of the "ecological balance" per capita for each municipality based on calculating the "ecological footprint" and "biocapacity" per capita to determine municipal scale sustainability	Ecological Footprint framework	Resource use and demand, decision-support tool, spatially explicit sustainability modelling	National and sub-national (municipal)	Italy
Xing et al., 2020 [19]	Efficacy of policy to green industry via exploring the relationship between environmental policies (regulation), sustainable innovation and financial performance	Assessing the mediating impact of "green dynamic capability" on sustainability exploration/exploitation innovation of industrial businesses	Measuring the capacity of specific environmental policies to stimulate sustainable innovation, conceptualised as "sustainability exploration innovation" and "sustainability exploitation innovation", in polluting manufacturing industries by introducing "green dynamic capability" as a mediating mechanism—extending the Porter Hypothesis framework.	Survey, Multiple mediation model	Environmental policy regulation, sustainability innovation, business responsiveness	National	China

2. Background

Over the past few decades, many low- and middle-income countries, especially in sub-Saharan Africa, have witnessed rapid socioeconomic developments that have resulted in significant transformations of local and national social-ecological environments [20–24]. What these references demonstrate is that on the one hand, these transformations have realized considerable economic growth, inward investment, improvements in infrastructure and basic amenities, poverty reduction and livelihood diversification. In turn, nurturing the education and skills of many young populations and catalyzing the growth of dynamic urban centers. However, on the other hand, these benefits remain unevenly distributed between and within countries, often leading to natural resource exploitation, habitat loss, and even species extinction, while poorer or marginalized communities across the rural-urban continuum are regularly alienated from decision making processes. Moreover, these developments frequently occur against the backdrop of weak governance, institutional bureaucratic backlogs, operational silos, and lack of transparency and accountability.

The continuing COVID-19 pandemic, which resulted in an estimated 3.2% contraction of the global economy in 2020 and according to the World Health Organization has so far claimed over 5.78 million lives, has further spotlighted the stark geopolitical disparities and unequal power relations that frame interactions within and between countries and their populations [25]. These asymmetries underpin the profound structural, social, and economic inequalities that exacerbate adverse impacts of global environmental change, where the most vulnerable communities continue to carry the greatest burden of these unfolding events.

Examples are all around to see. Altered La Niña rainfall patterns in 2020/2021 severely impacted global agricultural production and livelihoods, while drought impacted large areas of Africa, Asia, and Latin America, and tropical storms and cyclones caused widespread damage. Many nations witnessed devastating increases in the frequency and severity of wildfires, such as South Africa, Greece, Russia, Turkey, Greece, India, Israel, and across North America in 2021, releasing 6450 megatons of CO_2 (or 148% more than the total European Union fossil fuel emissions in 2020) [26]. The global costs of natural disaster damage in 2020 totaled US$210 billion according to a report by reinsurance company Munich Re [27]. Meanwhile, global land transformation continues apace. The sheer magnitude and extent of land appropriation for development and extraction meant over 12 million hectares of tropical tree cover was lost in 2020 [28], which continues to imperil the land rights, livelihoods, and cultures of rural and Indigenous communities [29]. At the same time, rates of unplanned urbanization are growing at an extraordinary pace (particularly in Asia and Africa) leading to some 1 billion people living in informal settlements [6]. Furthermore, the levels of consumption of food, water, and energy resources are vastly outstripping what is considered sustainable [1,30–32].

Within the environmental policy domain, questions of how to improve the efficacy, legitimacy, and efficiency of local to global governance has been a long-standing debate, as have the internal and external integration and streamlining of institutions, organizations, and their bureaucracies. Without doubt, the existential threats posed by the confluence of the climate, biodiversity and pollution crises require collective, multi-scalar policy action, as recognized by recent high-level pledges made by world leaders at the 2021 United Nations Climate Change Conference of Parties (COP26) in Glasgow. Time will tell if these pledges remain grandiose political rhetoric or become actualized into action. Nonetheless, the COP26 underscored the many and varied voices resolutely calling for the re-orientation of the world towards a pathway of equitable, sustainable development.

Even with such a global drive, there is no one 'best' path towards achieving sustainable societies nor necessarily a consensus on what those societies would be like. Instead, there are multiple avenues that may be appropriate to pursue. Geographies of development matter; populations are heterogeneous differing along wealth, ethnic and religious lines, and face different types and magnitudes of social-ecological challenges. Moreover, communities, countries and regions are not all starting from the same position, nor do they have the same

technical, physical, financial, human, and natural capital endowments or capacities. There are also historical legacies and path dependencies associated with conflict or colonialism that are important to acknowledge. This means reaching a so-called 'sustainable society' is harder and longer for some compared to others. Furthermore, sustainable development as a concept and its mainstreaming in the form of the SDGs is itself contested [33,34]. Questions remain regarding how local perspectives can be embedded in national policy frameworks and planning processes, the ability of sustainability metrics to support decision making, the role of dominant discourses in shaping policy narratives and implementation, and how environmental policies can stimulate industrial and public innovation now and in the future. There also remains limited empirical evidence of the efficacy of community-based natural resource management and multistakeholder platforms, gendered considerations of international climate financing initiatives, governing green infrastructure in peri-urban systems, and appropriate policy responses to human security implications of resource constraints under climate change.

