

Chapter 1. Transformative change and a sustainable world

Supplementary material

Contents

Annex 1.1. Calls for transformative change from intergovernmental, private and civil society actor groups	2
Annex 1.2. Underlying causes and their relation to commonly cited indirect drivers	12
Annex 1.3. The dimensions of transformative change.....	20
Annex 1.4. Approaches to evaluating transformative change	23
Annex 1.5. Summaries of case studies used in table 1.3	36

Annex 1.1. Calls for transformative change from intergovernmental, private and civil society actor groups

Table SM.1.1. Summary of calls for transformative change from intergovernmental, private and civil society actor groups.

This table presents a selection of calls from different types of organizations to indicate the breadth of emphasis on the importance of transformative change. The list is not exhaustive and places emphasis on calls making specific reference to the importance of transformation and transformative change. The presentation is done according to date. For information on the types of actors, refer to **section 1.4.2**.

Actor/organization	Document	Date	Call for transformative change
Intergovernmental Organizations			
UNEP United Nations Environment Programme	Global Environment Outlook-5 (UNEP, 2012)	2012	Notes the need for transformation to “stop doing the things that pull the Earth System in the wrong direction and at the same time provide resources, capacity and an enabling environment for all that is consistent with the sustainable-world vision”. Highlights that achieving climate goals will require transformational change addressing key drivers
UN United Nations	Transforming our world: the 2030 Agenda for Sustainable Development (United Nations, 2015)	2015	Notes that this agenda was developed with a resolve to free the human race from the tyranny of poverty and a desire to heal and secure planet Earth. It is to be achieved through bold and transformative steps, which are noted as urgently needed to shift the world into a sustainable and resilient path.
UN United Nations	Sustainable Development Goals (Resolution A/res/70/1) (United Nations, 2015)	2015	Sets out transformative goals and targets and a transformational vision as “urgently needed to shift the world on to a sustainable and resilient path”.
IPCC Intergovernmental Panel on Climate Change	1.5 degrees special report (IPCC, 2018)	2018	Distinguishes incremental adaptation from transformational adaptation. Outlines transitions and transformations as conducive to climate-resilience, ambitious mitigation and adaptation in conjunction with poverty eradication, and reduction of inequalities.
UNEP	Global Environment Outlook-6	2019	Determines the need for transformative change in the context of achieving SDGs

United Nations Environment Programme	(UNEP, 2019)		and other MEAs and outlines the shape of transformative policies and practices.
IPBES Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services	Global assessment report on biodiversity and ecosystem services (IPBES, 2019)	2019	Goals for conserving and sustainably using nature and achieving sustainability cannot be met without transformative change across economic, social, political and technological factors that simultaneously addresses the direct and indirect drivers of the deterioration of nature. Transformative change can be generated by incentives and capacity-building; cross-sectoral cooperation; pre-emptive action; decision-making in the context of resilience and uncertainty; and environmental law and implementation. Transformations towards sustainability are more likely when efforts are directed at visions of a good life; total consumption and waste; values and action; inequalities; justice and inclusion in conservation; externalities and telecouplings ¹ ; technology, innovation and investment; and education and knowledge generation and sharing.
High Level Panel for a Sustainable Ocean Economy	Transformations for a Sustainable Ocean Economy: A vision for protection, production and prosperity (The Ocean Panel, 2020)	2020	Written by 14 heads of state and government, representing all ocean basins. Defines "2030 outcomes" for the ocean in each of the five identified critical areas and outlines a set of priority actions to achieve them. Includes particular emphasis on innovation, where and what to invest in and incentivize, where to implement regulation and better management, reducing demand for resources, circular economy development ¹ , stopping net loss and increasing and improving critical ecosystems, inclusive and transparent knowledge for decision-making, integrating across sectors for multi-factor solutions, implementing nature-based solutions etc.
ICIMOD International Centre for Integrated Mountain Development	The HKH Call to Action to sustain mountain environments	2020	Calls for six urgent actions which are regional cooperation, prioritizing mountain people, transformative climate action, achieving the Sustainable Development Goals and nine mountain

¹ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

	and improve livelihoods in the Hindu Kush Himalaya (ICIMOD, 2020)		priorities, halting biodiversity loss, and knowledge cooperation, to achieve a prosperous Hindu Kush Himalaya in the 2030s.
UK Government	Dasgupta Review on the Economics of Biodiversity (Dasgupta, 2021)	2021	The document seeks to provide a map, navigating a path towards the restoration of the planet's biodiversity. Transformative change is called for to bring economics and ecology together to save the natural world and biodiversity loss. The Review calls for changes in how people think, act and measure economic success to protect and enhance people's prosperity and the natural world.
IPCC-IPBES	Workshop report on biodiversity and climate change (Pörtner et al., 2021)	2021	Transformative change in governance and society is needed to achieve global agreements for biodiversity, climate mitigation and good quality of life ² , and to create resilient development pathways. Transformative change can encompass technological and environmental policies, social tipping interventions, leverage points ² in socio-ecological systems ² and the following elements: effective incentives and capacity building, improved cooperation across sectors and jurisdictions, anticipatory and pre-emptive actions, inclusive and adaptive decision-making, and strengthened environmental policy and implementation.
FAO and CIFOR Food and Agriculture Organization & the Centre for International Forestry Research	Transformational change to reduce deforestation and climate change impacts - A review of definitions, concepts and drivers in scientific and grey literature	2021	Collaboration between the Food and Agriculture Organization and the Centre for International Forestry Research, reviewing how transformative change is understood in scientific literature. Used ISI web of science and reviewed articles that had transformational change in the title from 2000-2018, 111 articles, 22 directly related to agriculture, forestry and climate change. Acknowledges that the search was limited and could have been broadened through use of related words such as social change or

² See glossary (<https://doi.org/10.5281/zenodo.11382223>)

