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Review

Plural values of nature help to understand contested pathways to sustainability

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SUMMARY

Despite globally agreed sustainability goals, advocacy for specific pathways of action remains highly contested. Disagreement about how best to advance sustainability can produce constructive debate but can also lead to marginalization, conflict, and inaction. This review uncovers how different "values of nature" underpin allegiance to different pathways of action for sustainability. It analyzes four selected pathways: (1) Green Economy, (2) Nature Protection, (3) Earth Stewardship and Biocultural Diversity, and (4) Degrowth and Post-Growth. We identify how these four pathways diverge in the values they prioritize and how these values are inseparable from the kind of knowledge and solutions they advocate to resolve environmental crises. The review reveals the underlying values that differentiate (and connect) competing pathways and argues that transparency and reflection on these differences is a step toward more constructive use of diversity. Looking forward, we identify promising directions involving deliberative governance, institutional reforms, and disruption of dominance.

INTRODUCTION

The quest for sustainability can give a superficial sense of consensus over the desired trajectory for people and the planet. This agreement disintegrates once we look deeper into the details of how global society needs to transform. Even having agreed on the key features of a desired future, for example based on a set of Sustainable Development Goals (SDGs), there are still multiple and contested pathways to achieving and prioritizing these partially conflicting goals. A pathway to sustainability is defined here as a comprehensive strategy for achieving a vision, based on a recognizable body of sustainability thinking and practice.[1] Pathways are sometimes considered as fine-grained and sector-specific strategies and actions[2] and sometimes as more holistic frameworks.[3] We adopt the latter conception, considering pathways as comprehensive frameworks involving concepts, theories, narratives, and values about the kinds of changes that are needed to enhance sustainability and justice. Mature pathways are often supported by a body of knowledge and are advocated by coalitions of actors who strategically utilize evidence and other resources in the context of power relations.[4,5] They provide a narrative framing of the sustainability problem that identifies problem causes or drivers, make explicit normative judgments about responsibilities for the problem, and promote a corresponding perspective about the kind of solutions likely to be fair and effective.[6] While the proponents of a pathway might not agree about every specific intervention, they are more or less united, or at least able to compromise, in their basic appreciation for the main narrative and its core values.

Where the "facts are uncertain, values in dispute, stakes high and decisions urgent,"[7] it is inevitable that problems such as climate change and biodiversity loss will be framed in different ways by observers who prioritize different values about nature. While advocacy for competing pathways can stimulate constructive dialogue, too often it results in the marginalization of alternatives by more powerful coalitions, narrowing the

potential for more radical and collaborative solutions.[3,8–10] For example, some scholars feel that dominant narratives of sustainability predicated on efficiency gains and (green) economic growth, are promoted to the exclusion of competing normative concepts such as sufficiency and equity.[11]

Pathways to sustainability are inherently normative because the ways in which we know and represent nature are bound up with how we believe we should live in it.[12] Allegiance to sustainability pathways reveals positionalities involving particular ways of seeing and inhabiting the world that are shaped by worldviews, social learning, socio-economic conditions, environmental constraints, sense of place, cultural identity, political perspectives, language, and knowledge traditions.[13–15] While the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)[16] and others call for more reflexivity and openness about such positionalities, there remains a tendency for those wedded to specific ways of seeing and living in the world to "close down" on alternatives.[17–19]

One reason for this pervasive closing down is that pathways are distinguished by different underlying values and interests. As proposed in literature on leverage points, pathways to transformation require multiple places of intervention in society, from more superficial system "parameters" (such as what market price to place on a ton of carbon) to more deeply held values and norms that shape the underlying "intent" of society (such as why nature matters and what it means for a human to live well).[20–22] Moreover, pathways can reflect underlying political moralities about who is entitled to intervene in society, varying between strictly democratic and dictatorial tendencies.[23]

The IPBES Values Assessment[14] found that ways of valuing nature (e.g., stewardship) as well as relevant ways of valuing other humans (e.g., intergenerational equity) are woven into pathways toward sustainable futures. The prioritization of particular beliefs and values ultimately shapes choices about what nature people want and how, including notions about sustainability itself, and also, for example, ideas about optimality in natural resource use, stewardship of ecosystems, or caring for nature or future generations. While some fundamental values appear widely shared across pathways (such as recognizing the needs of future generations), prioritization of different "specific values" of nature, i.e., judgments regarding the importance of nature and its contributions to people in "specific" contexts (e.g., instrumental, relational, or intrinsic values)[16,24] still serves to demarcate competing pathways, presenting relatively unexamined barriers to a shared agenda.[1]

Here we explore four pathways that are well-established as potential approaches to resolving current environmental crises. While comparative reviews of alternative pathways and narratives have been previously undertaken,[4,5,25] we think that a review that focuses on underpinning values provides new and useful understanding. First, a values-centered analysis of pathways helps to understand the foundations of pathway plurality[26] and why support for particular pathways stems from often strongly held normative positions. Second, this understanding could support advocacy for engaging with the "plurality turn," and thus recognizing and integrating more diverse values and valuation approaches in decision-making.[27] Revealing value plurality and the underlying values of sustainability pathways facilitates transparency, mutual understanding and dialogue in support of building bridges across those pathways.[28–31] Recent reviews have shown that some ways of valuing nature have become dominant, notably instrumental, market-oriented values.[14] Such dominance helps to explain the discursive landscape in which some pathway visions gain traction while others tend to be marginalized, for example why a green economic growth narrative often dominates international- and national-level policy.[1] This is important because openness to more diverse values—disrupting historically entrenched narratives—is increasingly seen as a requirement for the kind of transformative change that most now accept is necessary.[27] Just as governance interventions for sustainability need to be "scaled up" to trigger transformative change, so too they need to be "scaled deep,"[32] addressing the reasons why certain values become marginalized in order to "unleash values diversity" in decision making[16,33] and disrupt currently dominant narratives of progress.

