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Original Article

# One Earth One Future: Integrating Sciences for Sustainability

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***Abstract***

*The complexity of the world poses both challenges and opportunities for attaining a sustainable and equitable future. This complexity involves imperfect control and unforeseen events, complicating the establishment of a clear route to sustainability. Transitions are expected to originate from various pathways that may conflict and require trade-offs among different regions. Acknowledging this diversity in perspectives can improve our collective capacity for global transformation. Nevertheless, fragmented knowledge systems hinder societies' ability to make timely and scientifically informed decisions to address global sustainability issues. Seed-scale interventions, however, neglect larger changes needed in societies and global systems towards seeds of desirable futures. While progress is made in nurturing seeds, there is failure in deconstructing old growth, that is the institutions, policies and cultural structures hindering the transformation of societies into paths of sustainable, thriving and just futures. It is argued that a new area of research is necessary on de-constructive policies that target institutions, culture and power structures impeding the growth of a more sustainable, socially just and prosperous world. These endeavours are required to enable the evaluation, support and connection of a more diverse set of place-based transformative sustainability initiatives. They should consider the global and integrated nature of emerging seeds of a desirable future, as well as the paths of co-evolution and potential interactions across seeds and possible futures.*

***Keywords:*** *Sustainability, Global Transformation, Interdisciplinary Collaboration, Human-Environment Interactions, Complex Systems, Environmental Equity, Social Justice.*

## Introduction

Many contemporary societal challenges manifest themselves in the domain of human–environment interactions. For a growing number of scientists, there is a growing recognition that responses formulated within current scientific disciplines, in isolation from their wider contexts, will be inadequate. Therefore, an integrated, transdisciplinary synthesis framework is required (van der Leeuw et al., 2016).

Addressing many of these challenges requires an understanding of the interlinked material, social, technological, and environmental systems. Considerable advances have been made, most spectacularly in understanding physical and life sciences systems. One of the underpinning tools in doing so has been the maturation of the complex-mapping cells (CEMs). In the social sciences, many challenges remain. Even with respect to the material aspects of social systems—energy, water, and land use—insufficient is known about these interactions with environmental systems.

Efforts to understand, model, and predict human–environment interactions have, however, thus far generally not featured these properties. Moreover, many models, particularly in response to one-off events, are built ad hoc in the aftermath of an event. Efforts to enhance the modeling and prediction of human–environment interactions are, therefore, often reactive and of questionable effectiveness. Such models commonly fit models of the scientific law/correlation type. While this is useful in many contexts, extraordinary events such as human–environment interactions are often not well predicted by this model.



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**The Role of Natural Sciences**

Offsetting greenhouse gas emissions through investment in solar farms, electric cars, and energy-efficient light bulbs, making cotton farming more sustainable, employing refugees to kick-start the workforce, and producing films promoting environmental awareness – a rarely found versatility of activities, but all of them have been projects by scientists. Their working fields widely vary from microbiology, geology and hydrology to an advisor on trade law to scientists employed by or pursuing Ph.Ds jointly with companies. What they have in common is an approach to understand, improve or modify the world in which we live, and they face (or try to address) the vast challenges concerning sustainability, one of the most pressing issues of the 21st century. In order to tackle them, science of different disciplines must be at the furfront of decision- and policy-making processes (Rauser et al., 2017). However, there are obstacles that need to be tackled so that all disciplines can make a concerted effort to promote a more sustainable future. On the one hand, while language is a key tool for the identification and solution of problems in various fields, the perception of and response to those problems varies substantially from one discipline to the next. Consequently (and as critically), the way scientists of a given discipline communicate often make it difficult for others to understand the broad picture.

Therefore, in this line of work, a series of interviews were conducted with international scientists from diverse fields (but all working on or very related to sustainability) to ascertain how they view sustainability, what the most pressing problems are from their perspective, and how they understand sustainability of other fields. This was driven by the view that exposing scientists to the views on sustainability of their peers in other disciplines is particularly insightful and may help them to find solutions they would not be able to identify on their own. This helped see that, indeed, the same problem is seen, defined and tackled very heterogeneously in different domains, not always with much success. To make things worse, the language employed in the way scientists of domain A talk sustainability very often makes it hard for their colleagues of domain B (or C, D, E, etc.) to see the problem at all or engage in productive collaboration on it.

**1. Ecology and Biodiversity**

Humans and human societies depend on the resources and services of the biosphere, the planetary life and material support system of Earth. The biosphere is in turn influenced and shaped by the history and dynamics of human societies. The mutual interplay of the social and the ecological are linked in the form of coupled social-ecological systems. Under the focus of sustainability, the social and the ecological are more than linked; they are intertwined and coevolving, shaping and being shaped by one another (Folke et al., 2016). They interplay in complex ways with relations, interactions, and feedbacks that emerge across temporal and spatial levels. This sets sustainability science apart from natural science and from those social sciences that tend to disregard the materiality of the environments of human social systems. If it is concerned with sustainability, the interplay of temporal and spatial scales of the social and ecological have to become part of the analysis.