	(FAO, 2021)		institutional reform. Also highlights that most literature was available in business management (organizational transformation), education (personal and collective learning and transformation) and health.
UNEP United Nations Environment Programme	Making Peace with Nature (UNEP, 2021)	2021	Argues that transformative systemic change is a prerequisite for a sustainable future. This type of change is required to address the environmental emergencies that include climate change and biodiversity loss. Transformations noted as required across, economic, financial, energy and food systems ³ .
IPCC Intergovernmental Panel on Climate Change	AR6 WGIII: Mitigation of Climate Change (IPCC, 2022b)	2022	Transformations are needed to limit climate change. Including transformation to production processes, development trends, technologies and social practices. “The necessary transformational changes are anticipated to be more acceptable if rooted in the development aspirations of the economy and society within which they take place and may enable a new social contract to address a complex set of interlinkages across sectors, classes, and the whole economy”
IPCC Intergovernmental Panel on Climate Change	AR6 WGII: Impacts, Adaptation and Vulnerability (IPCC, 2022a)	2022	Frames social transformation (to institutions, societies, etc.) as necessary to unlock the adaptations necessary for climate change projections. Frames social transformation as being across sectors and beyond transitions. Calls for transformations and system transitions in energy; land, ocean, coastal and freshwater ecosystems; urban, rural and infrastructure; and industry and society.
CBD Convention on Biological Diversity	Kunming-Montreal Global Biodiversity Framework (CBD, 2022b)	2022	Seeks to catalyze, enable and galvanize urgent and transformative action by Governments, and subnational and local authorities, with the involvement of all of society, to implement the three objectives of the Convention on Biological Diversity.
CBD Convention on Biological Diversity	Long-term strategic approach to mainstreaming	2022	Emphasizes the importance of intensified mainstreaming action to achieve the transformational change needed to attain the 2050 vision, while acknowledging

³ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

	biodiversity within and across sectors (CBD, 2022a)		the specific challenges faced by developing countries in supporting mainstreaming policies and the need for adequate means of implementation and enhanced international cooperation
IPBES Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services	The assessment report on diverse values and valuation of nature (IPBES, 2022)	2022	Determines combination of actions needed for transformative change. Policy instruments ⁴ can foster transformative change when: 1) a diversity of specific values (i.e., instrumental, relational and intrinsic values ⁴) is considered in their design and implementation; 2) they address one or more direct or indirect drivers of biodiversity loss; 3) they mobilize sustainability-aligned values through institutional change; 4) they promote capacities to embed nature's values into decisions; and 5) they are integrative and adaptive enough to bridge across world-views, values, sectors and scales.
IPBES Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services	Invasive Alien Species Assessment (IPBES, 2024)	2023	Notes that transformative change becomes necessary to achieve sustainable management of biological invasions because, like other key environmental threats, biological invasion is driven by demographic, social, economic and technological factors.
UN United Nations	Sustainable Development Goals Report Special Edition (United Nations Department of Economic and Social Affairs, 2023)	2023	Calls for transformative action, both nationally and internationally “going beyond mere plans and promises” as a necessary component of delivering on the promise of the Sustainable Development Goals.
ILO International Labour Organization	Transformative change and SDG 8 The critical role of collective capabilities and societal learning (ILO, 2023)	2023	The report elaborates on the policy framework presented in 2019 by seeking to explain more fully the dynamics of the transformative change envisioned by SDG 8, in particular by exploring the underappreciated role of the “collective capabilities” of societies in enabling and shaping such change. Also distils a number of principles and policy

⁴ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

			recommendations for integrated learning and transformation strategies— an epistemic approach—to mobilizing investment, technological change, and innovation and structural transformation in the economy.
UNESCO The United Nations Educational, Scientific and Cultural Organization	Ocean Decade Conference Barcelona Statement	2024	Recognizes a unique moment in the global ocean governance landscape, identifies priorities for science and governance, and encourages transformative actions that translate these priorities to tangible action.
Private sector			
WEF World Economic Forum	Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy (WEF, 2020b)	2020	Identifies priority socioeconomic systems for transformation as areas where strategic transformation of current business models and production processes can contribute the most to halting and reversing nature loss, and the ways to finance this transformation. These are: areas in which individual and collective action from business and other actors (such as state-owned enterprises, investors and financial corporations) is urgent and indispensable, and ecosystems that are closer to irreversible tipping points, and hence have more global relevance if tipped, and in which the drivers of degradation are more deeply connected to economic and business activities. Urges business to not ignore the trend in order to not be left behind.
WEF World Economic Forum	Global Risks Report (WEF, 2020a)	2020	Indicates that the next 10 years will shape the outlook for climate risk for the rest of the century and that far-reaching policies will be needed to transform industrial processes, transport, agriculture and land-use, alongside changes in consumer behaviours to scale the necessary critical solutions. Points to the potential of transformative technologies (e.g., big data and analytics) but also risks in using them.
WBCSD World Business Council for Sustainable Development	Time to transform (WBCSD, 2021)	2021	Notes that change is not happening at the speed or scale necessary. Urges to respond to a unique but rapidly closing window of opportunity for action, to transform the systems that govern businesses and societies. Urges

			businesses to lead the change and forge collaboration. Rejects a “business as usual” mindset and promotes a livable planet, an equitable society, genuinely free and fair markets, strong public institutions in the individual and collective self-interest. Outlines three critical strategic business mindset shifts: reinventing capitalism ⁵ to reward true value creation, not value extraction; building long-term resilience; taking a regenerative approach that moves beyond a “doing no harm” mindset to one in which social, environmental and economic systems heal and thrive. Outlines actions in nine transformation pathways: energy, transportation and mobility, living spaces, products and materials, financial products and services, connectivity, health and wellbeing, water and sanitation, food.
WEF World Economic Forum	Global Risks Report (WEF, 2020a)	2024	Analyses the perception of global risks in 2024 to support decision-makers in decisive action and identifies environmental risks (particularly biodiversity loss and ecosystem collapse, and critical change to Earth systems) as those that dominate the risks landscape in both short to long-term.
Civil society			
WWF	WWF Living Planet Report (WWF, 2020)	2020	Documents the continued loss of biodiversity and argues that “bending the curve” on biodiversity loss is possible but will require truly transformational change in economic systems, as well as the way food is produced and consumed and the way humanity manages and conserves nature.
The Nature Conservancy	Financing Nature: Closing the global biodiversity financing gap (The Nature Conservancy, 2020)	2020	Argues that slowing and stopping the global loss of biodiversity, entails fundamental rethink of people’s relationship with nature and transform economic models and market systems. Highlights the risks associated with biodiversity loss and highlights the value of biodiversity; explains why quantifying biodiversity values is difficult, and what are the structural barriers to integrating