Here we explore four well-established yet contested pathways for resolving current environmental crises. The objective is to reveal the values that are most salient to each pathway through application of the typology of nature's values developed by IPBES. While we find that some broad values such as care for future people are held in common, we also find compelling differences in the way nature is valued across the pathways. We argue that these findings are important for uncovering roots of disagreement and for developing ways of working that break down barriers to transformation, including approaches that foster transparency about values and challenge exclusion of some people's values.

CATEGORIZING PATHWAYS FOR BIODIVERSITY CONSERVATION

Our method involves a comparative analysis of four coexisting, yet partially conflicting pathways for sustainability: "nature protection," "green economy," "earth stewardship and biocultural diversity," and "degrowth and post-growth." These four are purposefully selected to represent a well-established typology for classifying different approaches to nature conservation. Mace[34] described an evolution of conservation approaches, from the more biocentric "nature for itself," to the anthropocentric "nature for people," to a more relational, biocultural approach that she termed "people and nature." This typology has endured as a useful shorthand for characterizing competing perspectives on conservation.[14,35–37] In this paper, we follow Mace's typology but not the evolutionary analysis because our interest is in pluralism and the ways to think about and respond to the contemporary coexistence of diverse pathways. We recognize these as pathways as powerful narratives that shape communities of conservation practice and their interactions, rather than as forms of actually existing practice that appear in pure isolation. As such, the boundaries between pathways are necessarily blurred; for example, a pure "nature for itself" position is unlikely given that most environmentalists also care about human welfare. Similarly, a "nature for people" narrative may go beyond purely economic views of nature by including justification for conservation based on nature's immaterial contributions to well-being (e.g., mental health, knowledge, inspiration, arts etc.).

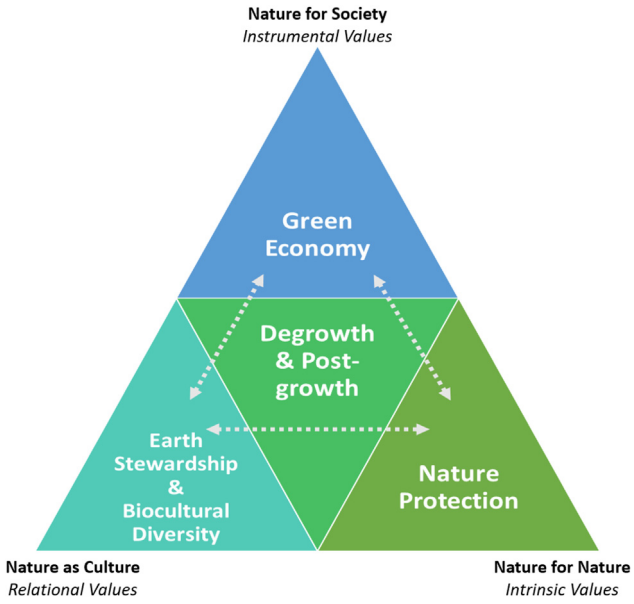

Figure 1. Sustainability pathways selected for review
Pathways are presented in relation to the Nature Futures Framework[37] (bold) and IPBES typology of specific values of nature[14] (italic). Arrows denote that pathway positions are not absolute but overlapping.

Our use of this framework is therefore to identify pathways that are more strongly (but not exclusively) attracted to one of these polarities (Figure 1). *Nature Protection* lies closest to the "nature for itself" (or nature for nature) position, characterized here with a comparatively strong emphasis on non-anthropocentric values of nature, in particular the intrinsic value of biodiversity.[38,39] *Green Economy* is closest to the "nature for people" position that emphasizes the instrumental values of nature as a set of resources and assets to sustain human well-being.[40,41] *Earth Stewardship and Biocultural Diversity* represents a society and nature (or nature as culture) approach that emphasizes relationships between humans and nature, and how these shape, and are shaped by, relations among humans.[13,42] *Degrowth and Post-Growth* is selected for occupying a cross-cutting position, that emphasizes intrinsic, instrumental, and relational values, advocating sufficiency and adherence to planetary boundaries as a basis for sustainability.[43–45] The purpose is not to systematically review the full range of variance composing each pathway, but to use authors with particular expertise in each pathway to identify seminal texts as well as those who reveal emblematic policy proposals in relation to our selected focus on biodiversity conservation.

Our analysis of texts employs the IPBES framework's distinction between broad and specific values. *Broad values* are overarching principles and goals relating, for example, to justice, development, and care. These can shape individual and social behavior in ways that are not restricted to specific contexts. By contrast, *specific values* are expressed in particular contexts. Specific values for nature include *instrumental values* (nature as an asset or resource valued for its contributions to people's well-being), *intrinsic values* (nature valued in its own right as an end in itself), and *relational values* (value located in human-nature interactions such as via sense of place and belonging, stewardship and reciprocity).[24]

NATURE PROTECTION PATHWAY

Referred to elsewhere as "traditional conservation"[36] and "neo-protectionist conservation,"[46] the nature protection pathway is defined here by its rejection of anthropocentrism, its centering of biodiversity as the focus of protection, and its positioning of intrinsic values of nature as a counter and balance to instrumental and relational ones.[37,47]

The nature protection pathway is underpinned by an evolutionary-ecological view of social-environmental systems that emphasizes the central importance of biological diversity to ecosystem functioning.[48] Some important related insights from conservation biology include the importance of keystone species, including the role of top predators and grazers in trophic cascades,[49] the problems arising from habitat fragmentation[50] such as the accelerated occurrence of zoonosis,[51] and ecological networks.[52] This perspective on the nature crisis identifies protection of biological diversity through protected areas as a primary goal. For the nature protection pathway, a narrow focus on protecting what directly benefits humans (protecting nature for society) will fail to protect what is necessary for ecological functioning (for example, large predators) and will strengthen the anthropocentric worldview that created the crisis in the first place.[53]