Rather than representing a system in itself, sustainability describes a goal or a desired outcome, a direction to be taken. It may be a normative desire, a set of principles, a blueprint, an ideology, or a research agenda. As a target or desired outcome, sustainability implies some kind of change. This may be maintaining or enhancing resilience, stopping degradation or extinction, changing practices, modifying values, altering institutions, or asking for transformative change and changes on deeper levels. This applies the understanding that humans operate in a legacy of social-ecological interplay, shaping the capacity of the biosphere and our options for development. At the same time we depend on a variety of ecosystemic resources and services, are constrained by ecosystem dynamics and tipping points, and have to negotiate trade-offs, justice, and equity in the distribution of these resources and services.

**2. Climate Science**

One Earth, one future: Integrating science to sustain the systems of our home planet (continued from previous page) Unintended climate modification, planet Earth and impacts on human actors: The long-term evolution of the planet Earth is characterized by a life-friendly environment enabled by the Gaia hypothesis. According to this view, the biota plays a large role in stabilizing the environmental conditions supporting life by complex positive and negative feedback cycles. A critical question in the context of the Anthropocene is what perturbations of the life-friendly conditions are permissible to prevent a catastrophic collapse of the life-enabling environment. A particular focus has to be on the climate system and its sensitivity to anthropogenic interventions. The continued burning of fossil fuels has a large and effectively irreversible impact on the life-enabling conditions on Earth. The current representative concentration pathway for intended climate change would result in a global mean temperature increase of 3.1°C relative to pre-industrial times by the end of the 21st century. Such a global mean temperature level would well exceed conditions known to humanity from the past. The cumulative carbon emissions post pre-industrial times necessary to achieve such a treatment of Earth are so high that they change the biogeophysical state of planet Earth permanently. An anthropogenic climate feedback with low probability but high impact on human society would render large parts of the planet uninhabitable. Therefore, the current political focus on transient temperature pathways and, for example, on a global mean temperature goal of 1.5°C is flawed. The decline of the life-support systems would disproportionally harm the poorest on the planet, enhancing unprecedented struggles for remaining resources. (Stammer et al., 2018). There is a strong interplay between state and behavioral change of societal actors, climate feedback, and unintended (adverse) climate change. For a transition towards sustainability, significant climate mitigation and the reordering of many of the current geoengineering activities are needed. A genuine, meaningful and robust sustainable

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development path is needed, transcending the current myopic view dominated by geopolitical considerations to avoid planetary life support system disruptions.

**3. Geology and Resource Management**

More geologists than probably any other geoscientists argue that transformation of geoscientific knowledge, experience, and guidance is critical for successfully addressing society's growing litany of environmental challenges (Stewart & Gill, 2017). The need for a paradigm shift in societal behavior vis-à-vis its embedded relationship to the natural world was noted, observing that the very essence of the geoscience community's contribution has been (implicitly) recognized. Far more than other Earth-system constituents, adversely altered status of rocks, minerals, water, topsoil and petroleum readily equates in cascading, increasingly deleterious environmental effects. The global geoscience community undoubtedly commendably performs in contributing to preservation of, and understanding replacing, other natural-system components: oceans, atmospheres, ices, weather systems, organisms and gases. Here, die Geowissenschaften has lagged and here transformation is needed. This largely speaks towards comprehensive broadening in the geosciences' constituency, forging multifarious, close-knit interdisciplinary linkages with the other environmental disciplines, the human and behavioral sciences and being pro-active within policy making. This tyranny includes integrating sustainability principles into geoscience education, training, field practices and continuous professional development. Alongside biology, chemistry and physics, understanding the Earth as humankind's life support – via geoscience – must be seen as vital against this present multitude of existential threats. With the advent of unipolar military super power status a growing global emphasis on 'national security' inextricably links these resources to strategic military considerations.

**The Role of Social Sciences**

The opinion piece brings attention to the project proposal 'One Earth One Future: Science for a Sustainable Planet'. The concerns are closely aligned with those of the new field of Sustainability Science. The latter faces the general challenge of providing advice to policymakers in a complex, rapidly changing world. The relation between the natural and the human components of the Earth system is complex and poorly understood. While deterministic processes such as atmospheric physics and chemistry are relatively well studied, much less is known about 'soft' processes such as societal interactions with the natural world. As the Anthropocene matures, societies are facing several profound transitions. Some, such as climate change, are planetary and involve transformations on time scales of several centuries or millennia. These affect, and are affected by, the functioning of socio-economic systems. There is an associated need for improved understanding of the coupled system, but this is scientifically challenging. Moreover, understanding does not automatically translate into better policy decisions. Decisions must be taken on the basis of necessarily imperfect information. Finding ways to navigate this space under conditions of scientific uncertainty, but within a robust decision-making framework, is an area where Sustainability Science could make a contribution.

