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The thematic assessment report on

THE UNDERLYING CAUSES OF BIODIVERSITY LOSS AND THE DETERMINANTS OF TRANSFORMATIVE CHANGE AND OPTIONS FOR ACHIEVING THE 2050 VISION FOR BIODIVERSITY

SUMMARY FOR POLICYMAKERS

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SUMMARY FOR POLICYMAKERS OF THE THEMATIC ASSESSMENT OF THE UNDERLYING CAUSES OF BIODIVERSITY LOSS AND THE DETERMINANTS OF TRANSFORMATIVE CHANGE AND OPTIONS FOR ACHIEVING THE 2050 VISION FOR BIODIVERSITY (TRANSFORMATIVE CHANGE ASSESSMENT)

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This report in the form of a PDF can be viewed and downloaded at www.ipbes.net/transformative-change-assessment

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The thematic assessment report on

THE UNDERLYING CAUSES OF BIODIVERSITY LOSS AND THE DETERMINANTS OF TRANSFORMATIVE CHANGE AND OPTIONS FOR ACHIEVING THE 2050 VISION FOR BIODIVERSITY

SUMMARY FOR POLICYMAKERS

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IPBES is an independent intergovernmental body comprising 150 member Governments. Established by Governments in 2012, IPBES provides policymakers with objective scientific assessments about the state of knowledge regarding nature and the contributions it provides to people, as well as options for actions to protect and sustainably use these vital natural assets.

The Transformative Change Assessment was initiated by the IPBES Plenary in decision IPBES-8/1 and is based on the scoping report set out in annex II to the same decision. The assessment was produced in accordance with the procedures for the preparation of the Platform's deliverables set out in annex I to decision IPBES-3/3.

The Transformative Change Assessment was considered by the IPBES Plenary at its eleventh session (IPBES 11, Windhoek, Namibia, 2024), which approved its summary for policymakers and accepted its chapters. All material can be found here: https://www.ipbes.net/transformative-change-assessment

FOREWORD

The unprecedented challenges posed by global environmental change call for an urgent shift in how we view and interact with nature. As humanity faces the consequences of unsustainable practices, it is clear that transformative change is not just an option—it is a necessity. The Thematic Assessment of the Underlying Causes of Biodiversity Loss and the Determinants of Transformative Change and Options for Achieving the 2050 Vision for Biodiversity (Transformative Change Assessment) highlights that to achieve this transformation, we must redefine the relationship between people and nature, basing new visions on inclusive, just, diverse and forward-thinking approaches that address the underlying causes of biodiversity loss.

The pursuit of transformative change requires embracing diverse and inclusive visions for the future-visions that reflect the interdependence of people and nature and are guided by ethics of care and respect for all forms of life. Such visions can be achieved through processes that foster shifts across ways of thinking (views), ways of organizing and governing the world (structures) and ways of doing things and relating to nature and each other (practices). Change may start within any one of these three, but true transformation occurs as shifts progress across all three.

Across the globe, many communities and movements are already engaged in articulating and enacting such visions. Close to 400 case studies and 7,000 sources of evidence are assessed and analyzed in this report and highlight five main strategies to drive transformative change across diverse contexts. These strategies include conserving

and regenerating those places with value for both people and nature, driving changes in the sectors that are more closely responsible for nature's decline, transforming economic and financial systems to account for nature and equity, transforming governance systems to make them more inclusive, integrative and accountable, and shifting views and values to recognize that humans and nature are interconnected.

As the Chair and the Executive Secretary of IPBES, we wish to thank the experts who participated in this key assessment to help us understand the underlying causes of biodiversity loss and the required transformative changes to address them. In particular, we would like to recognize the leadership and dedication of the co-chairs Karen O'Brien (United States of America / Norway), Arun Agrawal (United States of America) and Lucas Garibaldi (Argentina) and the hard work and commitment of all the coordinating lead authors, lead authors, review editors, fellows, contributing authors and external reviewers who ensured that this assessment reflected the critical and innovative thinking required to understand what transformative change means. We would also like to recognize the role of the technical support unit including Laurence Périanin, Camille Guibal and Anouk Renaud who undertook the arduous task of driving this assessment forward to completion.

Our thanks also go to the members of the Multidisciplinary Expert Panel (MEP) and the Bureau who provided guidance as part of the management committee for this report, and to the members of the IPBES secretariat, including those of the other IPBES technical support units, who have supported the production of this report and its successful launch. Finally, we would like to thank all Governments and institutions that provided financial and in-kind support for the preparation of this Assessment.

Achieving systemic transformation requires more than vision- it calls for broad-based coalitions that bridge sectors and scales. Transformative change is more likely when it is co-created through a whole-of-society and whole-of-government approach that includes governments, civil society, Indigenous Peoples and local communities, businesses, researchers and citizens alike. We are sure that this assessment outlines ways forward for diverse actors to collaborate and lead actions that are holistic, resilient and just, and that help respond to global environmental challenges and accelerate actions towards achieving the targets of the Kunming-Montreal Global Biodiversity Framework by 2030 and for achieving the 2050 Vision for Biodiversity. We are confident that transformative change can be enabled in a sustained effort rooted in shared aspirations for a just and sustainable world.

David Obura
Chair of IPBES

Anne Larigauderie
Executive Secretary of IPBES

STATEMENTS FROM KEY PARTNERS

Our patterns of unsustainable production and consumption have put us on a collision course with nature. Ecosystems are degraded and the services nature provides are faltering.

Without urgent action to address biodiversity loss, progress on every aspect of sustainable development will be undermined.

The IPBES Transformative Change Assessment provides critical scientific information to bridge the gap between science and policy and offers a roadmap for addressing the drivers of the nature crisis with tools for action across sectors and society.

It rightfully recognizes the vital role of Indigenous Peoples' knowledge in safeguarding nature and provides evidence-based insights to help policymakers in identifying solutions that can be applied across contexts.

As governments work to realize the goals and targets of the Kunming-Montreal Global Biodiversity Framework, the recommendations made in this report can be a catalyst for action.

Inger Andersen
Executive Director
United Nations Environment Programme (UNEP)

Our planet is facing growing environmental and social crises. Increasing evidence shows that these issues cannot be addressed through gradual action – our social and economic systems instead need large-scale transformative change.

UNESCO, as an institutional partner of IPBES, is proud to have contributed to this new assessment report. It highlights various pathways for achieving transformative change, including areas central to UNESCO's mandate, such as governance, education systems, culture, values and environmental action. UNESCO-designated sites, including biosphere reserves, world heritage sites and Global Geoparks are also spaces for exploring and testing innovative governance and ways to transform the relationship between people and nature.

UNESCO has also played a key role in the incorporation of Indigenous and local knowledge into this assessment. The report highlights the diverse perspectives of Indigenous Peoples and local communities and demonstrates that their practices and lifestyles are often rooted in knowledge and value systems that promote sustainability. As such, they can offer important lessons for the transition to sustainable living in global societies.

With its unique multidisciplinary expertise, UNESCO stands alongside its Member States and other partners to support progress towards global transformative change, a goal to which this IPBES assessment will undoubtedly contribute.

Audrey Azoulay
Director-General,
United Nations Educational, Scientific and Cultural Organization (UNESCO)

With our natural world being pushed to the brink of no return and a climate emergency intensifying before our very eyes, incremental change alone is no longer sufficient. Transformative change is essential to meet the urgent need for lasting, system-wide shifts to address the grave interconnected threats of biodiversity loss, climate change and pollution.

This IPBES Transformative Change Assessment underscores the imperative for a fundamental recognition of humanity's shared need to protect the ecological systems that sustain us. Notably, it calls for a transformation in collaboration across governments, communities, the private sector and civil society.

The principal drivers of nature loss lie in the breakdowns in the fair management of Earth's finite resources. To build a thriving future, we must return to the core principles of equity, justice, inclusivity and diversity in both participation and action.

This assessment provides a clear roadmap for real change through strategies that shift societal views and values, reform dominant economic and financial paradigms, and involve diverse stakeholders. Crucially, this science-based assessment demonstrates that transformational change for our ecosystems and biodiversity is not only necessary but one that is inherently achievable within our lifetimes.

Achim Steiner
Administrator,
United Nations Development Programme (UNDP)

Biodiversity is vital to the efforts to meet humanity's growing need for food, feed, fibre and fuel, while protecting the planet for future generations. We need to produce more with less, through the Four Betters: better production, better nutrition, a better environment and a better life – leaving no one behind.

The IPBES assessments help us to understand the interlinkages between biodiversity, food and livelihoods, as well as the urgent need to address biodiversity loss with solutions that enhance sustainability and resilience. These assessments clearly highlight the essential role of agrifood system solutions in meeting the Paris Agreement, the Kunming-Montreal Global Biodiversity Framework, and the Sustainable Development Goals (SDGs) - especially SDG 2 to end hunger.

FAO's mandate aligns closely with the 2050 Vision for Biodiversity, promoting sustainable agrifood systems that ensure food security – by ensuring food availability, food accessibility and food affordability - with safe, sufficient and nutritious food for all, while conserving biodiversity and addressing the impacts of the climate crisis.

With decades of experience in technical and policy support and guided by its *Strategy on Mainstreaming Biodiversity Across Agricultural Sectors,* FAO is well-positioned to lead the transition towards more sustainable agrifood systems. By leveraging our expertise, resources and global network, we can help implement the assessments' recommendations, ensuring agrifood systems contribute positively to biodiversity conservation, sustainable use and climate action.

Together, we can build a future where agrifood systems support sustainability and resilience, benefiting both people and the planet. Let us seize this opportunity to create a lasting impact.

QU Dongyu
Director-General,
Food and Agriculture Organization of the United Nations
(FAO)

The 2019 IPBES Global Assessment Report formed part of the scientific platform that underpins the Kunming-Montreal Global Biodiversity Framework, especially with regards to the direct and indirect drivers of the biodiversity crisis and the need for transformative change across technology, economy and society.

The IPBES Assessment Report on Transformative Change, which comes in response to a request by Parties to the Convention on Biological Diversity (CBD), builds on the foundations laid by the Global Assessment. It offers concrete strategies and actions to enable the fundamental changes needed to meet the targets of the Kunming-Montreal Global Biodiversity Framework and to fulfil the 2050 Vision for Biodiversity: Living in Harmony with Nature.

With its focus on the underlying causes of biodiversity loss – specifically the drivers that undermine the very natural foundation upon which productive sectors rely – the Report constitutes an important asset for Parties and offers an excellent addition to the 2022 IPBES Values Assessment.

Probing obstacles to transformative change – including human practices and habits – contributes to charting pathways to a more just and sustainable world for people and nature. I commend the entire IPBES community, especially the authors of this important report.

I look forward to seeing the Transformative Change Assessment Report serve as a guide for Parties, stakeholders and partners, as well as decision-makers involved in the whole-of-government and whole-of-society endeavor that the implementation of the KMGBF requires.

Astrid Schomaker
Executive Secretary
Convention on Biological Diversity
(CBD)

Table of Contents

Transformative change is a process that depends on many actors. Hence, the Transformative Change Assessment would not have been possible without the support, encouragement and patience of so many people and institutions. This includes the families and friends of everyone involved in this assessment. We recognize that producing such an assessment requires a considerable commitment of time and energy, and we are grateful for so much understanding and support throughout the process.