Role of values and valuation of nature

Proponents classify this as a bio- or eco-centric approach, calling for the protection of biodiversity for its own sake and emphatically rejecting the idea that conservation can be achieved primarily through appeal to the instrumental value of nature, including for sustaining economic growth.[38,47] This has at times been pitched as opposition to calls from "new conservation" proponents[54] to prioritize instrumental (e.g., ecosystem services) values of nature.[34,55] However, the central concern for biodiversity defies simple characterization as "intrinsic" valuation. While elements of biodiversity such as species and entities such as rivers are seen to hold intrinsic value, it is harder to say the same about diversity itself.[56] Furthermore, while the central focus on the intrinsic worth of biodiversity is essentially a non-anthropocentric position, biodiversity is still conceived as the basis for sustaining all life on earth, entailing broad values relating to the well-being of current and future humanity and other than-humans.[39] Attention to nature's instrumental values is evidenced by the ways in which biodiversity underpins ecosystem functioning in ways that lead to greater productivity and stability of nature's benefits for humans, including resilience to climate change.[33,57,58] Protecting biodiversity is thus argued to have a stabilizing effect on ecosystem functioning and is thus a way to ensure a more sustainable future.[59]

The nature protection pathway emphasizes certain broad values regarding human interaction with nature but is less focused on social values than other pathways. For example, ecological justice, implying the need to care and foster empathy for nature, are foregrounded[60] while social justice tends to be conceived as secondary and separable[61,62] despite some recent calls in conservation science to integrate the two.[63] This

prioritization of human-nature values over human-human (i.e., social) values can be illustrated through two debates about poverty and about expanding protected area coverage.

The debate about poverty is partly driven by a geographical overlap between biodiversity and poverty in the tropics, leading to a shift from an early eco-centric perspective to more anthropocentric conservation.[62,63] The Brundtland report characterized poverty as an instrumental constraint on conservation[64,65] while later initiatives such as the Conservation Initiative on Human Rights presented a more normative case that conservation must be pro-poor.[66,67] The linking of poverty and conservation goals became embedded in conservation policy through the 2003 World Parks Congress and the subsequent Durban Action Plan that included targets for protected areas to reduce poverty.[67] In contrast, advocates of a nature protection pathway have argued that poverty and biodiversity might be best addressed separately.[65] One argument for this is that the complexity of treating poverty and conservation together (combining values about how we treat nature with values about how we treat humans) deflects from the primary evolutionary-ecological goal of saving the variety of life on earth, with the risk of ecological degradation worsening poverty problems in the long run.[38,48] As such, there is skepticism about an approach to conservation that integrates instrumental values of nature such as its use to combat poverty, and especially so where the solution to poverty is strongly linked to the view that continuous growth in material consumption is always desirable.[48]

One of the debates about expanding protected area conservation is about the extent to which conservation requires a separation of humans from nature. The "half earth" proposal argues that we need to devote half of the planet to nature protection if we are to respect the intrinsic value of nature and save most biological diversity.[39] This diagnosis is disputed by those who emphasize the prospective injustices of massively expanding an exclusionary model of protected areas[68] and who point to the viability of alternative models, such as land sharing, coexistence, and local stewardship, that are seen to offer more ethical relationships with nature.[46,69,70]

Main policy proposals

Growth of the human population and over-consumption are seen as key drivers of ecological collapse, in turn associated with direct drivers of biodiversity loss including land use intensification, habitat fragmentation, climate change, invasive species, and over-exploitation. However, indirect drivers related to structural power relations (e.g., via trade) are typically not foregrounded in this pathway narrative.[71] For conservation, the key policy response will then be the saving of "pristine" nature through expanded networks of protected areas, in ways that restore balance between the needs of humans and the needs of non-human nature.

GREEN ECONOMY PATHWAY

Failure of market forces to capture the diversity of nature's values, and not accounting for the economic costs associated with biodiversity loss, have been identified as major drivers behind the climate and biodiversity crises.[40,41,72] Many costs caused by biodiversity loss are not included in economic decision-making, giving rise to *external effects*—the uncompensated costs imposed on third parties, that are not captured in the accounts of nations or businesses. A green economy pathway focuses on ways to integrate the full suite of instrumental values of nature into economic decisions, with the overarching goal to reduce environmental impact while securing economic growth in order to improve human well-being and equity.[73] That is to say that the dominant (but not only) version of this pathway centers on pursuing "green growth," which is currently advocated by most nation-states as well as major international organizations such as the World Bank. It is based on the belief that economic growth and environmental impacts can be decoupled in absolute terms through technological innovation.[74] Green economics also emphasizes the use of economic instruments to promote this decoupling, such as environmental taxes and subsidies, cap and trade mechanisms, and payments for ecosystem services to internalize externalities from biodiversity loss.