⁵ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

			biodiversity into accounting systems. Finally, it makes a compelling case for investing in biodiversity, including amounts needed at the global level as well as specific policy actions.
IUCN International Union for Conservation of Nature	A programme for the Union 2021-2024 (IUCN, 2021)	2021	In response to the planetary crisis of biodiversity loss and climate change, IUCN advances the 5R pathways to transformative change: 1) recognize and promote a shared understanding of the interconnected challenges the world is facing, 2) Retain the importance of safeguarding, maintaining, and sustainably using biodiversity, 3) Restoring species, ecosystems, and ecosystem services ⁶ , 4) Resourcing and financing conservation, and 5) Reconnecting people to nature.
ICCA Consortium Consortium of territories and areas conserved by Indigenous Peoples and local communities (or territories of life)	Manifesto for Territories of Life (ICCA, 2023)	2023	Calls for the urgent need for fundamental change in national and global regimes, moving away from unsustainable, exploitative, extractive, military-based economies and centralized governance.

⁶ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

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Annex 1.2. Underlying causes and their relation to commonly cited indirect drivers

Table SM.1.2. Overview of connections between the identified underlying causes and commonly cited indirect drivers of biodiversity loss and nature's decline.

The table provides further substantiation of the underlying causes that have been identified in the assessment on the basis of a broad synthesis of literature. These underlying causes are interconnected patterns that have historically co-evolved and influence and shape each other. This table is constructed using data from the in-depth analysis of papers identified as relevant within the assessment corpus on the underlying causes of biodiversity loss.⁷

Underlying cause	Relation to commonly cited indirect drivers and factors
<p>Disconnection from and domination over nature and people</p> <p>Mentioned in 41 of 61 papers identified in the assessment corpus as relevant for in depth analysis.</p>	<p>This underlying cause is related to commonly cited factors such as colonialism (Akenji & Bengtsson, 2014; Brand, 2022; C. Brown et al., 2019; Conradie, 2016; González, 2011; Washington, 2021; Wegerif & Guereña, 2020), (neoliberal and global) capitalism (Anderson & Guyas, 2012; Christoff & Eckersley, 2013; Dauvergne, 2016; Foster, 2002; Khoury, 2023; Napoletano & Clark, 2020; Selby & Kagawa, 2018) and modernism (Bandarage, 1991; Dorje, 2011; Hay, 2005; Naidoo et al., 1990; Northcott, 1996; Safdar & Shams-ur-Rehman, 2021; Thøgersen, 2014). Analysis has pointed to how dominant paradigms and associated knowledge systems create dichotomies between subjects and objects and between nature and culture⁸ which create a foundational justification of the exploitation and extraction (Ahmed, 2011; Brand, 2022; P. G. Brown et al., 2009; Conradie, 2016; Darlington, 1998; Dorje, 2011; González, 2011; Horton & Horton, 2020; Irvine-Broque & Dempsey, 2023; Khoury, 2023; Lawrence, 2015; Moseley & Feldman, 2003; Nepstad et al., 2011; Rinder et al., 2022; Sundqvist & Åkerman, 2024; UNDP, 2011; Wegerif & Guereña, 2020; Weinstein et al., 2013) of everything that, according to these paradigms, is seen as objects or as lesser or inferior subjects, including nature and natural resources, but also historically marginalized and exploited humans. The destruction of natural habitats that is facilitated and justified by this underlying cause has been shown to be a key factor in the emergence of epidemics, particularly zoonoses (Horton & Horton, 2020). This underlying cause is reflected in socio-cultural norms and values, embedded in economic, institutional and governance structures and lies at the root of one of the key indirect drivers of biodiversity loss, namely consumption and production (Akenji & Bengtsson, 2014; Anderson & Guyas,</p>

⁷ Literature review of the underlying causes of biodiversity loss (<https://doi.org/10.5281/zenodo.11657981>)