As highlighted in this assessment, transformative change is challenging but possible and producing this report would not have been possible without the commitment and professionalism of the Technical Support Unit hosted by the University of Montpellier in France. They coordinated the assessment and worked intensely on the production and delivery of the report. We thank Laurence Périanin, Camille Guibal and Anouk Renaud. We are also grateful to Stéphanie Hernandez for her beautiful figures and graphics, and to Michael Olbrechts, Kisa MacIsaac, Makuini Te Whata-Chatwick, the Indian Sundarbans children's painting group and the Versova Koli photovoice group for their vibrant illustrations portrayed across this document.

We appreciate the input and support from the Management Committee, namely, Markus Fischer, Özden Görücü, Floyd Homer, Madhav Karki, Asia Mohamed and David Obura. As Chair of IPBES, David Obura situated this assessment in the wider IPBES context and helped develop synergies and alignment with the Nexus Assessment running in parallel.

Transformative change involves weaving together diverse knowledge systems, including Indigenous and local knowledge. Therefore, we are grateful to Peter Bates and the members of the Indigenous and local knowledge task force for helping us organize dialogues in Leticia, Colombia and Agadir, Morocco, as well as to convene the first dialogue in Bonn, Germany during the COVID pandemic. The taskforce on Indigenous and local knowledge also supported us in engaging with experts and artists representing Indigenous Peoples and local communities throughout the assessment process. We thank Sinchi in Leticia, Colombia as well as the Centre for Historical and Environmental Amazigh Studies (CEAHE) and the Coordinating Committee of Indigenous Peoples of Africa (IPACC) in Agadir, Morocco for hosting the dialogues and community visits.

Both small-scale and large-scale changes contribute to transformative change. Thus, we want to recognize the small-

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scale contributions of the many reviewers who submitted comments on the assessment drafts to improve the report. We also thank Robert T. Watson for his early feedback on the summary for policymakers of the assessment. We want to acknowledge the large contribution of the IPBES secretariat, especially Executive Secretary Anne Larigauderie and her team, including Simone Schiele, Rob Spaull, Bonnie Myers, Mariana Cantú-Fernández and David Gonzalez-Jimenez. We appreciate their careful comments on drafts of the report, and the time to come and support our author meetings. We also thank the IPBES task force on knowledge and data and its technical support unit, particularly Rainer Krug, Aidin Niamir, Renske Gudde and Yanina Sica for their help analyzing a corpus of literature essential for the assessment, helping prepare maps and provide guidance on the delivery of the assessment.

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Governments are powerful enablers of transformative change, and we would like to express sincere thanks to IPBES members that helped us to develop the assessment and considered the summary for policymakers and its underlying chapters at IPBES 11. We thank the Government of Namibia for hosting the 11th session of the Plenary, Eeva Primmer (Finland) and Hesiquio Benítez-Díaz (Mexico) for co-chairing working group I at IPBES 11, as well as the IPBES Media Team for supporting the launch of the assessment.

Finally, we would like to thank our team of experts – the coordinating lead authors, authors, fellows, review editors and contributing authors – who together develop a shared positive vision for this assessment. Close collaboration has been key to this transformative process. The *IPBES Assessment Report on The Underlying Causes of Biodiversity Loss and the Determinants of Transformative Change and Options for Achieving the 2050 Vision for Biodiversity* is a labor of love and we hope it will inspire all actor groups to engage with transformative change for a just and sustainable world.

Karen O'Brien, Lucas Garibaldi, Arun Agrawal
Co-Chairs

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WE NEED
A CHANGE

PREAMBLE

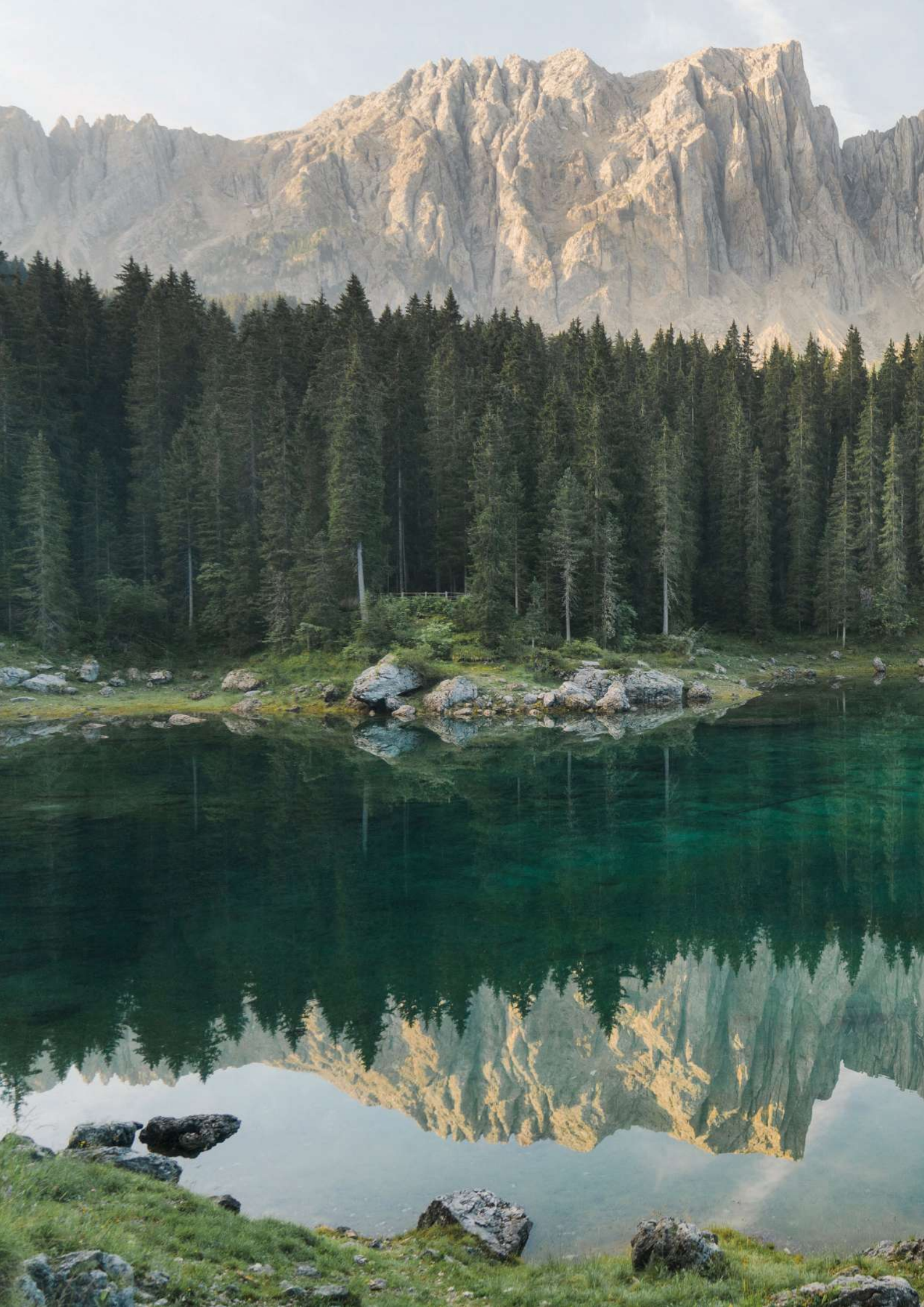
Transformative change for a just and sustainable world is urgent, necessary and challenging, but possible, to halt and reverse biodiversity loss and safeguard life on Earth.[2,3] It is required in order to respond to global environmental challenges and crises, including biodiversity loss, climate change and pollution. Biodiversity is fundamental to the systems underpinning life and good quality of life, and many of these systems are now at risk. Promoting and accelerating transformative change is essential to meeting the 23 action-oriented global targets and the four goals of the Kunming-Montreal Global Biodiversity Framework[4] by 2030 and for achieving the 2050 Vision for Biodiversity, namely, a world of living in harmony with nature where "biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people". It is also vital for progress towards the 2030 Agenda for Sustainable Development and its Sustainable Development Goals,[5] the United Nations Framework Convention on Climate Change[6] and the Paris Agreement. The vision of living in harmony with nature, including Mother Earth, describes a world that is just and sustainable and where all life can thrive. The links between sustainability and equity have been clearly recognized and acknowledged in international agreements relevant to the conservation, restoration and sustainable use of biodiversity.

The assessment focuses on transformative change that deliberately contributes to achieving the 2050 Vision for Biodiversity and global sustainability. It builds on past IPBES contributions that recognize the importance of transformative change for fully addressing biodiversity loss and nature's decline.[7],[8] The IPBES *Global Assessment Report on Biodiversity and Ecosystem Services*[9] defined transformative change as "a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values". The Transformative Change Assessment builds on and further clarifies this definition, focusing on what transformative change means, how it occurs and how to promote and accelerate it for a just and sustainable world.

Transformative change that matches the scope, scale, speed and depth necessary to maintain life on this planet calls for new understandings and strategic approaches that yield positive results for biodiversity and nature. Drawing on a rapidly growing body of literature and informed by evidence from diverse scientific disciplines and different knowledge systems, the Transformative Change Assessment recognizes that a simple system-wide reorganization of constituent elements is not enough. To achieve the breadth, depth and dynamics of system reorganization described in the IPBES *Methodological Assessment Report on the Diverse Values and Valuation of Nature*, it is important to address the underlying causes of biodiversity loss and nature's decline in a manner consistent with key guiding principles of transformative change.

The assessment focuses on various dimensions of transformative change that contribute to the 2050 Vision for Biodiversity. It also considers the challenges and barriers to realizing transformative change. The assessment emphasizes that overcoming these challenges is not just a matter of what people do, in terms of strategies and actions, but also how they do it, in terms of principles and shifts in views, structures and practices, taking into account different visions, world views and values. Practical guidance outlines how decision makers, businesses, civil society, Indigenous Peoples and local communities, and all people can use the messages and evidence in the assessment to engage with transformative change for a just and sustainable world **(Appendix 2)**.