Since the inception of the scientific paradigm in the Western world, traditional research has for the most part been confined within distinct disciplines: the division of labour in science meant understanding research in social processes was the business of the human and social sciences, research in the non-human world was to the natural and physical sciences. The view is not so prosaic. Gone is our epoch of taking comfort in the belief that there is a clear divide between society and nature. Denatured as the nature we find around and within has become, its power to act has hardly diminished. Equally, societies now intensify their imposing effects on the Earth's non-human properties (Bettini et al., 2010).

**1. Sociology and Community Engagement**

In the production of knowledge and the implementation of strategies toward sustainability, the involvement of a broad array of disciplines and stakeholders is said to be required. In an upcoming expert and public survey, experts and the broader public's perspectives on the critical issues and solutions for the global sustainability in 2040 are examined, with a particular focus on the knowledge needs for the sustainability strategies. The target critical issues, of which the assessment of the public opinion differs among those in different continents, are identified.

It is suggested that the scientific community should play a role in fostering social sciences research on such areas as demographic change, urbanization, community engagement, and education development in the context of sustainability. Rapidly developing countries, in particular, are advised to establish domestic science and technology collaboration networks for the effective absorption of the growing body of knowledge on sustainability. Any discussion of the future of Earth, from the perspective of both threats and promising trends, suggests the need to balance prudence with optimism. Effective solutions to problems may lie in the reframing of issues, integration of perspectives, or mobilization of networks outside conventional realms of research or policy. Future scenarios, both fearsome and promising, may depend as much on uncertain behavioral dynamics as on quantifiable trends. Efforts to grasp possibilities, and guard against risks, are relevant to the essence of a cautious but constructive firmament for global cooperation. One encouraging development is the growth of a scholarly community focused on human environmental systems (M Bennett et al., 2021). The understanding of human societies as interlaced with Earth's ecosystems, and of sustainable development as key to securing the life-support systems on which all well-being depends, is essential for dialogue across regions and sectors. Developments in this vein can point pathways toward a safer future, and understanding of multiple risks may foster cooperative strategies.

**2. Economics and Sustainable Development**

Vibrant Plains: Economics and Sustainable Livelihoods in the Nebraska Sandhills is a project designed

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to analyze how economic development can be achieved before huge asset sales destroy the working landscape in the central portion of the region. The research builds on a long-term, integrated program that has developed and spatially implemented a suite of ecological economic models that reveal a rapidly growing threat to the environmental goods and services that have contributed to the region's economic health. Economic development affects individuals' abilities to generate income and create sustainable paths out of poverty. Earth Science Applications to Local Communities (ESALC), a project in federally managed rural lands of the western United States, takes a more general perspective, seeking to assess connections between knowledge resulting from applied earth science research projects and actions of individuals and institutions. The project includes detailed analysis of how information gets produced and communicated on seven focal resource topics, a survey of use of that information, and case studies in collaboration with local resource managers (D. Hart & P BELL, 2013). Sustainability is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This has long been acknowledged as a complex and ambiguous target. Economists might be excused for avoiding the terminus sustainability, as well as the science and policy promises that have recently become entailed by the term. "Science is also a horde of vital, exhausted, casual ties." But surface consistency doesn't guarantee lucid perception. When one boils down the healthy whole mess to its individual fundaments, both the definitional obscurity and the counter-intuitive structure of the terrain are manifest. The objective of this primer, then, is to try to sharpen the focus of a purportedly wieldy slide-show: some thoughts on how economists can make sense of the sustainability tar-pit; and how such disciplined insight might be redeployed to more profitable ground, specifically on connections and fellowship with sustainability science, which, in spite of its grand pretensions, remains an adolescent and recalcitrant discipline. And one on the verge of inevitable entrenchment. Simply put, the threadbare policies that charitably comprise the current sustainable turn, are little more than feeble pirouettes in a maelstrom.