⁸ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

	<p>2012; Bandarage, 1991; Brand, 2022; Clifton, 2012; Darlington, 1998; Dauvergne, 2016; Dorje, 2011; Eichinger, 2019; Hay, 2005; Horton & Horton, 2020; Javaid, 2021; Lawrence, 2015; Le Duc, 2017; Merz et al., 2023; Moseley & Feldman, 2003; Naidoo et al., 1990; Nepstad et al., 2011; Northcott, 1996; Pybus et al., 2022; Rosa et al., 2010; Safdar & Shams-ur-Rehman, 2021; Scott et al., 2014; Thøgersen, 2014; Ulluwishewa, 2018; UNDP, 2011; Weinstein et al., 2013).</p> <p>Domination of people can also affect demographic factors, when it leads to denying women and girls the right to education and reproductive choice (Hindin, 2023).</p>
<p>Concentration of power and wealth.</p> <p>Mentioned in 34 of 61 papers identified in the assessment corpus as relevant for in depth analysis.</p>	<p>The concentration of power and wealth is mostly associated with the economic system of (neoliberal and global) capitalism (Anderson & Guyas, 2012; Christoff & Eckersley, 2013; Dauvergne, 2016; Foster, 2002; Khoury, 2023; Napoletano & Clark, 2020; Selby & Kagawa, 2018) and the focus on economic growth (Ahmed, 2011; Akenji & Bengtsson, 2014; Alves et al., 2022; Burch & Di Bella, 2021; Christoff & Eckersley, 2013; Clifton, 2012; Darlington, 1998; Dorje, 2011; Irvine-Broque & Dempsey, 2023; Le Duc, 2017; Miller et al., 2014; Mirza et al., 2020; Moseley & Feldman, 2003; Nepstad et al., 2011; Northcott, 1996; Rinder et al., 2022; Rosa et al., 2010; Rosales, 2006; Safdar & Shams-ur-Rehman, 2021; Selby & Kagawa, 2018; Thøgersen, 2014; Ulluwishewa, 2018; UNDP, 2011; Waiswa et al., 2015; Washington, 2021; Weinstein et al., 2013) both of which are embedded in economic, institutional and governance structures, including financial and trade regulations (Ahmed, 2011; Akenji & Bengtsson, 2014; Alves et al., 2022; Brand, 2022; Burch & Di Bella, 2021; Conradie, 2016; Crona et al., 2021; Dorje, 2011; Horton & Horton, 2020; Irvine-Broque & Dempsey, 2023; Javaid, 2021; Nepstad et al., 2011; Sundqvist & Åkerman, 2024; Wegerif & Guereña, 2020) and harmful subsidies (Crona et al., 2021; González, 2011; Irvine-Broque & Dempsey, 2023; Nepstad et al., 2011; Thøgersen, 2014; Watson, 1999). Central to this underlying cause is the issue of inequality (Mirza et al., 2020; Pybus et al., 2022; UNRISD, 2023; Wegerif & Guereña, 2020; Wood et al., 2013). The benefits of economic growth are unequally distributed. The concentration of power and wealth in an increasingly small part of the human population has important consequences. For one, it has important justice implications since the consequences of the environmental degradation, including pollution (Eichinger, 2019; González, 2011; Horton & Horton, 2020; Merz et al., 2023; Nepstad et al., 2011; Sundqvist & Åkerman, 2024; Thøgersen, 2014; Weinstein et al., 2013)</p>

	<p>caused by the wealthy disproportionately affect poorer areas and marginalized people and communities. Second, while the positive effects of technology are noted in some cases (Bandarage, 1991; Conradie, 2016; Thøgersen, 2014), inequities in power and resources results in technology primarily benefiting elites and further accelerating the exploitation and degradation of nature and biodiversity, among others because efficiency gains due to technological innovation are outpaced by growth in production and consumption and because technology makes exploitation and extraction more efficient (Akenji & Bengtsson, 2014; Brand, 2022; Bruce, 2008; Eichinger, 2019; González, 2011; Hindin, 2023; Rinder et al., 2022; Safdar & Shams-ur-Rehman, 2021; Waiswa et al., 2015). Third, it facilitates the ignorance, obstruction of transformative change, and the reproduction of the status quo (Darlington, 1998; Moseley & Feldman, 2003; Washington, 2021; Wells, 1993) since powerful actors⁹ have unprecedented resources at their disposal to block change, for example through the funding of (mis)information campaigns and thinktanks, lobbying and litigation. Inequality is also a key factor in driving conflict (Ahmed, 2011). The increases in inequality are such that overproduction and overconsumption has outpaced demographic factors. Several studies that cite global population growth as an indirect driver (Ehrlich, 2014; Merz et al., 2023; Rosa et al., 2010; Watson, 1999; Wood et al., 2013) fail to sufficiently consider inequality. The impact caused by growing consumption in and production for parts of the world where the human population is stable or even declining is higher than the impact of population growth in areas with high reproduction rates (Kayal et al., 2019; O'Neill, 2009). Second, while people in areas with higher growth rate can negatively impact biodiversity, including for example by overexploiting or overharvesting of wild species, these are in many cases survival strategies to cope with changes in land use due to overproduction and overconsumption in richer locations (Waiswa et al., 2015).</p>
<p>Prioritization of short-term, individual and material gains.</p> <p>Mentioned in 30 of 61 papers identified in the assessment corpus as</p>	<p>This underlying cause is linked to (neoliberal and global) capitalism (Anderson & Guyas, 2012; Christoff & Eckersley, 2013; Dauvergne, 2016; Foster, 2002; Khoury, 2023; Napoletano & Clark, 2020; Selby & Kagawa, 2018) and specifically how this drives consumption and production beyond levels of sufficiency (Akenji & Bengtsson, 2014; Anderson & Guyas, 2012; Bandarage, 1991; Brand, 2022;</p>

⁹ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

<p>relevant for in depth analysis.</p>	<p>Clifton, 2012; Darlington, 1998; Dauvergne, 2016; Dorje, 2011; Eichinger, 2019; Gibson, 2019; González, 2011; Hay, 2005; Horton & Horton, 2020; Javaid, 2021; Lawrence, 2015; Le Duc, 2017; Merz et al., 2023; Moseley & Feldman, 2003; Naidoo et al., 1990; Nepstad et al., 2011; Northcott, 1996; Pybus et al., 2022; Rosa et al., 2010; Safdar & Shams-ur-Rehman, 2021; Scott et al., 2014; Sundqvist & Åkerman, 2024; Thøgersen, 2010, 2014; UNDP, 2011; Weinstein et al., 2013). It is embedded in socio-cultural patterns that prioritize individual interests or collective and public values and embedded in economic, institutional and governance structures.</p>
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Annex 1.3. The dimensions of transformative change

Table SM.1.3. Ideas and concepts that have been clustered together and labelled under the broad umbrella terms as the dimensions of views, structures and practices.