2. IPBES (2019a): *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* Díaz, S., Settele, J., Brondízio, E. S., Ngo, H. T., Guèze, M., Agard, J., Arneth, A., Balvanera, P., Brauman, K. A., Butchart, S. H. M., Chan, K. M. A., Garibaldi, L. A., Ichii, K., Liu, J., Subramanian, S. M., Midgley, G. F., Miloslavich, P., Molnár, Z., Obura, D., Pfaff, A., Polasky, S., Purvis, A., Razzaque, J., Reyers, B., Roy Chowdhury, R., Shin, Y. J., Visseren-Hamakers, I. J., Willis, K. J., and Zayas C. N. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.3553458.
3. IPCC (2022): *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. H.-O. Pörtner, D. C. Roberts, M. Tignor, E. S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.) Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., 10.1017/9781009325844.
4. Adopted by the Conference of the Parties to the Convention on Biological Diversity in decision 15/4.
5. General Assembly resolution 70/1.
6. United Nations, *Treaty Series*, vol. 1771, No. 30822.
7. IPBES (2022): *Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Balvanera, P., Pascual, U., Christie, M., Baptiste, B., and González-Jiménez, D. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.6522522.
8. IPBES (2022): *Thematic Assessment Report on the Sustainable Use of Wild Species of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* Fromentin, J. M., Emery, M. R., Donaldson, J., Danner, M. C., Hallosserie, A., and Kieling, D. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.6448567.
9. Chan, K. M. A., Agard, J., Liu, J., Aguiar, A. P. D., Armenteras Pascual, D., Boedhihartono, A. K., Cheung, W. W. L., Hashimoto, S., Pedraza, G. C. H., Hickler, T., Jetzkowitz, J., Kok, M., Murray Hudson, M., O'Farrell, P., Satterfield, T., Saysel, A. K., Seppelt, R., Strassburg, B., Xue, D., Selomane, O., Balint, L., and A. Mohamed. (2019). *Chapter 5: Pathways towards a Sustainable Future. In: Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform.* Brondízio, E. S., Settele, J., Díaz, S., and Ngo, H. T. (eds). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.3832099.



KEY MESSAGES

KEY MESSAGES

A. Transformative change is urgent, necessary and challenging – but possible

KM1 **Transformative change for a just and sustainable world is urgent and necessary in order to address the global interconnected crises related to biodiversity loss, nature's decline and the projected collapse of key ecosystem functions. Delaying action to achieve global sustainability is costly compared with the benefits of taking action now {A1, A2, B4}.** Transformative change is urgent in order to address the scope and scale of current sustainability challenges, including the decline and projected collapse of key ecosystem functions and loss of biodiversity. It is necessary because previous and current approaches have failed to halt or reverse nature's decline at a global scale, which has serious repercussions for the global economy and human well-being. The world is facing multiple interacting and accelerating global crises: biodiversity loss, climate change and pollution. These interacting crises increase the risk of reaching irreversible biophysical tipping points that threaten fundamental ecological systems and processes that sustain life. There is increasing awareness of the need for transformative change on the part of governmental and intergovernmental bodies, private sector organizations and civil society, along with a growing recognition of interlinkages among a nexus of elements that include biodiversity, climate change, water, food and health.[10] Most previous and current approaches to conservation are aimed at reforming rather than transforming existing systems. Efforts to conserve, restore and sustainably use biodiversity are significantly underresourced in relation to the global economic value generated by activities that are directly dependent on nature. For example, financial flows towards biodiversity conservation ($135 billion–$156 billion, adjusted for inflation to 2023), amount to around 0.25 per cent of the global gross domestic product (GDP) that is moderately to highly dependent on nature ($58 trillion). The costs of inaction and delayed action are high, and delaying action to halt and reverse biodiversity loss globally by 10 years is estimated to be twice as expensive as taking immediate action.

KM2 **Transformative change is defined as fundamental, system-wide shifts in views, structures and practices. Deliberate transformative change for a just and sustainable world shifts views, structures and practices in ways that address the underlying causes of biodiversity loss and nature's decline. At the same time, it remains important to recognize and strengthen views, structures and practices that are aligned with the goal of creating a just and sustainable world, such as those of many Indigenous Peoples and local communities {A3, A4}.** Underlying causes are deeply rooted and interconnected social and cultural patterns that shape, influence and reinforce all direct and indirect drivers of biodiversity loss. The three key underlying causes identified in the assessment are: a) disconnection from and domination over nature and people; b) concentration of power and wealth; and c) prioritization of short-term, individual and material gains. Together they undermine the effectiveness of efforts to conserve and sustainably use biodiversity and contribute to challenges and barriers to transformative change. Currently dominant configurations of views, structures and practices perpetuate and reinforce these underlying causes of biodiversity loss and nature's decline. At the same time, many Indigenous Peoples and local communities around the world have views, structures and practices that are aligned with generating a just and sustainable world. Transformative change is necessary to achieve the 2050 Vision for Biodiversity and related global sustainability objectives by shifting views, structures and practices in ways that target and address these underlying causes. Views include ways of thinking, knowing and seeing. Structures refer to ways of organizing, regulating and governing. Practices represent ways of doing, behaving and relating. It is possible to promote and accelerate transformative change by selecting and advancing strategies and actions for the conservation, restoration and sustainable use of biodiversity and nature that integrate across views, structures and practices to specifically address underlying causes.

KM3 **Four key principles[11] are responsive to and address the underlying causes of biodiversity loss and nature's decline and guide the process of deliberate transformative change. These principles are equity and justice, pluralism and inclusion, respectful and reciprocal human-nature relationships, and adaptive learning and action {A5, A6, B7}.** The values and visions that guide decisions affecting nature and its contributions

10. IPBES (2024). *Summary for Policymakers of the Thematic Assessment Report on the Interlinkages among Biodiversity, Water, Food and Health of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* McElwee, P. D., Harrison, P. A., van Huysen, T. L., Alonso Roldán, V., Barrios, E., Dasgupta, P., DeClerck, F., Harmáčková, Z. V., Hayman, D. T. S., Herrero, M., Kumar, R., Ley, D., Mangalagiu, D., McFarlane, R. A., Paukert, C., Pengue, W. A., Prist, P. R., Ricketts, T. H., Rounsevell, M. D. A., Saito, O., Selomane, O., Seppelt, R., Singh, P. K., Sitas, N., Smith, P., Vause, J., Molua, E. L., Zambrana-Torrelio, C., and Obura, D. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.13850289.

11. The term "principles", as used here, refers to a framework for understanding, reasoning and making judgments, and does not refer to principles of law. Principles often represent values or beliefs that guide decisions and behaviours.

to people matter greatly (see the *IPBES Methodological Assessment Report on the Diverse Values and Valuation of Nature*). Given the breadth, depth and dynamics of transformative change processes, it is not only what is done that is important, but also how it is done. The key principles identified in the assessment are important for directly countering the underlying causes of biodiversity loss and nature's decline. They are also essential for guiding the process of change in ways that are attentive and responsive to unexpected or negative impacts. Transformative change is a process that affects multiple aspects of a system, often in unpredictable ways. Feedback across different levels and scales may result in unexpected and unintended outcomes. Transformative change also entails shifts in the status quo, which means that not everyone will benefit in the short term from the process of change. Even when the aim is a just and sustainable world with flourishing futures for all, the complex dynamics of deep change on a global scale mean that winners and losers (among humans and non-humans alike) will arise and change as the process continues to unfold across different contexts. This can lead to tensions arising between those who gain and those who bear the costs of change. The process-oriented principle of adaptive learning and action is vital for the ability to see and respond to unintended consequences, emerging impacts and tensions. Normative principles that guide decisions and behaviours help to ensure that the process of transformative change actively considers and responds to such dynamics and that the process remains oriented towards outcomes that are just and sustainable.

KM4 **Transformative change for a just and sustainable world faces challenges that are systemic, persistent and pervasive. Systemic challenges manifest as barriers that impede or prevent transformative change and reinforce the status quo {A6, A7}.** Challenges to transformative change influence all aspects of the relationships between humans and nature. Five overarching challenges were identified: (a) relations of domination over nature and people, especially those that emerged and were propagated in colonial eras and that have persisted over time; (b) economic and political inequalities; (c) inadequate policies and unfit institutions; (d) unsustainable consumption and production patterns, including individual habits and practices; and (e) limited access to clean technologies and uncoordinated knowledge and innovation systems. These challenges operate at multiple scales and reflect views, structures and practices that are complex and power-laden. The challenges manifest as barriers that block transformative change across diverse contexts. In terms of impact, the actions and resources devoted to blocking transformative change, for example through lobbying by vested interest groups or through corruption, overshadow those devoted to the conservation and sustainable use of biodiversity. However, coalitions of actors have developed strategies and options for overcoming barriers and challenges and are taking action with transformative potential towards a just and sustainable world.

KM5 **Weaving together insights from diverse approaches and knowledge systems, including Indigenous and local knowledge, enhances strategies and actions for transformative change {A9, B10}.** Transformative change involves mutually reinforcing shifts across views, structures and practices enacted in ways that address the underlying causes of biodiversity loss and nature's decline. Given the breadth and depth of change involved, no single theory or approach provides a complete understanding of the complexity of transformative change and how to achieve it across the necessary range of contexts and scales. Different approaches provide complementary insights into how transformative change occurs and how to promote, accelerate and navigate it. In this regard, the assessment identified six broad types of approaches: systems, structural, inner transformation, empowerment, knowledge co-creation and science and technology. Indigenous and local knowledge contributes to all approaches, offering philosophies, ethics of care and reciprocity, values and practices to shape transformative change, including through the recognition, by some, of the rights of nature and rights of Mother Earth. Attention to synergies across approaches and knowledge systems can promote and accelerate transformative change.

KM6 **Transformative change is possible, and it is characterized by the quality and direction of change. Both small-scale and large-scale changes contribute to transformative change for a just and sustainable world when they address the underlying causes of biodiversity loss and nature's decline {A7, A10, A11, C1, C11}.** Visions are of fundamental importance in inspiring transformative change, including small-scale or incremental changes that address the underlying causes of biodiversity loss and nature's decline and are potentially scalable. Challenges can be overcome through context-specific strategies and actions that embody the principles of transformative change and are directed towards visions for a just and sustainable world. Many existing initiatives have the transformative potential to generate fundamental, system-wide shifts in views, structures and practices. Multiple historical and contemporary initiatives from around the world demonstrate that actors and actor groups are planning and implementing a wide range of initiatives at different scales that are equitable, just, pluralistic and inclusive, while also promoting respectful and reciprocal human-nature relationships. Case studies show that examples of transformative change that explicitly include visions bring about more positive outcomes in the ecological, economic and social dimensions of global sustainability. They also show that positive outcomes for both nature and people can be achieved within less than a decade.

B. Strategies and actions for transformative change

KM7 **Five key strategies and associated actions have complementary and synergistic effects and substantial potential to advance deliberate transformative change for global sustainability. An integrated set of actions for each strategy shifts entrenched views, structures and practices in an adaptive way (Figure SPM.6) {B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11}. Strategy 1** deals with conserving and regenerating places of value to nature and people **(Box SPM.3)** {B1}. **Strategy 2** focuses on driving systemic change in the sectors most responsible for biodiversity loss and nature's decline **(Box SPM.5)** {B2, B3}. **Strategy 3** concerns transforming economic systems for nature and equity **(Figure SPM.7)** {B4, B5, B6}. **Strategy 4** relates to transforming governance systems to make them integrated, inclusive, accountable and adaptive **(Box SPM.5)** {B7, B8}. **Strategy 5** focuses on shifting societal views and values to recognize and prioritize fundamental interconnections between humans and nature **(Figure SPM.8, Box SPM.6)** {B9, B10, B11, B12}. Knowledge co-creation and collaboration can be woven through these strategies to ensure effective knowledge exchange and a commitment to the principle of pluralism and inclusion {B11}.