### 3. Political Science and Policy Making

Since the publication of the Brundtland Report and the 1992 Earth Summit, world leaders, policy makers, businesspeople, and academicians have embraced the challenge of sustainable development to ensure economic, environmental and societal prosperity for future generations. Policy experts have promoted numerous proposals to seed this future, including Agenda 21, Earth Charter, Sustainable Development Goals, Green New Deals, and Natural Climate Solutions. Meanwhile, insights from an ever-increasing number of academic disciplines, notably from the global change community, have identified burgeoning sustainability opportunities, such as the conservation and restoration of peatlands, mangroves, or tropical forests. Collaboration between policy makers and scientists is essential so that such sustainability opportunities are realised before they are foregone by lock-in to destructive, path-dependent global development (M Bennett et al., 2021). However, engaging across the science-policy interface is immensely challenging. Policy-making is complex and contested, involving the synthesis of multiple and dissimilar evidence bases amid differing interests, over differing temporal and spatial scales. Similarly, science is a complex and iterative pursuit, generating new questions and conceptualisations which can radically alter the real-world implications of existing evidence. Global sustainability is a vast, multifaceted topic, and the global change community spans multiple disciplines and scales. For practitioners to engage in this complexity is asking a lot. Critical reflection is needed to clarify issues and the way ahead. This article comprises multiple viewpoints from across the science-policy community to assess the state-of-play. Taken together, they propose an emergent research agenda for enabling substantive action informed by Earth system science (Dewberry & Johnson, 2010).

**Technological Innovations**

The world faces demonstrated sustainability challenges, such as sustainable food production, freshwater availability, or quality education for all, as well as those that are emerging or whose nature and implications are uncertain. Some of the known and emerging challenges interact in complex ways. For example, climate change impacts on water resources could exacerbate issues with safe drinking water, sanitation, food and nutrition; solving one or even two of these other SDGs could have unanticipated (negative) impacts on another. Over 3 years, 984 seeds were gathered from researchers in various disciplines and encouraged them to go beyond their current work in their ODP to "connect the dots" to demonstrate visualization of possible solutions to these complex challenges (M Bennett et al., 2021). The result is the visualization of 192 different solutions to these ODPs. Compared to the diversity in links and interactions in the Patchwork Earth exhibit, each seed in the Patchworks Earth database is a cornerstone in the support of desirable futures. The collection of seeds is used to create a new way to navigate action, based on the idea of a Patchwork Earth—a quilt of interconnected solutions each of which helps to support a desirable global future through the realization of the United Nations (UN) Sustainable Development Goals (SDGs). The world contains within it the seeds of multiple possible futures: flourishing life in the oceans, diverse habitats supported by the mosaic of agroforestry, protected land, and the widespread use of ecological toilets that enrich the soil and are used to generate nutrient-rich biogas.

### 1. Renewable Energy Technologies

The implementation and development of renewable energy projects has continued to expand as concerns over the environmental impacts of traditional power generation grow. Renewable energy technologies are becoming increasingly cost-competitive, and successful policies playing a role in increasing the effective deployment somewhat. However, the overall climate of uncertainty surrounding renewable energy still inhibits its growth. Policy and the supports they provide to renewable energy

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can also be based on faltering and incomplete information, specifically to developing countries. Ideally, the national authorities in these countries would provide an enabling environment wherein emerging technological options can be continuously scrutinized. Partnerships between government, non-governmental organizations (NGOs), development and research agencies on the one hand, and indigenous and international researchers on the other, could potentially push energy policy into more informed, reliable, and relevant directions (Katerin Rodas, 2013). The goal of our research, then, is to not only better understand renewable energy in terms of the scientifically and technologically encompassing systems. One response in light of the current atmosphere of climate uncertainty is to offer flexibility in response to the uncertain and rapidly changing natural environment. This stance has led to the exploration of renewable energy options in the field of sustainable development. The role of renewable energy in national and global scenarios are projected and critically assessed. To exemplify the potential for enhancement of more informed decision-making in renewable energy development, suggestions on five essential and specific areas for further research in renewable energies which integrated renewable energy technologies are offered.

**2. Sustainable Agriculture Practices**

The potential of sustainable agricultural practices to promote food security while enhancing other socio-economic indicators of wellbeing is widely acknowledged. For some, such as Shiva, the contradictions between differing goals of the green revolutions era and the agro-ecological approaches required to show case-studies of (W. Doran et al., 2002). Despite these contradictions, global food requirements continue to grow with the world population, albeit at considerably reducing rates. The recent World Bank posits that in order to address the problem of food security, priority must be given to the intensification of agriculture in 'hotspots'; another productive innovation. However, agro-ecology approaches such as the one outlined by Lynas, contend that these very practices are responsible for the lack of food security in the first instance. Imperial College, with partners in southern African countries, is a Consortium based at the Center for developing and testing a methodology for the robust assessment of the sustainability impacts of a range of technologies and practices. These include marginal improvements, and efforts to improve soil health, all of which offer potential livelihood benefits to low-income farmers. Initial scoping studies conducted by Lynas suggested that current recommendations by extension services to farmers in Swaziland were in gross failure, with maize yields as low as 770kg per cultivated hectare reported as 'normal'. Some of the literature has attributed this failure to the inadequacy of responses to agro-ecological contexts, with use of inappropriate packaging and concentration on technological and information transfer activities such as improved seeds, irrigation and plant protection. Supplementing these interventions, agro-ecological structuring activities are said to be, some fodder and soil conservation that supports continued environmental destruction and dislocation of small-scale indigenous social practices. Furthermore, the financialization of agricultural development in much of last five decades has led to decreased food sovereignty, a basis for any sustainable food security. Other arguments corroborated by Shiva embrace policy and regulation decisions that have encouraged or enforced practices that violate tenant rights in or erode bio-diversity rich. Indeed, most of the 'rural poor' are not poor in the resources and traditions that they require to maintain, and sometimes even improve, their socio-economic conditions. However, the inequities that often exist in the distribution of these resources in semi-arid Swaziland have extended periods of drought; the 'externalities' of neo-liberal economic policies now necessitated their commercialization to sustain the food deficits incurred from historical imbalances, chiefly due to the migration of monocultural water-dependent forms of agriculture at the onset of the colonial period.