This table is constructed using data from the analysis of contributions on what transformative change is according to different communities of knowledge.¹⁰

Description	References
 Views	
Values of nature	(Anderson et al., 2022; Brosch & Steg, 2021; Kashima, 2020; Penman, 2021; Raymond et al., 2023; Stern, 2000)
Relationships and identity relative to nature	(Artmann, 2023; Bhaskar, 2012; Braidotti, 2013; de la Cadena, 2015; Debaise & Halewood, 2017; DeLanda, 2016; Descola, 2013; Ingold, 2004; Kashima, 2020; Kohn, 2013; Meesters et al., 2023; Schultz, 2011)
Environmental ethics	(Gudynas, 2019; Sato & Alarcon, 2019; Ulrich, 2016)
Worldviews and mindsets	(Billion, 2021; Escobar, 2015; Gunningham, 2017; Mitchie et al., 2011; Woiwode et al., 2021; Yoshida et al., 2018)
System narratives, goals and paradigms	(Abson et al., 2017; Colding & Barthel, 2019; Dengler & Strunk, 2018; Hickel, 2021; Mayaux et al., 2022; Mehta et al., 2021; Muradian & Gómez-Baggethun, 2021; Otero et al., 2020)
Framings of science, knowledge and how it is conducted	(Lahsen & Turnhout, 2021; Lotz-Sisitka et al., 2016; Massarella et al., 2021; Turnhout et al., 2020; Turnhout & Lahsen, 2022)
Intergenerational memory and knowledge, biocultural memory, ancestral knowledge	(IFAD, 2022; Kurew Cea, 2023; Lilongwe University of Agriculture and Natural Resources, 2022; Lin et al., 2020)
Individual and community beliefs, spirituality, myths, religions	(Alarcón-Cháires, 2018; Carroll, 2004; Dabezies & Taks, 2021; Ives et al., 2018; Köhrsen, 2023; Luque et al., 2018; Mohamad et al., 2012; Richards, 2002; Woiwode & Woiwode, 2019)

¹⁰ Analysis of contributions on what transformative change is according to different communities of knowledge (<https://doi.org/10.5281/zenodo.10246572>)

Personal and cultural values	(Horcea-Milcu, 2022; Horlings, 2015; Ives & Kidwell, 2019; Wilson, 2008; Woiwode et al., 2021)
Motivations, attitudes, emotions, social and personal norms	(Abrahamse & Steg, 2013; Brick et al., 2021; Brosch & Steg, 2021; Dietz et al., 2009; Eom et al., 2016; Goldberg et al., 2021; Gustafson et al., 2022; Klöckner, 2013; Thøgersen et al., 2021; Vesely et al., 2021; Whitmarsh & O'Neill, 2010; Wolske et al., 2020)
 Structures	
Laws, regulations, policies, state and governance mechanisms	(Bolton, 2022; Brosch & Steg, 2021; Bulkeley et al., 2022; Leventon et al., 2021, 2019; Marteau et al., 2021; Patterson et al., 2017; Penca, 2023; Phang et al., 2020; Thøgersen et al., 2021; Visseren-Hamakers et al., 2021; Visseren-Hamakers & Kok, 2022)
Land/territorial/property rights	(Bisong & Andrew-Essien, 2010; Gordon, 2022; Red de Jovenes Indigenas de America Latina y el Caribe, 2022; Samta March, n.d.)
Institutions (formal and informal)	(Bisong & Andrew-Essien, 2010; Coglianese, 2001; Richards, 2002)
Ways of organising production and provision systems	(Bluwstein, 2021; Dengler & Strunk, 2018; Escobar, 2015; Gudynas, 2019; Hickel, 2021; Kashwan et al., 2021; Newell et al., 2021; Otero et al., 2020; Siamanta, 2021; Zwarteveen et al., 2021)
Economic, social, cultural and physical power	(Avelino, 2017; Bluwstein, 2021; Feola et al., 2021; IPBES, 2022; Stoddard et al., 2021)
Infrastructure and service provision	(Roelich, 2020; Vierikko et al., 2016)
 Practices	
Participation in collective social, political and cultural activities and movements	(Coglianese, 2001; Kenis et al., 2016; Mitkidis & Valkanou, 2020; Pelenc et al., 2019; Pelenc & Dubois, 2020; Setzer & Benjamin, 2020; Stern, 2000; Temper et al., 2018; Van Den Berg et al., 2022)
Individual behaviours and consumption practices, including lifestyles, habits and routines	(Abrahamse & Steg, 2013; Brick et al., 2021; Dietz et al., 2009; Eom et al., 2016; Kapoor, 2007; Marteau et al., 2021; Penman, 2021; Schultz, 2011; Thøgersen et al., 2021)
Raising awareness in others	(Barbosa, 2017; Kapoor, 2007; Meek, 2016; Moore et al., 2018; Rosset et al., 2019; Temper et al., 2018; Wolfram et al., 2016)

Decision-making behaviour, particularly by incumbent decision-makers and power-holders	(Armitage et al., 2020; Black et al., 2023; Bolton, 2022; Fisher et al., 2022; Fletcher & Büscher, 2020; Kashwan et al., 2021; Leventon et al., 2021; Nielsen et al., 2021; Pelling, 2014; Penca, 2023; Ulrich, 2016; Whitmarsh et al., 2021)
Adoption of social and/or technological innovations	(Alexiades, 2011; Dabezies & Taks, 2021; Geels et al., 2018; Gupta et al., 2019; Ingold, 2002; Kemp et al., 1998; Mayaux et al., 2022; Olsson et al., 2014; Renn et al., 2021; Reyers et al., 2018; Siamanta, 2021; Taebi et al., 2014; Trahan & Hess, 2022; Wolfram et al., 2016)

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Annex 1.4. Approaches to evaluating transformative change

Table SM.1.4. Fundamental shifts advised for evaluation practice to make it appropriate for contexts of societal transformation.

The contrasts in conventional/mainstream evaluation are not intended to imply that all conventional or mainstream evaluations have the characteristics described, but rather to describe typical or frequent practice.