KM8 **Conservation that involves sustainable stewardship, notably by Indigenous Peoples and local communities, contributes to transformative change when it is inclusive, well resourced, and focused on places of high value to nature and people, and when the rights of Indigenous Peoples are recognized (Strategy 1, Action 1.1) {B1}.** Transformative change can also include enhancing legal protections for biodiversity and respecting the rights of nature and the rights of Mother Earth as recognized by some countries **(Action 1.2)**, basing conservation on diverse values of nature **(Action 1.3)**, adopting regenerative views, structures and practices **(Action 1.4)** and advancing integrated spatial planning **(Action 1.5)**. A cost-effective strategy for transformative change is to focus efforts on places where nature is already being conserved, restored, valued and wisely stewarded by Indigenous Peoples and local communities, who manage or have tenure rights to about 40 per cent of protected areas and ecologically intact landscapes in 87 countries. Indigenous and local knowledge often supports biocultural approaches (integrating biodiversity conservation with cultural values) that have demonstrated long-term sustainability in place-based conservation measures **(Box SPM.3)**. Supporting and strengthening conservation led by Indigenous Peoples and local communities may involve adjusting national legislation and other governance processes to reflect and protect relevant applicable rights, as well as knowledge and biocultural governance systems, including those of

Indigenous Peoples and local communities, consistent with international instruments.

KM9 **Transformative changes in sectors that heavily contribute to biodiversity loss,[12] including the agriculture and livestock, fisheries, forestry, infrastructure, mining and fossil fuel sectors, are crucial and urgent for advancing global sustainability and delivering social benefits to reach the 2050 Vision for Biodiversity (Strategy 2) (Figure SPM.7) {B2, B3, B4}.** Actions under this strategy include regulating the direct exploitation of organisms **(Action 2.1)**, embedding technologies in transformative frameworks **(Action 2.2)**, financing for global sustainability **(Action 2.3)** and supporting civil society initiatives **(Action 2.4)**. Over the past five decades, unsustainable consumption and production patterns have accelerated biodiversity loss. In 2023, over half of the world's GDP, approximately $58 trillion, was generated by economic activities that are moderately to highly dependent on nature, with critical sectors such as agriculture being particularly vulnerable to biodiversity loss and nature's decline **(Figure SPM.7)**. In 2020, industries with high dependence on nature generated around $13 trillion (15 per cent of global GDP), while those with moderate dependence accounted for $31 trillion (37 per cent of global GDP). Externalities (i.e., effects of an economic activity on the environment, such as greenhouse gas emissions, water pollution or soil degradation, that are not reflected in market prices) associated with sectors contributing to biodiversity loss, such as agriculture, livestock, fisheries, forestry and fossil fuels, are estimated to total $10.7 trillion (adjusted for inflation to 2023) **(Figure SPM.7)**. Sustainable farming transitions enhance biodiversity, protect habitats and reduce external inputs, for example by implementing nature-based solutions and ecosystem-based approaches **(Box SPM.8)**. In numerous studies, these approaches have been shown to increase agricultural productivity, for instance by enhancing pollinator abundance and diversity. They also contribute to fostering employment, healthier livelihoods, food security and overall well-being. Repurposing subsidies to economic sectors that drive nature's decline and prioritizing sustainability and equity criteria in the allocation of subsidies will improve their environmental impact. Global coordination, policy alignment, impact monitoring and redistributive measures are needed to support all relevant stakeholders, in particular vulnerable populations, during the transformation of economic sectors {B4}.

KM10 **Transformative change strategies include transforming dominant economic and financial paradigms so that they prioritize nature and social equity over private interests (Strategy 3) {A6, B5, B6, B7}.** Transforming economic systems includes mainstreaming innovative economic tools **(Action 3.1)**,

12. Through direct drivers of biodiversity loss, including land- and sea-use change, unsustainable exploitation of organisms, climate change, pollution and invasive alien species, as presented in the IPBES *Global Assessment Report on Biodiversity and Ecosystem Services* (IPBES, 2019).

supporting just transitions towards good quality of life **(Action 3.2)**, reforming financial systems and institutions **(Action 3.3)** and adopting metrics of success that focus on social, economic, cultural and environmental goals **(Action 3.4)**. Dominant global supply chains promote unsustainable sourcing and overproduction, but well-designed international agreements can help to regulate these supply chains in order to reduce unsustainable consumption and production {B5}. Targeted and just downscaling of consumption and production, alongside cultures of sufficiency, contribute to reducing global footprints to sustainable levels across all countries. Overcoming inequities in consumption and production patterns, through governance that is coherent and effective along the whole supply chain, is essential for transformative change {B5, B7}.

Increased taxes or fines on environmentally harmful activities, binding regulations on pollution and ecosystem restoration, and policies that support the not-for-profit sector are valuable tools for embodying guiding principles for transformative change towards sustainable well-being economies {B4}. Reimagining the goals, metrics and indicators of progress can promote new economic paradigms that emphasize justice, inclusion, resilience and sustainability {B6}. Indicators that integrate economic, social (including cultural) and environmental dimensions are available to track progress and to identify, measure, evaluate and influence business's relationship to nature (e.g., the High-level Business Actions on Nature ("Assess, Commit, Transform and Disclose"; ACT-D) and the "Locate, Evaluate, Assess, Prepare" framework of the Task Force on Nature-related Financial Disclosures (TNFD-LEAP)) {B6}. Including nature in national income measures and global financial flows will elevate biodiversity and the environment as essential criteria in both public and private investments. As most of these tools and methodologies are still at early stages of development, many countries would require enhanced technical and financial support to develop the capabilities for their implementation and use.

KM11 Inclusive, accountable and adaptive governance systems play a pivotal role in driving transformative change by involving diverse stakeholders in decision-making and addressing governance challenges (Strategy 4) {A4, A6, B7, B8, B9}. Effective transformative change involves various stakeholders, incorporating their diverse knowledge systems and multiple values in the planning, implementation and evaluation of resource-, land- and sea-use governance at all levels {B7, B8}. However, governance challenges such as poor institutional fit (including fragmentation), unbalanced access to decision makers, corruption, disinformation, and domination by powerful interest groups can obstruct progress by giving low priority to nature-related values, such as those represented by Indigenous Peoples and local communities {B7, A6}. A stronger representation and role of relational and intrinsic values of nature in decision-making processes (e.g., through joint planning or alternating institutional structures and mandates) can strengthen the consideration of those values in the development of integrated visions for transformative change **(Action 4.1)** {B7}. Participatory processes, including experimentation, co-creation, co-monitoring, co-evaluation and citizen science, reflect the interests and needs of those affected and make transformative change processes more equitable, sustainable and effective **(Action 4.2)** {B7, B8}. Securing collaboration and accountability through multilateral governance addresses global interdependencies **(Action 4.3)** {B5, B7}. Monitoring, evaluation and clear accountability structures enable adaptive learning in order to ensure that policy development, implementation and enforcement processes can be adjusted to improve effectiveness and reduce unintended impacts **(Action 4.4)** {B8, B9}. Transparent and inclusive review processes enable all actor groups to genuinely participate in evaluation processes and require reflexivity for mutual learning {B8, B10}.

KM12 Shifting dominant societal views and values to recognize and prioritize human-nature interconnectedness is a powerful strategy for transformative change. These shifts can be facilitated through cultural narratives and by changing dominant social norms, facilitating transformative learning processes, co-creating new knowledge and weaving together different knowledge systems, world views and values that recognize human-nature interdependencies and ethics of care (Strategy 5, Action 5.1) {B9, B10, B11, B12}. Transformative change involves questioning the individual and collective paradigms and cultural narratives that perpetuate the underlying causes of biodiversity loss and nature's decline **(Action 5.2)**. This can be done by recognizing and promoting world views and values that emphasize care, reciprocity and harmony with nature, including Mother Earth. These world views and values include those associated with Indigenous and local knowledge systems. For example, unquestioned habits and social norms around consumption and growth reinforce socioeconomic disparities and prevent transformative change by disrupting human-nature relationships. Social norms that define acceptable behaviours within specific contexts can rapidly shift, "denormalizing" certain practices (e.g., single-use plastics) and normalizing others (e.g., reusable containers) in the interest of transformative change. Shifts in social norms can contribute to widespread behavioural changes **(Action 5.3)** {B9} and can be promoted by governmental policy tools (e.g., regulations). Transformative learning can be facilitated by integrating humans' connectedness to nature into education, health, spatial planning, communication and art, and by fostering the understanding that human well-being and quality of life are dependent on nature

(Action 5.4) {B10}. For example, educational curricula, from primary to higher education, can include content on biodiversity, its loss, nature's contributions to people, including ecosystem services, nature-based solutions and ecosystem-based approaches, and Mother Earth-centric actions to strengthen this connection. In addition, practices such as nature appreciation, systems thinking, empathy, mindfulness and transdisciplinary approaches can help to embed nature's values into decision-making. Knowledge co-creation and recognition of multiple forms of knowledge, world views and values are crucial for developing actionable and inclusive biodiversity and sustainability strategies **(Action 5.5)** {B11}. Examples include the consideration of ancestral, embodied and experiential knowledge and non-human[13] perceptions and perspectives in conservation decision-making. Context-specific, timely and dynamic communication strategies, notably through media, including social media, also play a critical role in shifting societal views and values {B12}.

C. Enabling transformative change: roles for all

KM13 **Shared positive visions and their development are especially important for recognizing socioecological interdependencies, the agency of non-human life forms and an ethics of care, and thereby for inspiring transformative change {A8, C2, C3, C4}. Visions, which include narratives and stories, are desirable future states of people and nature, including Mother Earth, shaped by values and world views, and often include defined goals and intentional efforts to attain such future states.** Transformative visions value nature in multiple ways, and no single vision is appropriate to all contexts and scales. Visions that recognize and combine intrinsic, relational and instrumental values are the most promising for transformative change. In addition, visions that promote Indigenous and local knowledge are associated with positive social, economic and environmental outcomes. More transformative visions emerge from visioning processes that centre on clarity of purpose and scope, meaningfully include persons with common goals but diverse perspectives, use imagination and creativity to move beyond existing patterns, and adapt to new ideas flexibly. Five core themes emerged from an assessment of 881 visions with transformative aspirations for desirable futures for humans and nature: (a) regenerative and circular economies; (b) community rights and empowerment; (c) biodiversity and ecosystem health; (d) spiritual reconnection (between humans and nature) and behavioural change; and (e) innovative business and technology. Visions and values that foster harmony between humans and nature to inform and guide the process of change and its direction facilitate the pursuit of deliberate transformative change. Many cultures and groups have spiritual relationships to nature that respect non-human species and entities. Such relationships and associated views contrast with views of nature that overprioritize instrumental values and practices and promote the exploitation and degradation of nature. Living in harmony with nature is enhanced by recognizing alternative cultural narratives and holistic thinking and learning. Such narratives are critical to raising awareness of the importance of biodiversity and nature. Therefore, stronger imaginative efforts are needed, including those that account for Indigenous and local knowledge to envision positive futures for a just and sustainable world.