These issues are explored by authors within this collection.

3. Key Insights

In this section, rather than provide a sequential synopsis of each paper, we highlight eight cross-cutting insights from our collection of articles that indicate how policy (broadly conceived) can engage with and inform the transition towards sustainable societies.

3.1. Develop Appropriate Coordinated, Integrated Institutional Arrangements

By comparing conservancies and community forests in the Zambezi region of Namibia, ref. [10] argue that matching actors, resources, and legal and administrative arrangements across scales is critical for the effective management of common pool resources. In analyzing the effective roll-out of multi-stakeholder platforms for water basin governance in Tanzania, ref. [11] similarly note that institutional matching (i.e., the correspondence between institutions and the level of authority, scale, or issues which they are addressing) is a common challenge necessary to overcome. Likewise, ref. [15] argue that to progress towards urban climate resilience in Namibia that forming coordinated governance systems that clarify mandates, roles, and modalities is mainstreaming urban green infrastructure and ecosystem services into municipal urban spatial planning and policy is essential. Equally, ref. [14] advances that enhancing the efficacy of reducing emissions from deforestation and forest degradation (REDD+) in Ghana requires individual programs to be coordinated or integrated into the 'national forestry governance landscape'. Fully aligning with these sentiments, arising from a multi-year scenario planning process exploring pan-African ecological futures, ref. [17] emphasize that holistic governance (i.e., the combining and streamlining of legislation, regulation, and informal rules across scales) is essential to move towards effective natural resource governance.

The consequences of inappropriate or inadequate governance are also clear. Prescriptive, top-down measures can diminish customary governance arrangements and undermine local social-ecological resilience [10]; structural institutional barriers can alienate or exclude individuals or groups from actively contributing to governance processes [11]; while insufficient governance resources and capacities are prohibitive to advancing informal settlement upgrading [15] or conservancies [10]. This strongly suggests that governance and institutional structures and processes need to be carefully crafted and considered, and critically evaluated. In this regard, ref. [17] underscore the importance of strengthening institutions, building capacity, ensuring consistent and long-term financing, and harnessing new technologies.

3.2. Ensure Inclusive, Pluralistic Stakeholder Engagement and Meaningful Participation

Several papers deal with the issue of stakeholder participation in decision making processes. Ref. [11] point to the need for the 'right mix' of actors (in terms of how stakeholders behave in response to rules and assigned roles), suggesting the need for more

extensive private and public, as well as social, political, environmental, and economic and other sector participation to enable the proper functioning of multistakeholder platforms. In advocating for collaborative governance, ref. [15] call for broader community-based consultation, involvement, and stewardship in urban green infrastructure installation, restoration, and maintenance. The authors put forth the case that revitalizing multistakeholder platforms could provide a mechanism to enhance "inclusivity and accessibility in the planning, design and management, while improving local stewardship and valuing of green spaces" (p. 17). Further, the work of [12] in Namibia indicates that participation in decision making and leadership may be enhanced through aligning climate adaptation governance with community based natural resource management institutional arrangements. Extending participation and enhancing stakeholder engagement is also about building and co-constructing new partnerships, which enable the establishment of new initiatives. As ref. [17] state in relation to the challenge of appropriately managing important ecological assets, to be effective this requires the reconfiguration and creation of new roles and relationships between public, private and civil society sectors and actors. Ref. [17] further highlight the need to establish new partnerships, especially those that heavily engage with the private sector through corporate social responsibility.

At the same time, participation is not an unalloyed good, and indeed can be counterproductive if it is approached in a cursory manner, lacks meaningful engagement, and fails to account for meaningful inclusivity. As ref. [11] reveal, participation in water sector multistakeholder platforms in Tanzania primarily occurs at a technical level or below, resulting in discussions that focus on technicalities at the expense of wider, longer-term, and strategic deliberations. A lack of diverse stakeholder engagement erodes the breadth and quality of discussions, reducing the likelihood of effective multi-scalar integrated water resource management. In addition, ref. [14] points out that participation does not necessarily endow decision making capability or power, even if it provides a space for discussion. In the case of REDD+ implementation in Ghana, whilst government, private, civil society, research, and development sectors are part of the conversation, local communities are frequently absent, and especially so in high-level decision making forums. Instead, ref. [14] notes, local communities are often represented by proxies who purport to speak on their behalf, construed as homogenous collectives with singular perspectives and aligned common interests.