**3. Waste Management Solutions**

The last contents are the waste management strategies conservatively to get a best case. Given the weak battery picks and bio-jar selectivity policy, it will be difficult to get all pro-environmental strategies adopted. The aim in all studies is to match the empirical data in observation pairwise, as the summary of previous and current recycling policies. Rich insights of every city were planned. Waste management is an essential part of the governing system of a city like Yangon and produces massive data that are difficult to collect. Moreover, waste management is likely to notice adjacent areas of the forecast feed. Urban modelling includes mainly land use transport models, meta models and related data checks. Independent variables, methods of estimation and model test-work are detailed. Accurate spatio-temporal maps of development types within LSOA to estimate average shadow effects are not feasible. This can seriously compromise the capability of model directly to simulate the system, the residential allocation, and commute model. Throughout the urban modelling for Yangon Waste Management Planning it should be taken as against the aim to site the model. However, many aspects of the system and model are investigated that have not yet been made explicit in the remaining literatures. As such much is gleaned by comparison of model performance and modelling approaches with the literature on similar topics. Hence, data related to urban modelling will be valuable for researchers and supporting the development of a suitable method.

**Global Perspectives**

To maximize the chances of future generations living on a globe range of landscapes that are just, thriving, and sustainable, we need to enable the panoply of future Earth seeds that are supported by grassroots sustainability initiatives and foster appropriate fertile ground in the form of enabling institutional and governance contexts (M Bennett et al., 2021). To do this, we need to nurture the growth of such seeds and deconstruct the institutions and organizations that impede their growth. Developing policies to enable these changes requires research on transformative change to evaluate, support and connect a diverse array of sustainability initiatives. In many respects, navigating

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pathways to such desired outcomes is like observing the world's patchwork of landscapes, where an infinity of unique patterns plays out across vast scales. Some future Earth seeds will unfold in the absence of any directed action, while others will require sustained effort and intent. Considering the palimpsest of integrated futures, two (or more) gestures that bring stones into direct or near-direct contact are best avoided, whether they are seeds that mutually bolster success or that increase the likelihood of a future already well-foreseen.

Navigating emergent pathways requires a blend of deep local knowledge, careful macro-scale observation from without, and ongoing processes of knowledge co-production, reflection, and adaptive action. In the pursuit of preferred future seeds, the challenge is to bring about harmonious stone placement while respect is paid to local timbers and graphite lines. Skilled masons, well-equipped with suitable tools, are the linchpin of progress; moreover, unexpected misalignments demand timely attention and adaptive response, lest cracks form that fatally weaken the over-arching structure. To that end, the world's practitioners and masons need better tools and conditions, including investment in new organizations custom-brewed to aid in bridging knowledge and practice.

**1. International Agreements and Protocols**

In the last century the natural scientist Karl-Henrik Robèrt came up with the idea of 'the natural step' -- a succinct management principle based on the scientific laws of physics and chemistry. It has to begin with the formulation of basic scientific principles upon which the organization sets course. This is the case with the journey One Earth – One Future. In this age of environmental destruction, the fundamental scientific precepts have been formulated as the survival principles of the Earth. Now One Earth – One Future has been proposed as a vehicle for the integration of these principles in the policy of the community of life on Earth. Without these principles to guide it, however, just like a ship without a compass, the vision threatens to be lost in the boundless horizon of the unknown.

More than 70 international agreements and protocols have been signed to manage resources, and protect land, water, and air. Yet, deforestation, decrease in bird populations, fish stock depletion, and non-point source pollution of waterways provide clear evidence of failure. In international agreements, nations often act primarily in their perceived self-interest, which may, or may not, be concordant with the global interest of sustainable development (RAIVIO, 2016). Further, many agreements are cumbersome and bureaucratic, and difficult to enforce. The carbon dioxide reduction agreement of the United Nations is an example. At the Rio Earth Summit in 1992, President Bush, Sr. signed the Global Climate Convention, but when carbon dioxide reduction came up in Kyoto in 1997, the United States Congress passed a bill not to accept it. Likewise, many parliaments have idiosyncrasies that prevent the cause of global sustainable development. Japan, for example, cannot refuse any demand by a small island country in the South Pacific during a UN conference, because the demands are voted on collectively. Japan therefore tries to expel the countries from the conference hall under some pretext before the vote.