KM14 **Transformative change is system-wide; therefore, achieving it requires a whole-of-society and whole-of-government approach that engages all actors and sectors in visioning and contributing collaboratively to transformative change (Figure SPM.10) {B7, C5, C6, C7}.** Coalitions of actors are more effective than individual actors in fostering transformative change. Successful transformative change is often realized by diverse actor coalitions that bring together complementary resources and capacities, including visioning. Different groups of actors possess specific abilities, resources and powers and encounter different opportunities to act for transformative change. Some coalitions of actors tend to work together to pursue the five identified strategies and actions for transformative change. Individual citizens, Indigenous Peoples and local communities, local governments, educators and the scientific community collaborate in place-based conservation actions **(Strategy 1)**. Businesses and scientific communities are often identified in the literature as playing important roles in addressing direct drivers through their actions and research **(Strategy 2)**. Research most frequently identifies donors and financial sector actors as the key actors associated with transformative change in economic systems **(Strategy 3)**. Government actors are critical for change, notably in governance arrangements and systems, as are demands from civil society actors and citizens **(Strategy 4)**. Individual citizens, Indigenous Peoples and local communities, businesses, national Governments, media, educators and the scientific community engage in actions oriented towards shifting views, values and paradigms **(Strategy 5)**. Examples of such collaborative approaches are reflected across many community-based initiatives. Noteworthy are community-based initiatives that bring together multiple actors with different but complementary skills and capacities, such as agroecology initiatives **(Box SPM.8)**.

13. Elements of the natural world that are not human but are recognized by some as having intrinsic value, agency, or rights, such as animals, plants, ecosystems and other elements.

KM15 **Governments are powerful enablers of transformative change when they foster policy coherence, enact and enforce stronger regulations to benefit nature and its contributions to people in policies and plans (e.g., regulations, taxes, fees and tradable permits) across various sectors, deploy innovative economic (including financial) and fiscal tools, eliminate, phase out or reform environmentally harmful subsidies, and promote international cooperation {C6, C8, C9, B2, B7}.** Considering the existing support for financial and economic instruments that are harmful to biodiversity and nature and the central role that governments play in establishing conservation strategies, decision makers at all levels of governance have a key role to play in enabling transformative change. However, the breadth and scale of implementation of existing actions and policy tools are insufficient. The number of policy instruments (234 biodiversity-relevant taxes in 62 countries, 194 fees and charges in 50 countries and 39 tradable permits in 26 countries) has increased only marginally since 2010, and they do not address the underlying causes of biodiversity loss and nature's decline. Eliminating, phasing out or reforming subsidies to economic sectors responsible for biodiversity loss and nature's decline is possible and effective when accompanied by coordination across sectors and scales. More extensive reforms for global sustainability go beyond reforms of economic instruments within the framework of growth-driven economies and include changes in policies and regulation, the provision of green infrastructure and the pursuit of alternative economic models. Embedding innovations in legal and planning frameworks, strengthening their economic viability and supporting long-term capacity enhancement increase prospects for transformative change.

KM16 **Civil society organizations, by fighting against biodiversity loss and nature's decline, point to the need for transformative change. Social mobilizations to pursue change, however, have often triggered responses that do not possess key aspects of transformative change. Civil society initiatives and environmental defenders have faced violence and rights violations. Protecting them supports transformative change {B9, C5, C6, C10}.** Civil society organizations have piloted new, scalable models for sustainable use of biodiversity, mobilized citizens for social actions against environmentally harmful processes, held governments and the private sector accountable for harmful practices and fuelled public debates on biodiversity and nature. An analysis of 2,802 mobilizations between 1992 and 2023 provides evidence that they contested 46,955 documented environmental threats. The most frequently contested threats relate to biodiversity loss, soil contamination, climate change, groundwater, surface water and landscape degradation, waste overflow and deforestation. More than half of the mobilizations (54 per cent) resulted in reforms (e.g., relocation, technical solutions, environmental improvements, application of existing regulations or compensation) that did not correspond to key elements of transformative change identified in the assessment. More than a quarter (27 per cent) of the mobilizations had regressive outcomes, including repression and violence against activists. Violence linked to extractive industries is often perpetrated by men against women, overlooked and likely underreported. Nineteen per cent of the mobilizations resulted in outcomes with transformative potential, including the withdrawal, cancellation or temporary suspension of the activities responsible for environmental threats. Social mobilizations were more successful when they were preventive and pursued a variety of tactics, including litigation. Supporting and amplifying civil society initiatives can help to dismantle harmful practices. Inclusive governance processes and protection of environmental defenders from violence and rights violations alleviate the vulnerability associated with civil society action. Governmental efforts to create corporate due diligence policies and trade agreements that incorporate support for the United Nations Declaration on the Rights of Indigenous Peoples and human rights law, and divestment campaigns targeting corporations involved in rights violations, have the potential to amplify the impact of civil society initiatives for transformative change towards a just and sustainable world.

KM17 **Well-designed policies, as well as business and private sector initiatives and tools, aimed at transformative change for a just and sustainable world provide economic incentives that influence socioeconomic development and consumption practices {B6, C8, C10}.** Among the various tools, standardization and certification schemes for sustainable production are instruments that businesses in diverse sectors have piloted, often with positive effects. However, these instruments have at times been inadequately designed and applied in ways that do not support transformative change. Their scale remains small and their efficiency is debated. For example, evidence of the sustainability and biodiversity impacts of forest and fish certification remains mixed. Despite certification potential, the global proportion of certified forests is less than 15 per cent, and less than 1.5 per cent of the global marine catch is certified. Stronger incentives and more widespread adoption of standards and other relevant regulatory measures in local to national contexts increase the likelihood of success. The private sector and international financial institutions have played a role in debt-for-nature swaps, creating additional financial opportunities to conserve nature. Such schemes could relieve debt burden, allowing allocation of resources in a manner that addresses ecological, economic and social challenges. However, among other weaknesses, they also pose risks of conflict

and have the potential to undermine the respective rights and interests of Indigenous Peoples and local communities and marginalize small producers. Therefore, more intentional design and implementation are key to mitigating such risks. Elements of such design vary by sector but include conservation priorities in business strategies and actions, sustainable supply chains, voluntary disclosures and commitments to engagement with Indigenous Peoples and local communities and small producers. Voluntary action by businesses is a way to pilot solutions and test their efficiency and their conditions of success. Given market competition, these innovations may need supportive policies to avoid unfair competition.

BACK-GROUND

BACKGROUND MESSAGES

A. Transformative change is urgent, necessary and challenging – but possible

A1 **Transformative change is urgent because there is a closing window of opportunity to avoid further biodiversity loss and prevent triggering the potentially irreversible decline and projected collapse of key ecosystem functions. Delaying action to achieve global sustainability is costly compared with the benefits of taking action now *(well established)* {1.1, 1.2, 1.2.1, 1.2.3}.** The current extent and pace of biodiversity loss and nature's decline, combined with the magnitude of the multiple interconnected global crises, including climate change and pollution, seriously and irreversibly threaten human well-being and life on Earth, decreasing quality of life and leading to substantial economic costs *(well established)* {1.1, 1.2.1}. These global environmental challenges and crises are interconnected, enhancing the possibility that a crisis within one system (e.g., biodiversity, climate, water, food or health) has effects on other systems[14] *(well established)* {1.2.1}. These challenges and crises are amplifying and accelerating one another in ways that significantly increase the risks to humans and nature *(well established)* {1.2.1}. This entanglement of crises, increasingly referred to as a polycrisis, points to the urgency and necessity of handling the different crises in an integrated manner *(well established)* {1.1, 1.2.1}.

Delaying action to halt and reverse biodiversity loss and nature's decline globally by 10 years is estimated to be twice as expensive as taking immediate action *(established but incomplete)* {1.2.1}. Taking action now delivers a range of co-benefits for both the economy and good quality of life. It contributes to poverty reduction and progress towards agreed goals and targets, such as the 2030 Agenda and its Sustainable Development Goals. It also unlocks business and innovation opportunities through sustainable economic approaches, such as the nature-positive economy, ecological economy and Mother Earth-centric economy. A recent study estimates that such action could generate over $10 trillion in business opportunity value and could support 395 million jobs globally by 2030 *(established but incomplete)* {1.2.1}.

The urgency of transformative change is underscored by the projected collapse of key ecosystem functions associated with current global trends driving biodiversity loss, which has implications for all ecosystems and for human well-being *(well established)* {1.2.1, 1.2.3, 4.2.4}. For example, deforestation influences climate regulation and carbon sequestration, and coral bleaching has consequences for reef structures and coastal protection. Under current trends, there is a serious risk of crossing several irreversible biophysical tipping points, including the die-off of low-latitude coral reefs, the die-back of the Amazon rainforest and the loss of the Greenland and West Antarctic ice sheets, with the possibility of cascading negative impacts across linked social and ecological systems *(established but incomplete)* {1.2.1}. Actors from intergovernmental organizations, governments, civil society, the private sector and the scientific community are emphasizing the magnitude of the crises and the urgency of action, and increasing calls for transformative change *(well established)* {1.1, 1.2}.

A2 **Transformative change is necessary globally because previous and currently dominant approaches have failed to address interconnected global challenges and crises, including biodiversity loss, climate change and pollution. These pose serious and potentially irreversible threats to nature and good quality of life *(well established)* {1.1, 1.2.1, 1.2.3, 2.3.2, 4.2.4}.** Current actions to conserve, restore and sustainably use biodiversity have created many positive outcomes, but they have not been able to halt or reverse global trends in biodiversity loss and nature's decline *(well established)* {1.2.3, 4.2.4, Figure 4.8}. For example, although trends vary within and among regions, the global human ecological footprint has consistently exceeded the world's biocapacity since the early 1970s, while species extinction rates and risk

14. IPBES (2024). *Summary for Policymakers of the Thematic Assessment Report on the Interlinkages among Biodiversity, Water, Food and Health of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* McElwee, P. D., Harrison, P. A., van Huysen, T. L., Alonso Roldán, V., Barrios, E., Dasgupta, P., DeClerck, F., Harmáčková, Z. V., Hayman, D. T. S., Herrero, M., Kumar, R., Ley, D., Mangalagiu, D., McFarlane, R. A., Paukert, C., Pengue, W. A., Prist, P. R., Ricketts, T. H., Rounsevell, M. D. A., Saito, O., Selomane, O., Seppelt, R., Singh, P. K., Sitas, N., Smith, P., Vause, J., Molua, E. L., Zambrana-Torrelio, C., and Obura, D. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.13850289.

for most taxa have increased severely over recent decades {4.2.4, Figures 3.10 and 4.8}. These trends and their consequences for global sustainability are well documented in IPBES assessments. Despite this recognition, and despite the increasing number of multilateral environmental agreements and growing recognition of the need for transformative change by a wide range of actors, global trends in biodiversity loss and nature's decline continue to move in the wrong direction *(well established)* {1.1, 1.2.3}.