3.3. Improve Gender Representation, Responsiveness and Reduce Inequalities

Across all sectors and levels of decision making responsibility, historical and current, women, Indigenous, impoverished, and other marginalized groups are frequently marginalized or excluded from core policy, governance, or management arenas. This exclusion is not only to the detriment of these groups, but also to the detriment of structures and processes of decision making. Ref. [17] remark, for instance, that there is a widespread gendered division of labor within water institutions, with women commonly relegated to administrative and non-decision making roles. Authors also find that multistakeholder platforms do not adhere to gender equality despite this principle being part of their founding guidelines. Examining the gender responsiveness of Green Climate Fund projects in Namibia, ref. [12] demonstrate that social and cultural factors work together to prohibit the participation of women in the implementation of Green Climate Fund programs, particularly in the form of patriarchal dominance, which constrains the ability of women to take leadership roles, contribute meaningfully to decisions, and undermines livelihood diversification, for instance to working as wildlife game guards. On the other hand, the authors argue that considering gender at the outset of community-driven adaptation projects can reduce gender inequities and build capacity, while improving the chances of achieving climate resilient outcomes. They go on to suggest that climate-financed interventions should focus on engaging both men and women of all ages, promote women to leadership roles, collapse income disparities, and fully acknowledge the value women's work and their reproductive rights.

3.4. Develop an Integrated and Coherent Multi-Scale Policy Landscape

Fragmented, incoherent, or contradictory policies are not only less effective, but can actively undermine sustainable solutions or perpetuate challenges. Assessing climate change impacts on human security in Northern Nigeria and the Lake Chad region, ref. [16] assert the centrality of land grazing policy failure and implicate it as the primary driver of human displacement. They propose that a nexus approach to policy formulation, design and implementation can help provide a holistic mechanism to address agricultural and pastoral land scarcity, ecosystem service degradation and navigate conflicts. A nexus policy approach further leverages a systems-based, multi-scale, multistakeholder appraisal capable of negotiating the tensions between environmental impacts, land use policy, and wider social and cultural factors influencing human migration.

Relatedly, ref. [17] advocate integrated planning capabilities to deliver more strategic evidence-based decision making, suggesting that such an approach can be deployed across scales, combine different forms of data and evidence, be used to assess the social-ecological costs and benefits of development projects, improve stakeholder collaboration, and thus better manage and steer the large-scale social-ecological transformations of Africa's landscapes, ecology, and natural capital. To build effective urban climate resilience for informal settlement communities, ref. [15] additionally make the case that this rests on improving policy coherence. As an example, the authors cite the need to include urban green infrastructure in integrated development plans such as the city of Windhoek's human settlements upgrading policy.

3.5. Understand the Politics and Power Dynamics of Policy and Be Sensitive to Local Needs and Conditions

A frequent barrier to achieving legitimate, consensual sustainable development is state misappropriation of power and the lack of awareness of local perceptions of policy interventions. In the case of Ghana's REDD+ strategy, ref. [14] asserts how its focus is intentionally in the 'wrong' direction. Rather than addressing the macro-level market and policy forces that enable the development of illegal markets for forest products and maintain their demand, instead the policy focuses on eliminating the micro-level illegal activities in rural areas that contribute to deforestation. The consequence of this is that this renders interventions both apolitical and technical. As ref. [14] goes on to argue, this enables the state to accrue decision making powers and financial resources under the guise of social-ecological responsibility, while simultaneously expanding its power and control into rural areas and over forest resources at the expense of local communities. This latter point chimes strongly with the recommendation by [10] that, in some (although not all) contexts, if communities have secure land tenure rights, whether communal or individual, overall natural resources on their land, this can improve land management.

Approaching the issue of localization of monitoring and evaluating climate change adaptation program in Tanzania, ref. [13] show how higher-level policy proxies for wellbeing and resilience can be misaligned and affected by different factors, while being rooted in local dynamics. They argue that from the outset programs must be attuned to, and fully acknowledge, local social and cultural norms and power dynamics (even though this is not the majority practice). This is critical to avoid unintended outcomes that lead to maladaptation. The authors also argue, as part of so-called 'locally-led adaptation', that researchers and practitioners need to be sensitive to the lived experiences and subjective perceptions of communities. On a similar note, ref. [12] emphasize that ecosystem-based adaptation policies and planning should encourage household level adaptation responses, and in cases where this is not fully sufficient provide public support for planned adaptation.