Role of values and valuation of nature

According to standard economic theory, identifying the socially optimal level of environmental protection requires that the costs of protecting environmental goods and services should equal the sum of benefits arising from them.[75] The focus is on the multiple instrumental values that nature has for many people, for example, through the provision of ecosystem services. The moral principle on which interventions are defended is that they should bring about a positive or at least non-negative change in well-being for all humans in society, by enhancing the multiple values they derive from nature. Where some people are negatively impacted by green policies, the negative costs would be outweighed and thus compensated for by the benefits from environmental protection (producing a Pareto improvement). Distributional issues are thus noted typically in a sequential way (first maximize net social benefits, then fix negative distributional effects).[76]

One proposal to maximize net instrumental benefits by protecting the environment is to issue environmental taxes or subsidies equal to the sum of all net marginal benefits aggregated across those affected by an activity.[77] For example, a tax on the use of pesticides equivalent to the marginal net benefits from reducing the risks to human health and ecosystems.[78] Such a tax would act as an incentive to farmers to take the risks of pesticides into account and to substitute for less risky plant protection measures.[78] As a consequence, the benefits in terms of ecosystem and human health should be larger overall than the costs of changed land management for the farmer, i.e., the net benefits are optimized. As mentioned, this form of market intervention generates social costs, i.e., costs for the government and for participants in market transactions. Further, this may not always be the best solution, especially when losers are not adequately compensated.[79] Alternatives involve keeping essential parts of nature outside the market system. Examples include protected areas or standards of good farming practice such as maximum livestock levels per hectare, compulsory set-aside, or regulation of harmful pesticides, although such measures are often implemented insufficiently.[80] However, voluntary and market-based interventions tend to be preferred in the green economy pathway.

Social equity (a broad value) features in green economy concepts for three key reasons. First, the value of nature's contributions to individuals depends on their income and wealth, meaning that the aggregate economic values of nature depend on the distribution of income and wealth in society.[81–84] For instance, it has been estimated that the global economic value of biodiversity would be 16% higher if income was perfectly evenly distributed.[81] Second, a core concern of the green economy is the ability to meet the basic needs of all, without undermining ecological life-support systems. Currently, some high-income countries satisfy basic needs, but overshoot ecological limits, whereas some low-income countries operate within ecological limits, but fail to provide people's basic needs.[41,85] The Green Economy pathway calls for international cooperation, especially through technological transfers and trade agreements, to meet both basic needs and ecological sustainability at the global level.[86] Third, exploiting natural resources generates current economic benefits, but often diminishes instrumental values of nature for future generations. Comparing costs and benefits across time involves "discounting" future values, a procedure required because, for several reasons, a dollar received in 100 years is valued less than a dollar today. The higher the discount rate applied, the higher future net benefits have to be to warrant current investment to protect them.[40] In a green economy, discount rates applied to future benefits from nature should be substantially lower than rates for private consumption goods, to ensure there is an economic case for nature protection.[41,82,87–89]

Main policy proposals

To achieve the transition toward a sustainable future, some forms of material resource use have to be reduced where insufficient progress has been achieved to decouple them from embedded energy use, biodiversity loss, and other ways of exceeding planetary boundaries. At the same time, non-material goods and services (e.g., nature-based recreation and education) can continue to grow and increase prosperity.[90] Economic tools that hold potential for transformation toward a green economy include national accounting systems; ecological tax and subsidy reforms; promoting environmentally friendly technologies,[91] and economic instruments like tradable permits for resource use and pollution, liability law, or voluntary incentive schemes such as payments for ecosystem services (PES).[92] Such economic instruments can give visibility to under-recognized values and costs, creating incentives for pro-environmental behavior. For example, the tax on plastic bags in Ireland, accompanied by a sensitization campaign on the environmental harm of plastic, resulted in a massive drop in their use. However, these instruments are not a panacea,[93] and there are also cases where inappropriately designed incentives have led to the erosion of non-economic motivations for environmental care.[94]

Measuring economic development in a green economy requires a reform of national accounting schemes, because current measures of gross domestic product (GDP), do not adequately include values of nature and their connection to human well-being.[41,95] As a response, most states committed to integrate natural capital into national accounts by 2020, and new international guidelines for accounting inclusive wealth are on the way. However, this has not yet been accomplished in most countries.[96] In practice, unaccounted costs are often shifted toward future generations,[40,97] which is becoming a fundamental barrier for achieving sustainable and just futures. To overcome these issues, inclusive wealth accounting has been proposed,[98,99] measuring the social worth of all natural and human-made assets in terms of their contributions to human welfare.[41]

By and large, governments and intergovernmental organizations like the OECD or World Bank have prioritized economic growth as the primary mechanism to lift people out of poverty. Past economic growth, however, has been accompanied by an unsustainable exploitation of natural resources and ecosystem degradation.[100–103] The transition to a green economy remains an enormous challenge and the potential for "green growth" is disputed.

EARTH STEWARDSHIP AND BIOCULTURAL DIVERSITY PATHWAY

Earth stewardship refers to responsible use and protection of the land through sustainable practices,[42] as well as values and concepts that guide local initiatives of biocultural conservation.[13] It can be considered to be a biocultural practice because it operates at the interface of biophysical and cultural domains and thus prioritizes relational values that encompass spiritual, aesthetic, economic, and communitarian values grounded on biocultural diversity.[104,105] Human languages, cultures, and local environments are considered as co-constitutive, leading, for example, to a spatial correlation between biological and linguistic diversity.[106,107] Earth stewardship is distinguished by its emphasis on multiple social and environmental values associated with a plethora of ancient and current worldviews and cultures, their attachments to local territories, and their religious and philosophical traditions.[108] Exercising earth stewardship involves enabling the expression of these existing ways of knowing and living with nature,[109,110] as well as integrating traditional and scientific ecological knowledge for biocultural conservation.[105,111,112]