The failure to halt and reverse biodiversity loss and nature's decline resulting from these multiple interacting crises is creating unacceptably high economic and non-economic costs and undermining the provision of nature's contributions to people (e.g., food, fresh water, fuel, fibres) and the richness of social, cultural and spiritual life *(well established)* {1.2.1}. The high economic costs and risks associated with the failure to address biodiversity loss are recognized, and several attempts have been made to quantify these costs on the basis of the economic value derived from ecosystems and the scale of investments needed for restoration and regeneration activities **(Figure SPM.7)** *(well established)* {1.2.1}. However, these do not account for non-material contributions of nature, such as opportunities for inspiration, education and recreation, as well as important contributions to sense of place, cultural diversity and religious or spiritual values *(well established)* {1.2.1}. Quantifying the loss of such non-material contributions of nature is particularly challenging and has received less attention in the assessed literature, although that does not make their loss any less significant or serious *(established but incomplete)* {1.2.1}. The most transformative visions for a just and sustainable world demonstrate immeasurable potential benefits across all life by including diverse perspectives and multiple focus areas *(established but incomplete)* {2.3.2}.

A3 Transformative change is a process that involves fundamental, system-wide shifts in views, structures and practices *(well established)* {1.3.1, 1.3.2, 1.4, 3.2}. The adjective "fundamental" relates to the depth, quality and direction of change, and "system-wide" refers to the breadth of changes at different levels and scales in a system *(well established)* {1.1}. Views include ways of thinking, knowing and seeing. Structures refer to ways of organizing, regulating and governing. Practices represent ways of doing, behaving and relating *(well established)* {1.3.1}. The three dimensions are interwoven and affect each other; fundamental, system-wide shifts involve changes across all three of these dimensions *(well established)* {1.3.1}. Significant changes in one dimension have the potential to influence changes in the others. Similarly, changes in one dimension can be constrained by what is present or what changes in others *(established but incomplete)* {1.3.1, 1.4}.

Transformative changes do not always benefit biodiversity *(well established)* {3.5, 1.3.2}. Historically, many transformations have contributed to nature's decline **(Box SPM.1)** *(well established)* {3.1}. However, the intersecting dimensions of views, structures and practices are created by humans and thus can potentially be transformed *(well established)* {1.3.1}. The terms "transitions" and "transformations" are often used interchangeably to refer to processes of transformative change. In the assessment, a distinction is made between transitions, which typically refer to orderly shifts occurring in specific sectors, systems or locations (e.g., the energy system), and transformations, which refer to broader and deeper societal shifts taking place across multiple systems (e.g., the Industrial Revolution) **(Box SPM.1)** *(established but incomplete)* {1.1}. In complex systems characterized by uncertainty and emergence, transformative change is an adaptive process *(established but incomplete)* {1.1}. It is possible to influence

Box SPM 1 **The Industrial Revolution as an example of shifts in views, structures and practices.**

Historical examples such as the Industrial Revolution illustrate how shifts in views, structures and practices have contributed to transformative change in the past {Box 3.1}. Although this example contributed to biodiversity loss and nature's decline, the magnitude of transformative change that occurred during the Industrial Revolution is considered by some to be comparable to the scale and scope of changes needed to achieve global sustainability, but it occurred over a much longer time period than is needed for transformative change for a just and sustainable world. In terms of views, it has been argued that the Scientific Revolution and the Enlightenment were primary drivers of the Industrial Revolution. They promoted the idea that empirical knowledge and reason can be used to understand and control nature, which itself was increasingly viewed in terms of instrumental rather than relational or intrinsic values. Structural shifts included the reorganization of production, where the new factory system enabled massive increases in productivity and European empires extended their search for natural resources through colonialism. Practices shifted as new technologies, such as the coal-fired steam engine and textile machinery, enabled vast increases in the speed and efficiency of production through factory systems. Together, these interwoven changes transformed the way in which nearly every product was made, contributing to deep changes in the way people worked and the way society was organized {box 3.1}.

and guide processes of transformative change, but it is difficult, if not impossible, to control outcomes precisely. This makes ongoing monitoring, evaluation, learning and adaptation of plans and actions essential for addressing unintended consequences and maintaining alignment with agreed goals *(well established)* {1.3.1, 3.3, 3.5.7, 5.6.4, 5.8}.

A4 Underlying causes influence all indirect and direct drivers of biodiversity loss and nature's decline. Transformative change that addresses these underlying causes is vital for a just and sustainable world *(well established)* {1.2.2, 1.3, 4.2}. Underlying causes are deep-rooted and interconnected patterns that shape, influence and reinforce the indirect and direct drivers of biodiversity loss and nature's decline **(Figure SPM.1)** *(established but incomplete)* {1.2.2}. They lie beneath the surface of what is immediately obvious but nevertheless have significant links to the origins of observed problems *(established but incomplete)* {1.2.2}. The three key underlying causes identified in the assessment and described below have co-evolved and continue to reinforce one another, with far reaching and systemic impacts that influence multiple interconnected challenges and crises *(well established)* {1.2, 1.2.1, 1.2.2}. Together, they undermine the effectiveness of efforts to conserve, restore and sustainably use biodiversity and manifest in challenges and barriers to transformative change *(well established)* {4.1}. The three underlying causes are as follows:

(a) Disconnection from and domination over nature and people refers to the view that humans are separate from and superior to nature and that nature is comprised of objects for humans to use as resources *(well established)* {1.2.1, 1.2.2}. This way of framing human-nature relations justifies not only the exploitation of nature, but also the exploitation of specific people and communities to build the labour force necessary for the exploitation of nature *(well established)* {1.2.1, 1.2.2}. This reinforces their marginalization and can push some communities into destructive relationships with nature *(well established)* {1.2.1, 1.2.2, box 3.3,

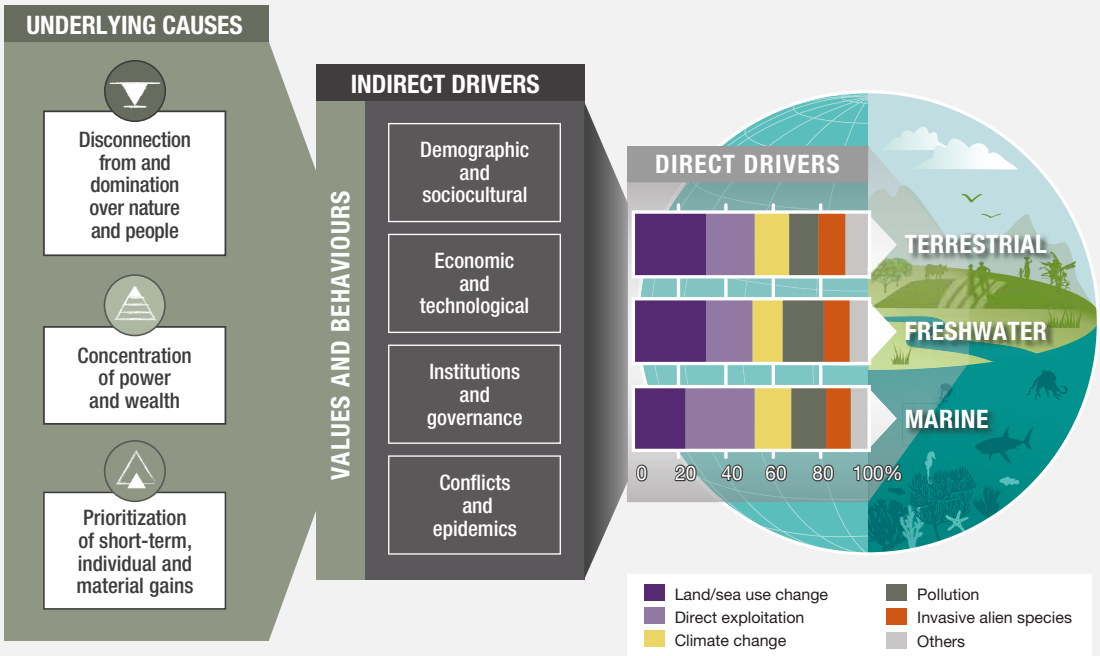


Figure SPM 1 **Underlying causes, indirect drivers and direct drivers of biodiversity loss and nature's decline.**

This figure shows how the Transformative Change Assessment specifies and synthesizes the key underlying causes that underpin, cut across, shape and reinforce all the indirect and direct drivers of biodiversity loss and nature's decline. The figure builds on Figure SPM.2 of the Summary for Policymakers of the *Global Assessment Report on Biodiversity and Ecosystem Services*, including its identification of indirect and direct drivers, with the latter represented in the bar chart showing the proportional contributions of each direct driver to biodiversity loss in terrestrial, freshwater and marine ecosystems. Further details on the analysis leading to the identification of these indirect and direct drivers and on the calculation of contributions to biodiversity loss across different ecosystems can be found in the IPBES *Global Assessment Report on Biodiversity and Ecosystem Services* (IPBES, 2019). More information on the underlying causes and how they manifest across views, structures and practices (including values and behaviours) is provided in the Transformative Change Assessment {1.2.2, 1.3.1}.

4.2.1}. This underlying cause has deep historical roots and has had widespread impacts through colonialism, slavery, modernity, capitalism and growth-driven economies *(well established)* {1.2.1, 1.2.2, box 3.3, 4.2.1, 4.2.2}. It continues to influence social and economic structures that justify the exploitation of nature and of marginalized people and communities *(well established)* {4.2.1}. It is inconsistent with the world views and values of many Indigenous Peoples and local communities *(well established)* {1.2.2, 1.2.3, 3.2.3, 3.5.2, 4.2.1, 5.7};

(b) Concentration of power and wealth acknowledges that the activities and interests of a decreasing number of people are disproportionately driving biodiversity loss and nature's decline *(well established)* {1.2.2, 4.2.2}. Inequalities in power and wealth exist both within and between countries and intersect with other drivers of marginalization (including, for example, race, class, ability, gender or age) *(well established)* {1.2.2, 4.2.2}. Concentration of power and wealth matter for biodiversity because the wealthy are responsible for a disproportionate share of the use of natural resources, unsustainable levels of consumption and associated environmental impacts. Wealthy actors are currently driving biodiversity loss locally and in other places through their levels of consumption and associated patterns of resource extraction. Furthermore, the destruction of nature can become a survival strategy in poorer communities. The concentration of power and wealth also creates differences in access to decision-making processes and can be used to block transformative change *(well established)* {1.2.2, 4.2.2, 4.2.4}. In 2021, the share of global wealth held by the top 1 per cent of the global population was 39.2 per cent, while the bottom 50 per cent owned 1.85 per cent of global wealth *(well established)* {4.2.2}. In 2015, Europe and North America held 84 per cent of the world's wealth per capita, leaving the rest of the world holding only 16 per cent *(well established)* {4.2.2};

(c) Prioritization of short-term, individual and material gains emphasizes immediate interests and desires over values of community and the maintenance of social and ecological integrity in the longer term *(well established)* {1.2.2}. This underlying cause is perpetuated through economic and social systems that measure progress primarily as growth in GDP, frame satisfaction or happiness in terms of accumulation of material possessions and consider humans as benefit-maximizing individuals *(well established)* {1.2.2, 4.2.2}. Compounding this is the short-term thinking that dominates business reporting and political cycles *(established but incomplete)* {1.2.2}.