**2. Cultural Perspectives on Sustainability**

Cultures around the world have developed a diversity of practices all based on a multitude of various underlying assumptions and values with regard to how humans relate to the rest of the earth system. Despite these differences, all cultures are in some way pursuing essentially the same goal, which is, namely, the capacity to provide for their individual or collective survival. Pursuing this goal, they have evolved elaborated and specialized knowledge systems and practices that are, in fact, the result of a particular way of understanding and perceiving the earth, or of a specific culture. In this view, every culture is in effect a complex, accumulated tradition with regard to interactions with earth, whose very essence is the unique set of premises and assumptions that give form and structure to the ways in which humans engage with the rest of the world. By understanding the consequences of the aforementioned cultural assumptions and mentalities we can better understand the environmental outcomes and plan our relationship with the environment in a way that is more respectful and harmonious with earth cycles, from local to the global scale (Strasser, 2013).

**Challenges to Sustainability**

Almost 50 years after the publication of the report to the Club of Rome, there is an agreement that the current unbridled pursuit of perpetual economic growth poses a fundamental threat to the natural systems that support life on Earth. In the subsequent decades, thinkers from a wide range of disciplines have developed an array of visions, ideas, and action plans to make human societies more sustainable. Progress has certainly been made over the past half century on various dimensions of sustainability, but the dominant narrative is that "business as usual" development paths are steering humanity toward the brink of existential crises (M Bennett et al., 2021). Unfortunately, the most prominent signals of unsustainability –be it over-fishing of the world's ocean, the erosion of pollinators, or the rapid loss of planetary biodiversity– are not nearly as clear as a graph showing exponential increases in the consumption of finite resources or $CO_2$ in the Earth's atmosphere.

There are emergent and as-yet-unforeseen scientific challenges and opportunities for turning those visions, ideas, and plans into realities, and increasing the equity, prosperity, and well-being of all people on Earth. To increase the chances of success of the research endeavor of forging a "pathway to the future of One Earth", it would be wise to nurture the growth of seeds of desirable futures and to deconstruct the institutions and organizations that impede their growth, even if they appear to be tiny or ridiculous. Development of policies to enable those changes requires an understanding of how Transformations TOWARD sustainability are initiated, guided, and impacted, as well as examination of the broader implications of sustainability efforts worldwide. To navigate emerging pathways together, it is essential to engage in an effort to

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discuss, share, and deepen a collective understanding of an ancient but urgently required process.

**1. Environmental Degradation**

Across the globe environmental degradation unfolds, instigating ecological ruin. That said, this diminution is neither an individual national concern, nor precipitated by a specific channel; it affects all countries, worldwide, at all levels and scopes and in a host of varieties. The natural world and its numerous biotic environments are only one aspect of this concern, however; the human, animal, plant and earth systems are also complicated and disturbed. Such ruin, however, are products of human creativity. The destruction is generated by populated land and its operations, developing, strengthening, and creating in the process of this crisis. Because of many problems and concerns related to these links between environmental harm and ecosystems and society, this devastationalization and its concomitant illness must be ceased, or at least remedied, in individual scenarios, ones that appear out of sync through the individuals intervening within the circulation of ecological violations (Irene Berg, 2009).

While some diminutions of this emergency crisis appear moderate and can barely be noted—examples include oil spills or gas stations polluting the air in neighbourhood confines—others are great, distressful, and extensive, as is the case in rainforest degradation and eradication, generating adverse eruptions in peoples' locales globally. Infinitely, individuals and groups find themselves involved in ecological altercations, conflicting multinationals or local governments constructing nuclear reactors in their vicinities, preying on or destroying basic sources and highlighting progress as agencies that ought to be cut. Inadequacies are revealed in every part of the world and, subsequently, these failings reflect the mimetic character of the global intelligences, capital and market that are proving the base for this emergency and its reverberations. Recurrently offered by the corporates and governments to obfuscate the wilderness of such ruin, sustainable development essentially reveals the true budgeting of capital and operationalization of market forces – integrating them into every dwelling and peripheral distancing the planet ensuring resources will be extracted, consumed and expelled in tandem with this crisis.