Role of values and valuation of nature

An earth stewardship pathway narrative prioritizes biocultural diversity based on the core broad values of responsibility and care for both human and non-human nature[22] often related to a more diverse set of related values such as reverence, respect, equity, solidarity, and collaboration.[113–116] These values are translated into diverse practices by actors involved in activities such as participatory conservation, alternative education, agroecology, and custodianship of biocultural rights. Across these practices is a social and environmental justice agenda to prevent development activities that constitute forms of aggressions against local cultures and environments. Loss of biocultural diversity connected to land stewardship practices has a long history and has recently been driven by global processes of enclosure and accumulation of land property (including land-grabbing) that displace Indigenous and peasant communities from their territories.[117,118] For example, the contemporary concentration of food production by a few corporations is identified as a driver that supplants the values and life-habits of local communities, exacerbating their dependence and undermining their livelihood.[119,120] These processes are driving biocultural

homogenization.[121,122] The need to protect and restore the diversity of biocultural values requires practices that promote dialogue and resurgence of Indigenous and local knowledge (ILK).[123] Resurgence of ILK is often inseparable from land, dependent on redistributing power to reverse the loss of local control over territories. There are cases of local resistance to dialogue due to fear of cultural assimilation, or due to limitations to genuine representation of different cultural values and habits. For this reason, the need for recognition, trust, and respect in conditions of power asymmetry need to be highlighted in processes of earth stewardship and biocultural conservation.[124,125]

Main policy proposals

An earth stewardship pathway seeks to link biocultural conservation to the well-being of local communities.[126,127] This requires conditions for conservation and restoration that support the connections of Indigenous and local communities (IPLCs) with their territories. Because local territories are the source of multiple values, the protection of territory is a key means to enhance earth stewardship and thus to conserve biocultural diversity.[112,125] Pathway proponents draw on a growing body of evidence for this positive association between secure local territories and rights, and effective conservation.[96]

An earth stewardship approach calls for policies to take account of the historical role that diverse communities have played in the maintenance of biodiversity in different ecosystems, and of the current role played by custodians of biocultural rights.[128] Engagement and participation of people is central to an approach to protected areas that puts earth stewardship into action.[129] Involving local communities as co-managers or stewards often leads to more socially and ecologically positive outcomes than treating them as mere beneficiaries or excluding all forms of uses as proposed in strict preservationist criteria.[130,131]

Models of protected areas that contribute to earth stewardship include UNESCO Biosphere Reserves, Other Effective area-based Conservation Measures (OECMs), and Indigenous and Community Conserved Areas (ICCAs).[129,132,133] For example, there are more than 700 Biosphere Reserves globally that have potential for conserving priority conservation landscapes and expanding positive people and nature relationships through biocultural conservation at regional scales.[134] However, neither the biosphere reserve model nor OECMs are exempt from tensions such as those that occur between the requirements to extend agricultural activities in the face of nature protection, and the pressures for economic development.[135] This highlights the challenge of moving away from protectionist models of area-based conservation in which the exclusion of local people is mainly justified using narrow economic values.[14,136]

Education is seen as a foundation for earth stewardship and biocultural diversity, serving a fundamental role in conserving or recovering relations between people and nature. Educational programs have been developed that promote values and reflection based on a diversity of religious and philosophical traditions, including relational IPLC philosophies such as good living (“buen vivir”) in South America, “ubuntu” in South Africa, and “satoyama” in Japan.[108,110,137] For example, the core principles of “buen vivir” education are intercultural cooperation, reciprocity, collective action, and solidarity.[138,139] Education reaches far beyond the school and is embedded in everyday community life, including close relationships with nature[140,141] guided by Indigenous and peasant worldviews and practices.[142,143] IPLC philosophies and education foster earth stewardship through including models of conservation and the implementation of the biocultural rights.[144,145]

DEGROWTH AND POST-GROWTH PATHWAY

Degrowth is a political, economic, and social movement, rooted in ecological economics and political ecology, and influenced by anti-consumerist and anti-capitalist ideas. It does not claim one unitary theory or plan of action.[45] Rather, it covers a wide ensemble of discourses and practices aiming to steer transformative change while not assigning a special status to instrumental, intrinsic, or relational values, although the latter are often emphasized through the notion of conviviality.[146] Degrowth calls for an organized slowing down of society, to minimize harm to humans and other species.[45,147] Degrowth and post-growth proponents conceive economic growth as a major driver of environmental degradation.[102] Beyond a certain scale, the economy is seen to enter into conflict with ecological life-support systems,[41,43] the costs of growth accelerate,[148] and environmental conflicts multiply.[149] Consequently, a degrowth pathway would require downscaling production and consumption in industrialized countries, as a means to promote environmental sustainability, social justice, and well-being.[44]

The degrowth pathway rests on a thermodynamic vision of the economy, first elaborated by[150] and later popularized by the field of ecological economics.[43,151,152] This vision portrays the economy as a subsystem of the biosphere, where the economy depends on ecosystems as both source of resources and as sink for waste.[43] Recycling is a partial solution but has a high energy cost. Renewable technologies are seen as part of the solution too, but deploying them at scale, keeping pace with continued economic growth, would require increasing inputs of finite materials, including rare minerals[153] as well as growing space requirements (e.g., for windmills and solar panels). Hence, according to this perspective, the economy cannot grow perpetually because the scale of the economic subsystem is limited by the size of the host ecosystem.[43,154]

Role of values and valuation of nature

A degrowth pathway would involve mobilizing values and reforming institutions to allow societies to flourish without growth of throughput (energy and material flows). Degrowth conceives the broad values of sustainability and justice as inseparable, requiring integrated strategies to promote both values and associated outcomes (e.g., income distribution, living within biophysical limits). Redistribution is favored over economic expansion as a means to secure decent living standards for all. Social justice is thereby defined by both minimum and maximum thresholds of consumption[155] and the idea of fair sharing within planetary boundaries.[156]

Proponents of degrowth emphasize broad values aligned with the concept of “strong sustainability,” whereby ecosystem processes that sustain prosperity and well-being are seen as irreplaceable by technology and other forms of human-made capital. Other broad values of degrowth include autonomy,

sufficiency, caring, conviviality, and commoning.[157] In line with the views from ecological economics, degrowth acknowledges incommensurability and value pluralism,[158] opposing the dominance of market values driving the commodification of nature.[159]