A5 Four principles address the underlying causes of biodiversity loss and nature's decline and guide transformative change towards global sustainability:

(a) equity and justice; (b) pluralism and inclusion; (c) respectful and reciprocal human-nature relationships; and (d) adaptive learning and action *(well established)* {1.2, 1.2.2, 1.3.2, 1.5, 2.3.2, 4.3, 5.3, 5.6, 5.7}. In the assessment, principles[15] refer to normative or procedural guidelines that govern behaviour, decision-making or actions. Principles are crucial to addressing the underlying causes of biodiversity loss and are fundamental to shifting views, structures and practices for a just and sustainable world **(Figure SPM.2)** *(established but incomplete)* {1.3.2, 1.4.3}. Views, structures and practices associated with certain contexts or communities are already aligned with these principles and do not need to change, including relational views of the oneness of people and nature held by many Indigenous Peoples and local communities, among others *(well established)* {1.3.2, 2.3.4, 5.3}. To address the global nature of current sustainability challenges and the deep nature of the underlying causes of biodiversity loss and nature's decline, the following guiding principles of transformative change could be more widely embodied within prevailing views, structures and practices than is currently the case *(well established)* {1.3.3, 1.4.3}:

(a) The principle of equity and justice ensures that interventions for transformative change are designed in a fair manner. The literature related to this principle highlights the critical importance of equity and justice in both procedures and outcomes for humans (including both present and future generations) and other species *(well established)* {1.3.2, 2.3.5, 3.2.2, 4.3, 5.3.2, 5.7.2};

(b) The principle of pluralism and inclusion ensures that differences in perspectives, voices and experiences are recognized and honoured through the development of context-specific strategies and actions for transformative change. Actions that are aligned with this principle engage diverse actors, visions and world views and remain open to ongoing contestation, renegotiation and change *(well established)* {1.3.2, 2.2.3, 3.2.5, 3.3, 3.5.1, 3.5.2, 4.3, 5.3.3, 5.6.2, 5.6.4, 5.7.2};

(c) The principle of respectful and reciprocal human-nature relationships acknowledges relational values and responsibilities based on human-nature connectedness. It represents a move from instrumental relationships of extraction, exploitation, domination and control towards fostering values of care, respect, solidarity, responsibility

15. The term "principles", as used here, refers to a framework for understanding, reasoning and making judgments, and does not refer to principles of law. Principles often represent values or beliefs that guide decisions and behaviours.

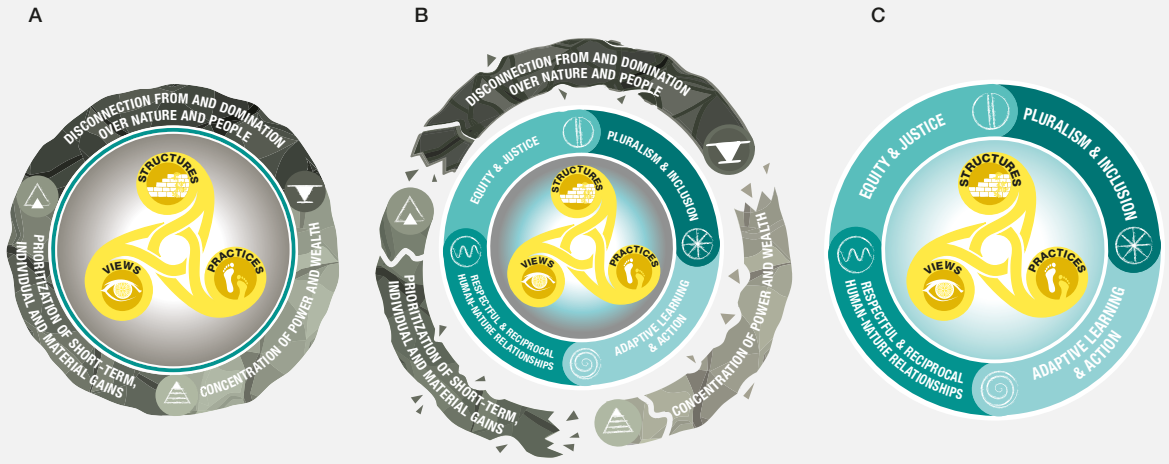


Figure SPM 2 **The framework of transformative change for a just and sustainable world.**

Panel A shows views, structures and practices (the golden spirals) being strongly shaped by the underlying causes of biodiversity loss and nature's decline (solid grey ring). **Panel B** depicts shifts in views, structures and practices breaking the influence of the underlying causes when they are guided by the four key principles of transformative change (turquoise ring). **Panel C** represents a just and sustainable world, with prevailing views, structures and practices aligned with the principles of transformative change. This framework can be used by different actor groups to help identify where and how they can promote, accelerate and scale the process of transformative change towards a just and sustainable world.

and stewardship *(well established)* {1.2.2, 1.3.2, 2.3.2, 3.2.3, 5.3.1, 5.3.3, 5.3.4, 5.6.1, 5.6.2, 5.7};

(d) The principle of adaptive learning and action recognizes that transformative change is a dynamic and emergent process with unfolding impacts and unintended consequences that need to be addressed continuously *(well established)* {1.1, 1.3.2, 3.3, 5.6.4, 5.8}.

A6 The challenges to transformative change are complex, systemic, persistent, pervasive and power-laden. Five overarching challenges to transformative change were identified in the assessment: (a) persistent relations of domination, especially those that emerged and were propagated in colonial eras; (b) economic and political inequalities; (c) inadequate policies and unfit institutions; (d) unsustainable consumption and production patterns and individual habits and practices; and (e) limited access to clean technologies and uncoordinated knowledge and innovation systems *(well established)* {1.2.2, 3.5.3, 3.5.7, 4.1, 4.2, 5.8}.

(a) Relations of domination, both of people over nature and people over others, have a long history in many societies. However, contemporary relations of domination, which act as challenges to transformations in people's relations to nature and biodiversity that can bring about a just and sustainable world, emerged from a convergence of prior relations and a focus on resource extraction during colonial eras *(established but incomplete)* {4.2.1}. These relations are durable because they reproduce power imbalances and institutional structures that benefit the privileged and the powerful *(established but incomplete)* {4.2.1}. For example, contemporary political economic systems rely upon intersectional inequalities and hierarchies that shape which voices and ideas are included in plans for and visions of people's relations to nature and biodiversity *(well established)* {4.2.1}. The environmental consequences of these plans often impact those who are excluded, reproducing intersectional inequalities, including those based on race and gender *(well established)* {4.2.1}.

(b) Economic and political inequalities undermine the effectiveness of strategies for conservation, restoration and sustainable use of biodiversity {4.2.2}. Powerful actors with vested interests, whether individuals or institutions, may resist transformative change that reduces their privileges {4.2.2}. Marginalized or vulnerable populations may perceive transformative change as adding an unacceptable, even existential, risk to their already precarious lives, such as when change might negatively affect employment and development *(well established)* {4.2.2}.

(c) Inadequate policies and unfit institutions do not account for the dynamics and magnitude of biodiversity loss and nature's decline *(well established)* {4.2.3}. Institutions have problems of fit when institutional arrangements – the set of norms, rules and decision-

making procedures that seek to regulate human-nature processes and governance systems – do not match the spatial extent and/or the spatiotemporal functioning of the biophysical systems in which they are embedded *(well established)* {4.2.3}. Mismatches in spatial, temporal and institutional dynamics limit the effectiveness of biodiversity-focused policies and practices *(well established)* {4.2.3}.

The neoliberal (re)structuring of State policies, including liberalization and austerity, further constrains States' ability to advance transformative change. Although neoliberal policies are applied heterogeneously around the world, the prevailing framing of governmental policies shaped by neoliberalism legitimizes market-led development and investment at the expense of State-led environmental initiatives *(well established)* {4.2.3, 4.2.1}.

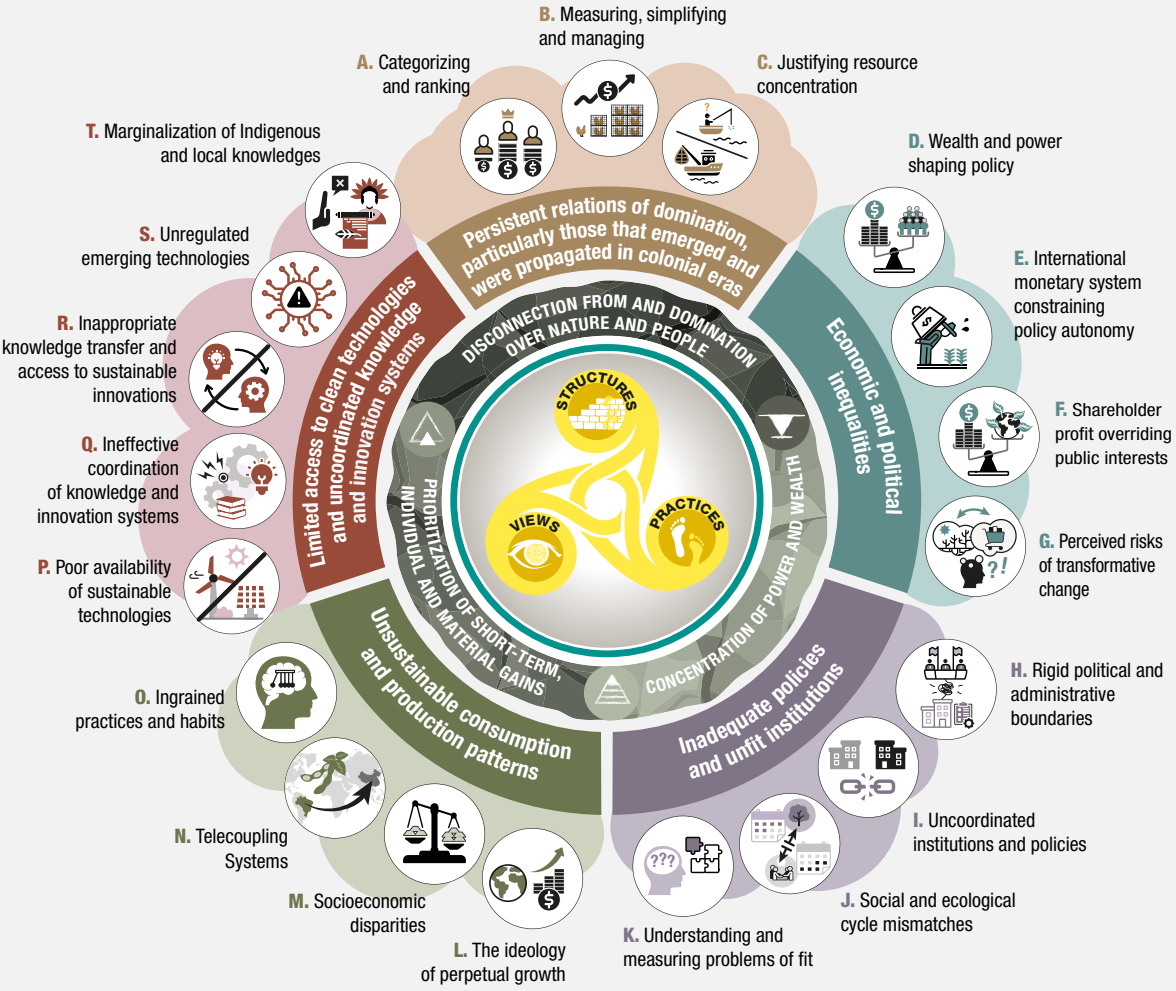
Reformist responses to biodiversity loss and nature's decline that do not address underlying causes can challenge transformative change when they obscure the indirect drivers of biodiversity loss, and they may lead to a sense that effective action has occurred. For example, many biodiversity offsets may seem to address biodiversity loss but have faced challenges with compliance and difficulties in effectively managing the complexity of measurement and offsetting. There have also been instances in which poorly designed and/or governed offset schemes led to dispossession and violations of the respective rights of Indigenous Peoples and local communities, among other challenges *(established but incomplete)* {4.2.3, box 4.1}.