3.6. Encourage Environments That Stimulate Innovation and Support Leadership

Providing enabling environments that support green innovation is crucial to helping the private sector move in a sustainable direction. In their analysis of environmental regulation policy on Chinese manufacturing companies, ref. [19] show that regulatory policy

can positively affect firm financial performance via 'green dynamic capability' (i.e., encouraging businesses to reconfigure resources to develop greener capabilities). The authors demonstrate that innovation is largely via the 'sustainability exploitation innovation' (i.e., as a result of incremental changes made by firms through improving performance such as by purchasing patents and outsourcing production) not through product development. In the context of peri-urban green infrastructure, ref. [15] raise the prospect of innovation via strategies such as 'safe-to-fail' pilot schemes, or learning-by-doing, collaborative, experimental spaces in the form of urban living labs. Innovation in adaptation is also reliant on the galvanizing and convening power of local leaders, which can support for instance training and extension programs [12].

3.7. Employ Novel Methods to Provide Effective Decision-Support Tools for Sustainable Development

Methods can offer invaluable decision support tools to inform evidence-based policy making for sustainable transitions. Increasingly, these include strategic environmental and social impact assessments, conservation planning tools, and natural capital accounting [17].

One method which has gained traction in policy circles over recent years is scenarios. Scenarios are articulations of plausible future system states. Scenarios help policy makers and other stakeholders move beyond their normal restrictive political, business, and economic short- and medium-term time horizons, and to think strategically over the long-term about potential development pathways. Scenarios have the potential to move policy away from being reactive towards being adaptive and iterative. In their paper, ref. [17] report on a participatory scenario planning exercise underpinning the African Ecological Futures initiative. Participatory tools of this kind support knowledge exchange, social learning, transdisciplinary practice, and co-production. Bringing together diverse stakeholders, the process generated four scenarios that were entitled: 'Going Global', 'Helping hands', 'All in Together' and 'Good Neighbors'. The authors stress the power of these narratives by exploring how different policy actions could influence national and continental development pathways and environmental outcomes. Pragmatically mobilizing narratives in this way can provide tangible ways to feed into policy decision making processes. Ref [16] use scenarios in a more theoretical exploratory manner, based on literature review and expert judgement, to explore the risks and opportunities of how capital investment, technology and partnership building could transform the Lake Chad region into a sustainable finance and development hub, benefiting as many as 50 million people living in the region.

Another method is highlighted by [18] who use an ecological footprint approach to develop a municipal scale sustainability index. Their analysis shows that 60% of municipalities are unsustainable, covering virtually 95% of the Italian population. Despite the acknowledged shortcomings of the ecological footprint framing, the authors argue that their sustainability index can feed into different stages of decision making, particularly the early warning and monitoring phases, to improve the targeting of policy interventions and their adaptation over time.

3.8. Ensure Consistent Financing That Supports Local Communities, Social-Ecological Systems, and Institutions

The availability, distribution, and use of international and national finance channels to support environmentally sustainable policy interventions is central to deliver and sustain local change. Equally important are the checks and balances of these funds and their responsiveness to local contexts. Taking a macro perspective, ref. [17] urge lending institutions and market investors to create appropriate investment safeguards, legal and regulatory frameworks, and long-term social-ecological impact strategies that mainstream ecological and social benefits into financial risk assessments and minimize the ecological damage. Directing their attention to climate financing, refs. [12,16] argue for the need to repurpose the Green Climate Fund so it is more effective in accounting for livelihood practices, land use policies, conflict, and interactions between ecosystem-based adaptation, gender, and other socially differentiated divisions of labor. Finally, ref. [10] argue that ensuring finan-

cial benefits flow directly to communities (e.g., in return for their labor efforts) is key to supporting local natural resource management institutions.

4. Looking Forward

Crafting effective environmental policies that enable societies to move towards greater sustainability is an ongoing challenge, but one which is ever more urgent to address if we are to successfully confront the multiple crises of the Anthropocene. In reflecting on the contributions to this special issue, we hope to offer a small snapshot of the diversity and depth of research that is addressing eight cross-cutting themes fundamental to environmental policy issues. Individually, none of these themes is new. However, considered together, they not only align with current political, civil society and scientific discussions at meetings such as COP26, but (we hope) offer a more holistic pathway to realize transformative change.

In closing, as we look to the future and the progressive alignment of environmental policy and sustainable development for the benefit of all peoples, societies, and the natural world, it is worth contemplating the words of Wangari Maathai and the responsibility we all have in contributing to that vision:

> "Today we are faced with a challenge that calls for a shift in our thinking, so that humanity stops threatening its life-support system. We are called to assist the Earth to heal her wounds and, in the process, heal our own—indeed to embrace the whole of creation in all its diversity, beauty, and wonder."

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