Main policy proposals

This pathway focuses strongly on the institutional and ideological drivers of environmental degradation, including loss of biodiversity. Major policy proposals in the degrowth and post-growth literatures include the adoption of alternative indicators of economic progress, green and progressive tax reforms, subsidy reforms (to remove e.g., fossil fuel subsidies), work time reduction and sharing, re-regulating trade, establishing maximum-minimum income ratios, and securing universal basic needs through public services and universal allowances.[44,102,154,157,160,161]

Macroeconomic indicators such as GDP fail to value social and environmental costs, economic inequalities, and domestic work, resulting in poor measures of human well-being.[16,43] While cautious of commodifying nature through pricing it, alternative indicators are favored that incorporate unaccounted social and ecological values and costs, including the Genuine Progress Indicator (GPI), the Indicator of Sustainable Economic Welfare (ISEW), the Sustainable Development Index (SDI), and Inclusive Wealth. Degrowth proponents emphasize the need for green and progressive tax reforms. Economic activities involving large environmental costs would need to be taxed.[160] Degrowth also makes a case for taxing and regulating advertising, and for reducing taxes on repairs to promote more circular economies and counter ''planned obsolescence'' of products.

Work time reduction is one of degrowth's flagship policy proposals for reducing environmental pressure while also buffering the unemployment effects of automatization and increasing life satisfaction. This would in turn rely on using at least some productivity gains that may arise from technological development for expanding leisure time instead of economic output.[162–164] However, as modern economic theory perceives technological development as arising from profit-seeking investments,[165] it is an open question to what extent automatization and technological improvements would go on in a degrowth and post-growth economy.

A degrowth pathway would also involve re-regulating international commerce, moving away from free trade, free capital mobility, and economic globalization,[160] favoring an ''open localism'' with larger degrees of autonomy and self-sufficiency. Measures to reduce inequalities in income and wealth distribution include taxes on income, wealth, and capital, as well as the establishment of minimum and maximum allowed income (and wealth) levels.[155,166]

DISCUSSION

Sustainability pathways embody distinct and contested approaches to mobilizing the transformative potential of values. The four pathways reviewed here are inherently normative because their diverse conceptualizations of sustainability are bound up with different worldviews and bundles of broad and specific values. Indeed, the differences between them are so deeply rooted in values that they may appear insurmountable, leading to continuing conflicts that can paralyze action when we try to choose between them.[26] However, we suggest that the diversity of potential pathways toward sustainability also increases the wealth of possibilities. Moreover, the ability to benefit from such possibilities will be improved through better understanding their normative content and by ongoing transparency and deliberation about their underlying values.[14,24] In what follows, we summarize the main ways in which pathways diverge, with reference to differences in values and associated worldviews and ideologies. We then consider ways of working with this diversity that have the potential for moving beyond conflict and building stronger coalitions for sustainability.

Values divergence across pathways

As summarized in Table 1, pathways prioritize different disciplinary and theoretical traditions that underpin distinct problem framings, exemplified by differing assumptions about the fundamental drivers of environmental degradation. Problem framings are closely linked to the kinds of solutions that are considered to be most effective, represented here as what is considered the key requirement for transformation to sustainability and the emblematic policies for achieving these.

The four pathways were purposefully selected to differ in terms of the specific values they prioritize (instrumental, intrinsic, and relational), but we also find some variation in the broad values, including guiding principles of justice deemed to be aligned with sustainability (Table 1). Nature Protection draws on conservation science knowledge about the fundamental importance of protecting the diversity of life on earth, often, though not exclusively, emphasizing ecological justice (justice for other-than-human nature) and the intrinsic value of biodiversity, while also drawing on the importance of ecosystem functions, and broader values related to humanity's duty to other species and to future humans. The Green Economy pathway prioritizes instrumental values of nature closely aligned with market-based approaches to sustainability, emphasizing utilitarian principles of justice common in liberal democracies. Earth Stewardship develops a biocultural conception of value that emphasizes relational values rooted in local territories, supporting calls for more community-oriented approaches to sustainability that rest on broad values related to territorial rights and political empowerment of marginalized voices. The degrowth pathway prioritizes the idea of living within environmental limits and redistribution of wealth, hence emphasizing the need for radical economic and political transformations, with special attention to reduction of material and energy throughput, distributional justice, and the expansion of public services and the commons (from local to global).

Understanding differences in underlying values helps to explain why pathway proponents are often not receptive to possibilities for transformation that stem from alternative pathway concepts or narratives. Broad values are known to be highly durable and while they can and do change, this rarely happens quickly or without significant contextual motivation to do so.[167–169] Broad values can therefore be seen to be ''non-negotiable'' and underpin a degree of intransigence, for example, sustaining disagreements about the extent to which biodiversity conservation and ecological justice objectives should be twinned with social justice objectives. Differences over the framing of social justice are central to disagreements between,

Table 1. Overview of nature protection, green economy, Earth stewardship, and degrowth pathways