**2. Social Inequality**

Social and economic inequality are ubiquitous in contemporary human societies and are commonly linked to a host of detrimental consequences both for the environment and for the well-being of individuals (J. Haynie et al., 2021). Like species themselves, habits do relate to particular environments and social choices. Social inequality is epitomized and to some extent formalized by cultural institutions like social class hierarchies and caste systems. It is determined and reconstructed both by a pattern of social relations and by personal qualities like kinship or wealth. Social inequality obviously has an ecological dimension. Looking at the processes leading to social inequality in depth, one can say that it is also predetermined by the more or less random encounters of individuals—or groups—with particular assemblages of non-human species, structures or features, differential exploitation resulting in differential local availability and decrease in or protective measures against this availability. It is further predetermined by the gradual emergence of detailed knowledge and scripts about that nature and all features in a certain environment or environment, which in higher civilization involve writing. As a course, such scripts tend to be culturally transmitted and associated with social difference. The advance of farming and its faster iteration is particularly significant in this respect—an instance of what Wittfogel called hydraulic mnemotechnics.

The need and consequently the ability to control more and more extensive resource areas fall back on larger workforce, generate defense issues, and as a result accumulate significant mechanistic and social control over nature—de facto encouraging social inequality in various forms. On a more specific count, questions can be asked about the differential and consequent impacts of that control, the cross-linkage between social inequality and different kinds of environmental standings, the role of thrown contentious in redrawing the boundaries of such standing, and so forth and so on (Dietz, 2014). Given that the control or rechanneling of water systems is one of the cornerstones of environment technique from the rise of the first cities and states, hydraulic model can be a neat starting point for some of these inquiries.

**3. Political Resistance**

While the potential for sustaining life is without bounds, the expectation that humans continue to endure the relentless degradation of environmental systems is not conceivable at a certain point. Notions of sustainability, studies of the global environment, and the policies drawn from insights of sustainability science offer means to collectively change the situation before that point is reached. Rather than cascading failure, it is possible to imagine earth's future in which humans are able to sustain the web of life and the beauty and diversity of the planet. That future rests on the accepting stewardship for the future of the earth, taking responsible actions to provide for future generations of plants, animals, and humans (G Webster, 2017). Society has both the power and the obligation to choose a more promising future and translate that future into reality. Achieving that future Earth, one of the prospects for sustainability, rests on five integrations, all requiring a sustainability and resilience perspective. One earth draws attention to the reality that humans live in a world with limits and one that can be fractured and broken by actions that transcend developed resilience. That integrated vision of one earth offers the potential for one future in which the beauty of the planet is sustained. It is not a barren planet devoid of human impact but instead offers a vision of the planet in which the relationship between humanity and earth is guided so as to provide for diversity, life, beauty, the pursuit of dreams, and the fostering of growth. Up to now, humanity's relationship with the earth has often been contentious, exploitative, and thoughtless. There remains the potential for a different future, one of integrated, imaginative, and thoughtful care of the earth as home to society and to so many other forms of

life. One earth, one future offers that integrated vision of stewardship and it is incumbent on society to take the responsible and thoughtful steps to make that future a reality.

**Future Directions**

Subsequent to the conference, the following discipline-specific recommendations were formulated: Agri-food systems research is uniquely placed to contribute toward the SDGs given its relevance to food security but should adopt a more holistic approach extending beyond food systems to address multiple SDGs. To enhance effectiveness, agri-food systems research projects need to incorporate objectives on long-term social, economic and environmental sustainability as well as short-term productivity and food security. A more prominent role should be played by agri-food systems research in bridging the gap between local and global stakeholders, in monitoring the implementation of the SDGs and assessing their outcomes. Transdisciplinarity is a core requirement given the complexity of agri-food systems and the transformative nature of the SDGs. Hence theoretical work should explore how different types of transdisciplinary relationships can improve the application and feasibility of global sustainability goals at only local or global level across different systems or sectors. To reflect the diversity of the UNCCD and the SDGs in the research process, basic principles for the design of transdisciplinary projects should be laid out while considering: Systems to be connected, Actors supported to contribute and learn, Cultures and traditions respected from all actors, Feedback loops established.

**1. Emerging Trends in Sustainability Research**

Global research on sustainability has emerged since the 1960s in different disciplines such as Earth, environmental, social and political Sciences, as well as in Economics. Since 1972, the Conference on the Human Environment in Stockholm, followed by the Brundtland Report in 1987 and the 1992 Earth Summit in Rio, induced a transformation of sustainability research such that today the challenges of futurity have found more sophisticated philosophical, spatial macro, and actor-based micro perspectives. From the environmental point of view, apocalyptic narratives have been followed by research traditions on sustainable development, vulnerability, just transitions, resilience, or even transformative capacity. (M Bennett et al., 2021). Emerging trends in sustainability research are also being tracked as climate alterations and oceanographic perturbations increase the attention paid to fisheries, to the poles, or to the habitable labored atmosphere of the earth. A similar leapfrog gaze can be trained on research conceived and conducted in the Global South, especially on that produced in and about the world's largest and most populous land mass, the African continent. European obcernation, often flawed by conceit and misinformation, can provide valuable perspectives on Chinese education and research and vice versa. Transnational cooperation in research, and on research about research, is thus an acute need for a future that is globally sustainable (Ott, 2017).