Shift	Contrast in conventional/mainstream evaluation
Become fluent in systems thinking ¹¹ and to adopt more complexity-aware frameworks and evaluation approaches, including being prepared for uncertainty, unpredictable and emergent outcomes, the need for ongoing, long-term feedback and adaptation, and the frequent impossibility of establishing clear causal relationships (Junge et al., 2020; Williams et al., 2021).	<ul style="list-style-type: none"> • Evaluations assume that change can be commanded and controlled in linear, predictable ways (Norman, 2021). • Evaluations treat evaluands as relatively disconnected from the wider world (Uitto, 2021). • Evaluations assume that there are stable end-points at which to conduct summative evaluations (Junge et al., 2020).
Become expert in ‘bricolage’, choosing and creatively adapting criteria, methods and tools from diverse sources to particular contexts (Patton, 2021; Reynolds et al., 2016).	<ul style="list-style-type: none"> • Evaluators focus on using standardized, repeatable methods without adapting them to context (Patton, 2021).
Shift power towards the evaluand, with the evaluator playing more of a facilitatory role and allowing evaluand communities to play major guiding or leading roles in designing, implementing and drawing conclusions from evaluations (Bilella et al., 2021; Fetterman, 2017).	<ul style="list-style-type: none"> • Evaluators play a more technocratic and directorial role (Fetterman, 2017). • Evaluators impose their own view of reality and evaluation approaches on communities (Fetterman, 2017; Maclure, 2006).
Decolonize evaluation and support social justice ¹¹ , embracing diverse perspectives and knowledges (Gates et al., 2023; Mertens, 2013; Sibanda & Ofir, 2021).	<ul style="list-style-type: none"> • Evaluators adopt a neutral, independent stance (Patton, 2021). • Western and Global North evaluation approaches dominate (Sibanda & Ofir, 2021).
Support stronger professionalization and autonomy of evaluation practice	<ul style="list-style-type: none"> • Evaluation design dominated by those in power with vested interests to

¹¹ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

(Hejnowicz & Chaplowe, 2021; Picciotto, 2021).	<p>maintain the status quo (Picciotto, 2021).</p> <ul style="list-style-type: none"> ● Excessive focus on accountability and economic gain (Hejnowicz & Chaplowe, 2021; Picciotto, 2021; Uitto, 2021).
Cultivate mutualistic partnerships with other evaluators, researchers, young people, and other stakeholders (van den Berg et al., 2021).	<ul style="list-style-type: none"> ● Evaluations conducted in isolation and without wider networking (van den Berg et al., 2021).
Adopt an explicit ethical stance of supporting urgent transformation towards regenerative systems (Patton, 2021), recognizing that evaluators are never fully independent but rather embedded within evaluated systems (Fetterman, 2017), and that evaluations are part of transformation processes, not removed from them (Patton, 2021).	<ul style="list-style-type: none"> ● Evaluators adopt a neutral, independent stance (Patton, 2021). ● Evaluation criteria chosen (e.g., OECD Development Assistance Committee criteria) suggest that business-as-usual¹² can be continued (Patton, 2021). ● Evaluators agree to conduct evaluations even if they fail to align with transformative principles (e.g., they promote greenwashing¹²) (Patton, 2021).
Evaluate, and facilitate discussions about, subjective, and emotional aspects of evaluands, including their underlying values, worldviews and norms that shape behaviour (Foster-Fishman et al., 2007; Gallagher & Ofir, 2021). Evaluators should also recognize their own values and how these influence their evaluations (Gates et al., 2023).	<ul style="list-style-type: none"> ● Evaluators focus on objective and quantitative facts (Fetterman, 2017) ● Evaluators not reflexive about their own values and approaches (Gates et al., 2023).
Make reflexivity and learning central to evaluations, both for evaluators and evaluands (Guimarães, 2017).	<ul style="list-style-type: none"> ● Evaluators not reflexive about their own values and approaches (Gates et al., 2023). ● Evaluations used primarily for accountability purposes rather than adaptive learning (Hejnowicz & Chaplowe, 2021).

¹² See glossary (<https://doi.org/10.5281/zenodo.11382223>)

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Annex 1.5. Summaries of case studies used in table 1.3

The following are summaries of the case studies included in **table 1.3**. These are derived from the case study database of this assessment¹³.

Initiative: Malama Maulamua

Region/Country: America/United States of America

Actors: Civil society - individual citizens, local communities, CSOs, youth, Indigenous peoples, women community groups, government agencies; Government – local government, national government; Private sector – donors; Communicators and knowledge holders – scientific community.

Summary: This is a community-based conservation initiative with the goal of addressing environmental issues such as degraded coral reefs, invasive species, pollution, and declining fish populations in Maunalua Bay on the island of Oahu, Hawaii. The project engages community members including local residents, schools, businesses, and community groups, in conservation activities, awareness building, fostering stewardship, and mobilising support for conservation efforts. Scientific research is also conducted to better understand the ecological dynamics of Maunalua Bay and to prioritise areas for conservation and restoration. Restoration activities include coral reef restoration, planting native vegetation, controlling invasive species, and implementing sustainable fishing practices. Education and outreach is also seen as an important tool to build environmental stewardship and to foster long-term conservation efforts.

Initiative: Nashulai Maasai Conservancy

Region/Country: Africa/Kenya

Actors: Civil society – individual citizens, Indigenous Peoples.

See **box 1.4** for details.

Initiative: Mujeres y Ambiente

Region/Country: America/Mexico

Actors: Civil society – individual citizen, local communities, women, Non-Governmental Organizations

Summary: The Mujeres y Ambiente started as a group of eight women who came together to improve the conditions of people's lives. With their actions, they empowered themselves while creating skills and income generating opportunities through sustainable resource use. The group's actions have led to the development of initiatives such as a project on access and benefit sharing, one of the first global experiences of full compliance with the Nagoya Protocol in the cosmetics industry. They have also inspired other communities to replicate their experiences and receive trainings. These connections are leading to communities being integrated into broader value chains¹⁴ based on biodiversity and its sustainable use. The

¹³ Case studies database with transformative potential and pitfalls (<https://doi.org/10.5281/zenodo.10260233>)

¹⁴ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

benefits are already showing up as business opportunities, jobs, research, technology transfer¹⁵ and capacity building.