	Nature protection	Green economy	Earth stewardship	Degrowth	All pathways
Key bodies of knowledge highlighted	Conservation science, evolutionary ecology, cological justice	Environmental economics, ecosystem science, engineering, law	Biocultural diversity, traditional ecological knowledge, social-environmental justice	Ecological economics, political ecology, post-development	Earth systems science, sustainability science, climate science
Main driver of degradation highlighted	Failure to respect and care for other-than-human life	Institutional and information failures (esp. market failure)	Structural power imbalance blocking plurality of values	Throughput expansion driven by economic growth	Failure to respect biophysical boundaries
Key requirement for transformative change	Biodiversity conservation, protected areas, recognize non-anthropocentric values	Enable accounting of values of nature, economic incentives for pro-environmental behavior	Biocultural conservation, local sovereignty linked to territory and agrarian reform	Reducing material throughput of affluent societies, wealth redistribution, decommodification	Respect biophysical boundaries
Priority broad values	Bio- and eco-centrism, care, responsibility	Efficiency, liberal democracy, utilitarianism	Responsibility, care, biocultural diversity	Sufficiency, autonomy, commoning	Sustainability, intergenerational justice
Priority specific values	Intrinsic	Instrumental	Relational, intrinsic	Instrumental, intrinsic, relational	–
Core values agenda	Recognize and prioritize the non-anthropocentric value of the diversity of life at all scales	Ensure nature's values inform institutions and incentives	Challenge discrimination and marginalization of social groups to mobilize more diverse values	Rebalance economic with social and ecological values (escape economism)	Diversify and balance values of nature incorporated in decision-making
Emblematic policies	Major expansion of area-based conservation, "Half Earth" to be gazetted as protected areas	Alternative metrics to GDP, green taxation, redirecting market incentives, green technologies	Shift from preservationist to biocultural models of area-based conservation, land reforms and IPLC rights	Work time reduction, basic or caring income, max-min income ratios, resource and pollution caps	Formal and informal education for sustainability

e.g., Earth Stewardship and Nature Protection over how to deliver global nature conservation targets such as the Kunming-Montreal Global Biodiversity Framework (Box 1).

Outlook: Strategies for more effective pathway coexistence

How can society respond to a situation in which some critical, high-level goals are shared but where the pathways toward these goals are often deeply contested? By focusing on underlying values, we find that a more constructive coexistence of pathway elements will require ways of working that foster recognition and respect for diverse values. Conversely, this means moving away from a status quo in which narrow sets of values regularly dominate environmental decision-making, creating barriers to sustainability and denying the rights of some stakeholders to meaningfully participate in decisions that are critical to their well-being. More effective coexistence of pathways requires value pluralism that can be actioned through ways of working that enable a diversity of worldviews, broad and specific values to be recognized, respected, and embedded in economic and political decision-making. While not exclusively the case, this will often involve moving away from purely economic and instrumental ways of valuing nature and ensuring that alternative values gain meaningful recognition.[24,174]

So what are the ways of working for sustainability that promise to advance this agenda to be more inclusive of diverse values and thereby more open to engagement with multiple pathways? The research literature does not have all the answers to this yet, but a helpful starting point is to consider actions at different levels of intervention (or leverage points). We consider three intervention levels here, providing some indicative examples of practices that have proved effective in some contexts.

Making diverse values of nature visible and usable for decision-making

There are many available methods for eliciting and communicating diverse values of nature including methods based on nature-based, statement-based, behavior-based and integrated methods of valuation.[175] Methods can involve more formal procedures such as multi-criteria analysis but also less formalized qualitative descriptions arising from participatory and deliberative procedures. For example, kelp forest restoration initiatives in the Haida Gwaii archipelago of British Columbia have involved a participatory process of identifying local values that are then incorporated into the design of interventions.[176] This process has rendered relational values visible, helping to bring

Box 1. Global Biodiversity Framework targets 2 and 3

The Kunming-Montreal Global Biodiversity Framework (CBD 2022) includes the following:
Target 2 "Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity."
Target 3 "Ensure and enable that by 2030 at least 30 per cent of terrestrial and inland water areas, and of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing Indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of Indigenous peoples and local communities, including over their traditional territories."
These "30 × 30" targets can be approached in different ways that profoundly influence how their implementation might impact on the rights and livelihoods of Indigenous peoples and local communities as well as ecological outcomes,[135,170,171] giving rise to fears of social injustices.[70,172] While some nature protection proponents emphasize expansion of exclusionary protected areas to meet Target 3, this is contested by many Earth Stewardship proponents who prioritize fostering associations between biological and cultural diversity. Those representing IPLCs during final negotiations insisted on inserting qualifying text such as Target 3's caveat regarding IPLCs. While such framing principles should anyway apply to each target, there was demand that they appear specifically in this target, for fear that more exclusionary/protectionist pathway narratives prevail.[173] Additionally, there are significant differences between Green Economy and other pathway proponents regarding the extent to which commodification of nature's instrumental values can help toward these targets.

constructive coexistence between international conservationist and local community visions of sustainability. A set of six local values were identified: Respect, Responsibility, Interconnectedness, Balance, Seeking Wise Council, and Giving and Receiving. These were seen to align with bringing a "people as part of ecosystems" pathway perspective, aligning diverse values with, e.g., biocultural conservation approaches.[176]

While not all deliberative approaches are scalable, national-level examples exist. For example Ireland's 2023 Citizens' Assembly on Biodiversity Loss involved over 2,000 participants in deliberating how to address continuing biodiversity decline.[177] The resulting priority actions reveal the potential for agreement on priority actions, even where some of these appear to flow from different value foundations. For example, instrumental values of nature are embedded in priority actions for the green economy and sustainable finance, but these coexist with intrinsic values of nature, for example, calls to embed the rights of nature into Ireland's constitution, and relational values, for example, in calls for a new "Well-being Framework."