**2. The Role of Education in Sustainability**

Education more broadly (other than future generation core education) and particularly higher education and lifelong learning have a critical role to play in knowledge systems and understandings of sustainable development (E.J. Wals & Benavot, 2017).

**Conclusion**

One Earth One Future is a network of artists and scientists working together to communicate the changes needed, the solutions to the climate crisis, to a broad global public (M Bennett et al., 2021). On Earth Day 2021, April 22nd, an international network of One Earth One Future Sail Satellite partners will launch a Satellite Art Installation re-coding the satellite sky with reflection and animation patterns from a work inspired by All-Is-Well. One Earth One Future asks everyone to support these initiatives and the work of people around the world creating a better future, not just for themselves, but for all species and ecosystems. On Earth Day 2021, September 22nd, the ideas in this poster, and more, will be presented at the One Earth One Future One Climate Festival in central Mumbai. Healthcare professionals are now asking, let's do the same for the planet (Ott, 2017). Encourage that other spectrum of activism, the actions both small and large, apolitical and political, that collectively re-orients us from extractive to sustainable – actions that enhance the durability of human life in accordance with ecological systems. Actions that have the power to bring about changes that are as radical as the transformation in health care workers positions.

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**Conflicts of interest**

The authors declare that they have no conflicts of interest related to this research.

**References:**

1. van der Leeuw, S., Costanza, R., Aulenbach, S., Brewer, S., Burek, M., Cornell, S., L Crumley, C., A. Dearing, J., Downy, C., J Graumlich, L., Heckbert, S., Hegmon, M., Hibbard, K., T. Jackson, S., Kubiszewski, I., Sinclair, P., Sorlin, S., Steffen, W., Dearing, J., & J. Graumlich, L. (2016). Toward an Integrated History to Guide the Future.
2. Rauser, F., Alqadi, M., Arowolo, S., Baker, N., Behrens, E., Bedard, J., Dogulul, N., Domingues, L., Frassoni, A., Keller, J., Kirkpatrick, S., Langendijk, G., Mohammad,

S., Misafa, M., Naumann, A., Osmon, N., Reed, K., Rothmüller, M., Schemann, V., Singh, A., Sonntag, S., Tummon, F., Victor, D., Villafverte, M., Walawender, J., & Zaroug, M. (2017). Earth system science frontiers - an early career perspective.

3. Folke, C., Biggs, R., V. Norstrom, A., Reyers, B., & Rockstrom, J. (2016). Social-ecological resilience and biosphere-based sustainability science.
4. Stammer, D., Bracco, A., Braconnot, P., P. Brasseur, G., M. Griffies, S., & Hawkins, E. (2018). Science directions in a post-COP21-world of transient climate change: enabling regional to local predictions in support of reliable climate information.
5. Stewart, I. S. & Gill, J. C. (2017). Social geology — integrating sustainability concepts into Earth sciences.
6. Bettini, G., Brandstedt, E., & Thorén, H. (2010). re-negotiating the role for science in society.
7. M Bennett, E., Biggs, R., Peterson, G., & Gordon, L. (2021). Patchwork Earth: Navigating pathways to just, thriving, and sustainable futures. osf.io
8. D. Hart, D. & P BELL, K. A. T. H. L. E. E. N. (2013). Sustainability Science: A Call to Collaborative Action.
9. Dewberry, E. & Johnson, J. (2010). Design interventions, prediction and science in the sustainable transition of large, complex systems.
10. Katerin Rodas, M. (2013). Alternative and Renewable Energy.
11. W. Doran, J., Stamatiadis, S., & Haberern, J. (2002). Soil health as an indicator of sustainable management.
12. RAIVIO, K. (2016). Coordinated global change research – the ICSU perspective.
13. Strasser, T. (2013). Cultures of (Un)Sustainability:Ecovillages as Seedbeds for a Cultural Transition.
14. Irene Berg, E. (2009). The Value of Ecofeminism for Environmental Regulation.
15. J. Haynie, H., H. Kavanagh, P., M. Jordan, F., R Ember, C., D. Gray, R., J. Greenhill, S., R. Kirby, K., Kushnick, G., S. Low, B., Tuff, T., Vilela, B., A. Botero, C., & C. Gavin, M. (2021). Pathways to social inequality. ncbi.nlm.nih.gov
16. Dietz, K. (2014). Researching Inequalities from a Socio-ecological Perspective. G Webster, D. (2017). Scape Goats, Silver Bullets, and Other Pitfalls in the Path to Sustainability.
17. Ott, C. (2017). Enabling Transformative Research: Lessons from the Eastern and Southern Africa Partnership Programme (1999-2015).
18. E.J. Wals, A. & Benavot, A. (2017). Can we meet the sustainability challenges? The role of education and lifelong learning.