Initiative: Co-management of the Marine Reserve “Os Miñarzos” (Galicia-Spain)

Region/Country: Europe/Spain

Actors: Civil society – individual citizens (small-scale fishers), CSOs (*cofradías*-fishing guilds), Non-Governmental Organizations; Government – regional government; Knowledge holders - scientists

See **box 1.3** for details

Initiative: AKTEA

Region/Country: Europe/European Union

Actors: Civil society – local communities, women; Knowledge holders – scientific community

Summary: AKTEA is a network of women in fisheries and was established in 2006. The name is derived from the goddess in Hellenic mythology who symbolizes the shore which is the source of livelihoods of European women in the small-scale fishing sector. AKTEA works at the European and national level to recognize the role of women in fisheries and aquaculture and to achieve gender equality in these sectors. Other AKTEA priorities are women's access to decision-making processes within fisheries management at EU level (Advisory Councils) and within national fishermen's organizations, access to professional training and defense of small-scale fishing and fishing communities.

Initiative: Chipko Movement

Region/Country: Asia/India

Actors: Civil society – social movement, individual citizens, local communities, women, Non-Governmental Organizations

Summary: The Chipko movement was a non-violent movement in 1973 aimed at protecting and conserving trees. It originated in Chamoli, Uttar Pradesh (now Uttarakhand) in response to the rampant felling of trees and soon reached other states in India. Villagers hugged trees to prevent them from being felled. The name 'chipko' comes from the word 'embrace' or 'to stick'. The movement is variously called 'Embrace the Tree' or 'Hug the Trees'. The Chipko movement exemplifies transformative change for a number of reasons: it laid the foundation for modern environmentalism in India; it was guided by the Gandhian philosophy of non-violence and entailed people simply hugging trees to prevent them from being felled - this form of passive resistance appealed to the masses and it quickly spread elsewhere in India; it collectively mobilized women towards conserving natural resources which also brought about a change in attitude regarding their own status in society; and it not based on the politics of the distribution of wealth but on sustainable ecological stability.

Initiative: Namati

Region/Country: Global

¹⁵ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

Actors: Civil society – social movement, local communities, CSOs, Indigenous peoples, women, Non-Governmental Organizations; Government – national government, international organization; Knowledge holders – scientific community

Summary: Namati is a movement of community paralegals from all over the world whose mission is to advance social and environmental justice¹⁶ by building the capacity of people to know, use, and shape the law. Namati is derived from the Sanskrit word that means “to shape something into a curve,” e.g., towards justice. Namati helps communities protect their environments from threats such as land grabbing, deforestation, and pollution. Namati also provides legal assistance and representation to communities whose environmental rights are violated.

Initiative: Coexistence with the Crested ibis in Sado

Region/Country: Asia/Japan

Actors: Government – local, prefectural, national; Civil society – individual citizens (farmers), Non-Governmental Organizations; Communication and knowledge – multi-sectoral committees, scientists; Private sector – agricultural cooperative, retailers, consumers

See **box 1.2** for details

Initiative: Pachamama – Ecuador Constitution

Region/Country: America/Ecuador

Actors: Government – national government

Summary: "Pachamama" is a term that comes from the indigenous Quechua language, traditionally meaning "Mother Earth" or "World Mother." It has a profound spiritual significance for many Andean Indigenous peoples, embodying the concept of an all-providing, nurturing, and life-sustaining mother that presides over planting and harvesting. Respect for Pachamama is central to the Andean way of life, interwoven with local practices, rituals, and cosmology. In 2008, Ecuador became the first country in the world to recognize the Rights of Nature, including the concept of Pachamama, in its constitution. The recognition of the Rights of Nature in the constitution has led to the development of a legal framework that incorporates these principles into Ecuador's environmental laws and regulations.

Initiative: EU Water Framework Directive

Region/Country: Europe/European Union

Actors: Government – intergovernmental organization (EU), national governments

Summary: The EU Water Framework Directive (WFD) is an EU environmental legislation that was adopted in 2000. The WFD applies to inland, transitional and coastal surface waters, and groundwater. It ensures an integrated approach¹⁶ to water management, respecting the integrity of whole ecosystems, including by regulating individual pollutants and setting corresponding regulatory standards. It is based on a river basin district approach to ensure that neighbouring countries cooperate to manage the rivers and other water bodies that they share. The WFD was developed because many European river basins are international, crossing

¹⁶ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

administrative and territorial borders. Therefore, a common understanding and approach was crucial to the successful and effective implementation of the Directive.

Initiative: Kunming-Montreal Biodiversity Framework

Region/Country: Global

Actors: Government – national governments, international conventions

Summary: The Kunming-Montreal Global Biodiversity Framework was adopted in December 2022 during the fifteenth meeting of the Conference of the Parties (COP 15) following a four-year consultation and negotiation process. The Framework sets out an ambitious pathway to reach the global vision of a world living in harmony with nature¹⁷ by 2050. It has set four goals and 23 targets for 2030.

Initiative: Bhutan Trust Fund

Region/Country: Asia/Bhutan

Actors: Private sector - trust, donors, philanthropic organizations; Government - national

Summary: The Bhutan Trust Fund was established in 1992 and is the world's first environmental trust fund. It was granted the Royal Charter in 1996 which was subsequently updated in 2021 in keeping with the changing environmental context of the country. In its 30-year history, the Trust has made significant impacts in conserving Bhutan's environment and natural resources by providing long-term sustainable financing of projects that include the establishment of protected areas, conservation and management planning of species and ecosystems, and building human capacity to manage and conserve natural resources.