Reforming institutions to enable incorporation of diverse values and pathways

Making diverse values and pathways visible is a vital step, but usability can be constrained by prevailing institutions (the rules and norms that regulate decision-making) that limit those values, and what values can be acted upon. Formal institutions (such as property rights) and informal institutions (such as a political norm of productivism) enshrine and reproduce dominant values and pathways. Again, there are promising initiatives at different scales that may help to "get the institutions right" for more constructive coexistence of pathways. At a national scale, revised systems of performance indicators (such as the new Well-being Framework proposed by Ireland's citizens) can help to embed plural values into measures of societal progress. For example, the Gross National Happiness indicators in Bhutan incorporate Buddhist relational philosophy into goals for green economic growth.[178] National constitutions can also institutionalize diverse values, as for example in the constitution of Bolivia that enshrines relational values of nature and earth stewardship through the philosophy of *Buen Vivir*.[179,180]

The UN Convention on Biological Diversity (CBD) highlights important intrinsic, instrumental and relational values of global biodiversity-*as*-variety.[56] Biodiversity option value, for example, is fundamental to sustainability.[64] The CBD and its Global Biodiversity Framework (GBF) provide various strategies integrating these global values with more local values of nature/biodiversity, including mixed-use Protected Areas and Other Effective Area-based Conservation Measures (OECMs) that focus on local nature values, but nevertheless make contributions to conserving globally important biodiversity (e.g., a globally threatened species). OECMs also contribute to a system of protected areas that is representative of regional and global biodiversity (see GBF Target 3 in Box 1). An early exemplar of such integrated biodiversity-inclusive planning adopted Papua New Guinea's Indigenous and traditional territories as the core for a representative network of global biodiversity conservation areas, acknowledging multiple IPLC values of nature.[181] Further, planning flexibility allowed pursuit of land uses elsewhere, delivering other (instrumental) local values. Challenges raised by cross-scale integration of values may require cross-scale management and decision-making. Papua New Guinea's IPLC areas provided incomplete representation of the country's biodiversity,[181] requiring further decisions about complementary conserved areas. Further, IPLCs may fail to conserve some globally important biodiversity,[182] calling for targeted management and funding locally.

Addressing the power asymmetries that produce patterns of domination

Disrupting the status quo requires power to be reconfigured in ways that can ensure recognition and justice for currently marginalized groups.[183–185] This challenge goes well beyond

our choice of approaches for environmental decision-making, involving, for example, the mobilization of civil rights movements. However, such wider movements are producing outcomes that can be used to insist that alternative worldviews, values, and pathways are incorporated into environmental decision-making. For example, the 1989 Indigenous and Tribal Peoples Convention (ILO 169), the 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), and the 2018 Declaration on the Rights of Peasants (UNDROP) all provide a legal basis for communities to demand that their values count in decisions effecting their welfare. In the high Andean plateau of Bolivia, Peru, and Chile, Aymara Indigenous Peoples have defended their transhumant practices through deliberative processes, that in turn have informed demands for rights to use and administer their ancestral territories. Aymara transhumance patterns are organized according to biocultural calendars that are adjusted to climatic variations from year to year and this flexibility has enhanced practices of grazing camelid herds that are compatible with the conservation of high Andean wetlands. The capacity to conserve and access these habitats has been strengthened through national institutional reforms creating Indigenous Development Areas (IDA) in 1995. IDAs have been reinforced by appeal to national and international formal institutions, including an appeal to ILO 169.[186] Such appeals to international law are increasingly widespread and, in principle, supported by a turn to rights-based approaches by major international conservation NGOs.

The key message from these examples is that methods of working with more diverse values and pathways have been widely experimented, across diverse political and economic contexts and at different scales. We know much more about some than others, e.g., the evidence for the conservation effectiveness of respecting Indigenous territories is strong, while evidence of the outcome of national citizen assemblies is more limited. But the general outlook seems clear, that when we are reviewing the design of sustainability interventions, or the institutions that shape decision-making about nature, we should always be looking at opportunities to enhance values pluralism.

CONCLUSION

The generality of goals such as sustainability and biodiversity conservation are conducive to securing globally negotiated agreements to act together. But the details of how to act, considered here as comprehensive pathways to sustainability, are highly contested because pathways evoke competing values about the kind of future they envisage and preferred ways to get there. Much literature makes the case in favor of one pathway, sometimes in opposition to others (e.g., degrowth is often contrasted to the green economy pathway). We are not convinced that any single pathway is a panacea, offering a complete solution design that can be applied in all contexts. Rather, we argue that the current situation demands to recognize that there is a diversity of values and associated pathways. For example, while (green) economic growth may help low-income countries to eliminate poverty and achieve better living standards, high-income countries need to put more emphasis on nature conservation rather than further expanding material consumption. Furthermore, both the green economy (including its dominant growth variant) and degrowth share some common policies (e.g., carbon taxing, renewables, and promoting high energy efficiency) that provide common ground for taking initial steps in the direction of a green shift.

Pathways to sustainability based on narratives of the green economy, nature protection, earth stewardship, and degrowth share some important broad values such as ensuring some form of justice for future generations, but they also diverge significantly in the ways they prioritize and combine instrumental, intrinsic, and relational values of nature. We know that broad values can eventually change and even converge, but (fortunately or not) it is unrealistic to think we can direct such a convergence, and besides, the pursuit of consensus can undermine opportunities to harness the transformative potential of plural and even conflicting values.[187] For this reason, we propose efforts to enhance the coexistence of pathways, a process that in many contexts would require disruption to dominant pathways (such as green economic growth) and greater openness to alternative pathways (such as earth stewardship).

At the site level, there is strong evidence that values diversity and pathway coexistence can be supported by devolution of control over conservation to Indigenous peoples and local communities. At national and international levels, deliberative approaches such as citizens' assemblies also look promising, while sectoral policy approaches such as integrated conservation planning also offer examples of how instrumental, intrinsic, and relational values can be better incorporated into institutions to support coexistence of local and global values. Equally, we should accept that pathways are normative and political, intersecting debates about what should be done with the art of what is possible. As with all manner of things, pathways are not blueprints for all.

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DECLARATION OF INTERESTS

The authors declare no competing interests.

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