Initiative: ABALOB

Region/Country: Africa/South Africa

Actors: Private sector – business, trade union, donors; Civil society – local communities, youth, women, Non-Governmental Organizations; Knowledge holders - scientists

Summary: ABALOB is a South African-based global social enterprise. Its mission is to contribute to thriving, equitable, climate-resilient and sustainable small-scale fishing communities globally through the joint development of Technology For Good. Its modular technology ecosystem, including FISHER-to-MARKETPLACE and MONITOR solutions, are packaged as Software As A Service (SaaS). This service is underpinned by Community Development, a Community-Supported Fishery Model, Community-level Fisheries Improvement and Impact Measurement. The technologies and programmes poise small-scale fishers for social, economic and ecological sustainability. They believe in participatory fisheries rebuilding strategies that consider ocean life and livelihoods.

Fish With A Story – powered by ABALOB – is much more than a premium quality seafood product. It is a movement to drive ecological, economic and social change in small-scale fisheries. It emphasizes responsible sourcing, fair prices for small-scale fishers, traceability, transparent supply chains, low-impact fishing methods, 'eating with the ecosystem', local food systems and livelihoods. Fish With A Story provides a framework for fishers and patrons alike to steward marine resources creatively through a triple-bottom-line approach to sustainability. Fish With A Story is fully traceable 'from hook to cook'. Consumers can scan a

¹⁷ See glossary (<https://doi.org/10.5281/zenodo.11382223>)

QR Code accompanying their order to find out the full story behind the purchased seafood. It is possible to trace the fish back to who caught it, where, when, and how it was caught – it has a social and ecological story! Consumers can even message the fisher who caught it and read their story.

Initiative: Coral Vita

Region/Country: America/The Bahamas

Actors: Private sector – business; Knowledge holders - scientists

Summary: Coral Vita is a social enterprise focused on restoring dying coral reefs which are vital ecosystems crucial to the health of the ocean. The company operates on the cutting edge of coral restoration science and technology. Coral Vita creates high-tech coral farms that incorporate breakthrough methods to restore reefs in the most effective way possible. The scientific team has partnered with leading marine institutes, utilizing techniques to grow coral up to 50x faster while boosting their resiliency against the warming and acidifying oceans that threaten their survival. They then outplant these corals back into degraded reefs, bringing them back to life. Coral Vita's land-based farms not only supply corals for restoration projects, but also function as education centres for local communities as well as ecotourism attractions. They can also scale to make a significant ecological difference with a single farm able to grow millions of resilient corals for distribution around a region.

Initiative: FinTech Ant Forest

Region/Country: Asia/China

Actors: Private sector – business; Civil society - individual citizens, youth, Non-Governmental Organizations.

Summary: Launched in 2016, the Ant Forest is a mobile application that uses financial technology (fintech) to convert a user's uptake of lower-carbon activity into tree plantation. It is China's largest private sector tree-planting scheme engaging over 500,000 million users with more than 120 million trees planted in over 100,000 hectares of land. Ant Forest was awarded the UN's Champions of the Earth award in 2019. Ant Forest uses the Alipay mobile payment app as its platform. Every time a user performs a lower-carbon activity, for example cycling to work or using public transportation, they are rewarded with 'green energy points' that grow into a virtual tree. For each virtual tree grown, Ant Forest donates and plants a real tree.

Initiative: Gemüse Ackerdemie

Region/Country: Europe/Austria, Germany, Switzerland

Actors: Communicators and knowledge holders – schools; Civil society - Non-Governmental Organizations.

Summary: The Gemüse Ackerdemie (Vegetable Academy) is primarily an educational program for students of grades 3 to 6. Younger and older age groups are also engaged, but the caveat is that they have currently developed their educational materials targeting the 3rd to 6th grade curricula. In the Gemüse Ackerdemie, children learn where the food on their plates comes from - on the school's own arable land, together with their teachers. This experience allows children to think outside the box and to actively explore their natural surroundings. This will ultimately inspire a young generation for nature and sustainability.

Initiative: French Television weather news

Region/Country: Europe/France

Actors: Communicators and knowledge holders - media (TV), scientists; Government - national government

Summary: State TV channels France 2 and France 3 changed their daily weather forecasts into "weather and climate bulletins" to raise awareness about climate change. The weather bulletin was always the most popular program on French TV. Transforming "weather bulletins" into "weather AND climate bulletins" therefore had a tremendous impact on raising awareness on climate change. It contributed to making climate change more concrete in the daily life of millions of citizens. It also reflected on the progress made in public media regarding the urge to tackle climate change.

Initiative: Small Scale Fisheries Academy

Region/Country: Global

Actors: Communications and knowledge – scientists, artists, schools; Civil society – individual citizens, local communities, youth, Indigenous Peoples and local communities, Non-Governmental Organizations.

Summary: This initiative is a case with transformative potential because it is using diverse artistic expressions to make small-scale fisheries visible and relevant for coastal communities around the world and helping (i) to encourage and promote the valuation of fishing communities' social capital and cultural heritage in pursuit of sustainable relations with the sea and the coast, including through exhibitions and other forms of communication; (ii) to encourage artistic expression in response to scientific knowledge reflecting diverse ways of 'knowing' and articulating such knowledge, (iii) to encourage the development of didactic tools for education and self-training, and (iv) to promote a better recognition of Indigenous and local knowledge in the pursuit of the transition towards sustainability by encouraging active collaboration between researcher, artists, teachers, students and local communities.

Initiative: IPBES

Region/Country: Global

Actors: Communicators and knowledge holders – scientists; Government – national; Civil society - individual citizens

Summary: The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was established in 2012 with the aim of strengthening the science-policy interface for biodiversity and ecosystem services. IPBES brings together experts from around the world, including scientists, policymakers, and stakeholders, to assess the state of biodiversity and ecosystem services. These comprehensive assessments provide policymakers with evidence-based information to support decision-making. IPBES also contributes to capacity building and knowledge exchange.