(d) Unsustainable consumption and production patterns are often defined, encouraged, driven and reproduced by social and cultural norms, rather than by conscious, deliberate decision-making *(well established)* {4.2.4}. In a globalized economy, telecoupling effects over distance, including through trade, may cause economic incentives to increase consumption through efficiencies of scale and may obscure environmental impacts because they occur in faraway places *(established but incomplete)* {4.2.4, Table 4.1, Figure 4.8}. Telecoupling can result in rebound effects, such as when efficiency improvements result not in lower but in higher consumption rates (because lower production costs result in lower costs of consumption) *(established but incomplete)* {4.2.4}. For example, a societal emphasis on economic growth underpins modern-day consumerism, as do strategies to maximize profits, such as planned obsolescence and premature ageing of technologies *(well established)* {4.2.4, 4.2.5}. These norms make it difficult to define alternative patterns with improved biodiversity outcomes.

(e) Limited access to clean technologies and uncoordinated knowledge and information systems prevent resource- and energy-intensive producers and consumers from adopting technologies that support transformative change *(established but incomplete)* {4.2.5}. Planned obsolescence and premature ageing of technologies, exacerbated by "rebound effects", cause unsustainable production and use *(well established)*. There are operational and procedural limitations on access to sustainable technologies, such as weak market institutions and inadequately trained professionals tasked with operating or maintaining these technologies, that impede the adoption of such technologies by companies, organizations and producers in low- to middle-income nations. Many producers continue to rely on unsustainable technologies that harm people and biodiversity because of the limited availability and high costs of cleaner technologies *(established but incomplete)* {4.2.5}.

A7 The challenges to transformative change manifest across contexts as a wide range of barriers that perpetuate and reinforce existing patterns and relationships, contributing to biodiversity loss and nature's decline *(well established)* {1.2, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5}. Transformative change for a just and sustainable world involves power struggles, tensions and trade-offs among actors with different world views, values, visions and stakes in and experiences of transformative change *(well established)* {3.5.3}. Powerful actors that benefit from the status quo are mobilizing resources to protect their interests *(well established)* {1.2.2, 1.2.3, 4.2.2, 4.2.3}. One indication of this power imbalance is the use of force and violence against civilians, activists and environmental defenders fighting environmentally destructive activities related to deforestation, dam building or mining, and against journalists covering such conflicts, with an estimated 2,000 people killed between 2012 and 2022, around one third of whom belonged to Indigenous Peoples *(well established)* {1.2.2}. Environmental defenders are also subject to displacement, repression, criminalization, harassment and digital attacks *(well established)* {1.2.2}. Research shows that the actions and the scale of resources devoted to blocking transformative change currently overwhelm those devoted to the conservation and sustainable use of biodiversity *(well established)* {1.2.1, 1.2.2, 1.2.3}.

Each of the overarching challenges is linked to the underlying causes of biodiversity loss and nature's decline and associated with a set of barriers that impede transformative change **(Figure SPM.3)**. An assessment of the literature identified 20 barriers to transformative change. For example, the challenge of economic and political inequalities manifests as a barrier when wealth and power shape policy, or when decisions about investments are



A	Dominant categorizations and rankings of people and biodiversity obscure alternative understandings and world views
B	Dominant forms of measurement, simplification and management reduce nature to a narrow set of values, limiting options for management and understanding
C	Persistent relations of domination, reinforced by systems of measurement and associated categorizations, ranking and management, justify taking resources
D	Uneven access to and influence in processes that formulate policy and regulation limit exposure to ideas and experiences that could change the status quo
E	The dependence of countries on foreign investment creates competitive environments incentivized to minimize regulation
F	Shareholder primacy doctrines drive investment decisions towards shareholder interests and profit rather than the public interest
G	The beneficiaries of the status quo are concerned with losing privileges, while the vulnerable fear potential precarity created by transformation
H	Administrative boundaries do not match the geography of biodiversity loss and environmental degradation, reducing the efficacy of plans and policies
I	Policies across sectors may conflict with each other, such as when a climate policy does not lessen biodiversity loss
J	Time lags between policy implementation and ecological dynamics, e.g., when measures are implemented too slowly to respond to abrupt environmental changes
K	Policy effectiveness is difficult to measure, challenging the alignment of policy and environmental needs
L	The societal emphasis on economic growth reinforces consumerism, which underlies market and policy arguments for protecting current unsustainable practices
M	The socioeconomic disparities that characterize global production and consumption are often hidden by narratives blaming degradation on overpopulation
N	Unseen practices and structures in one social-ecological system that impact ecosystems, biodiversity and societies across great distances
O	Habitual behaviours conform to and confirm social practices and structures (including values, norms and institutions), making them stable and difficult to change
P	Structural, strategic, operational, procedural and behavioural barriers to the generation, development and adoption of sustainable technologies
Q	Knowledge and innovation systems related to biodiversity management are not sufficiently coordinated and integrated among different stakeholders
R	Limited and uneven attention to and investment in sustainability and biodiversity management knowledge and innovations across different sectors
S	Poor regulation and a lack of oversight of the application and potential negative impacts of emerging technologies
T	Indigenous and local knowledge about biodiversity-friendly actions and innovations is unrecognized, marginalized, disintegrated and not adequately supported

Figure SPM 3 **Relationship between challenges and barriers to transformative change.**

This figure represents the wheel of interconnected challenges (different colours) and barriers (different letters) to transformative change. It illustrates the relationship between the challenges, which are interrelated through views, structures and practices associated with the

underlying causes of biodiversity loss and nature's decline. Their entangled character at this deep level explains how they reinforce one another, but also shows how each barrier within a challenge is an entry point for catalyzing transformative change that can alter views, structures and practices and thus trigger wider changes across other challenges {adapted from figure 4.2}. The table describes the barriers in detail (A, B and C correspond to section 4.2.1; D, E, F and G to section 4.2.2; H, I, J and K to section 4.2.3; L, M, N and O to section 4.2.4; and P, Q, R, S and T to section 4.2.5).

made according to shareholder interests and profit, rather than the public interest, including biodiversity conservation, restoration and sustainable use *(well established)* {4.2.2}.

The power dynamics within the international monetary and financial systems influencing biodiversity finance further entrench structural inequalities by hampering policy autonomy and limiting institutional change towards distributional equity and justice *(well established)* {4.2.2, 4.2.3}.

System lock-ins, such as path dependencies, compartmentalized and/or short-term thinking and the concentration of power, also impede transformative practices *(well established)* {4.2.2}. The dominant economic system, with its focus on market-led development, investment and export-led growth, reduces nature to a single economic value and marginalizes other ways of valuing nature and biodiversity, including on the basis of relational and intrinsic values *(well established)* {2.3.2, 4.2.1, 4.2.3, 4.2.4, 4.2.5}.

A8 Pathways to transformative change entail overcoming context-specific challenges and barriers through strategic decisions, willingness, courage and actions aligned with principles of transformative change *(well established)* {1.4.2, 2.3.2, 3.5, 4.3, 5.8}. Pathways to transformative change involve policies, programmes and projects that address the underlying causes of biodiversity loss and nature's decline and are consistent with principles of transformative change *(well established)* {1.3.1, 4.3}. Such pathways include multiple actions by diverse actors working collectively to implement strategies for transformative change *(established but incomplete)* {5.8}. The challenges and barriers to transformative change are interrelated and cannot be overcome through approaches that focus on only one of them. Visioning processes often involve collective imagining of fundamental changes in human-nature relationships, helping people see the connections among system dimensions and processes and how they think about the world around them *(well established)* {2.3.2, 2.4.2}. They are powerful and effective in generating transformative change when they incorporate: (a) clarity of purpose and scope; (b) the meaningful inclusion of persons with shared goals and diverse perspectives; (c) imagination and creativity to move beyond existing patterns; and (d) flexibility to adapt to new ideas *(established but incomplete)* {2.2.3}.

Each challenge offers strategic opportunities to catalyse actions that address multiple barriers. For example, efforts to improve a policy's fit to the spatial context can also address relations of domination that preserve institutions in their current forms and the lack of coordination between knowledge systems *(well established)* {4.3}. Addressing barriers sometimes includes active disruption or careful phasing out of existing path dependencies *(well established)* {4.3}. Overcoming challenges and barriers requires attention to transformative ways of thinking, doing, organizing, governing, relating and knowing in all contexts and across all scales *(established but incomplete)* {4.3}. Ignoring contextual factors introduces higher risks that transformative initiatives will fail, diverge significantly from their intended outcomes or create other harmful consequences *(established but incomplete)* {3.5.1, 3.5.4}.

A9 Six broad approaches highlight complementary insights for promoting and accelerating deliberate transformative change. Each provides unique insights to understand, describe, analyse, trigger and navigate how transformative change occurs. Weaving together multiple approaches can lead to synergies that reinforce pathways towards a just and sustainable world *(well established)* {3.2, 3.3, 3.5}. No single theory or approach provides a complete understanding of how to achieve transformative change across contexts and scales *(well established)* {3.3, 3.5.1}. Six broad approaches have been identified in the literature, each representing a group of related theories and frameworks that have commonalities in their underlying assumptions and understandings of how to bring about transformative change. Indigenous and local knowledge contributes to all these approaches **(Table SPM.1)** *(well established)* {3.2, 3.3, 3.5}. The six approaches and their core focuses are:

(a) *Systems approaches.* Transformative change takes place through system shifts and therefore requires attention to multiple aspects of a system, such as the visions or objectives, feedback and structures that make up the system {3.2.1};

(b) *Structural approaches.* Transformative change occurs when economic, cultural, political or social structures shift in ways that promote sustainability {3.2.2};

(c) *Inner transformation approaches.* Transformative change takes place through shifts in personal values,

Table SPM 1 **Main actions and interventions associated with six broad approaches to transformative change, and the role of Indigenous and local knowledge in each approach.**

APPROACHES	MAIN ACTIONS AND INTERVENTIONS ASSOCIATED WITH THE APPROACH	ROLE OF INDIGENOUS AND LOCAL KNOWLEDGE
System	Interventions that alter the relationships and feedback that block or can help to accelerate systemic change, including changes to the structure, rules and networks in a system, and the overall goals or underlying intent of the system.	Sharing and providing encompassing and interconnected views of human-nature relationships and complex relations among beings (material and non-material).
Structural	Altering economic, social, political and cultural rules, either through governance interventions or through communities reforming predominant rules.	Challenging colonial structures and institutionalizing local governance for promoting and enhancing sustainable practices associated with Indigenous and local knowledge.
Inner transformation	Relational activities that nurture relationships bewteen humans and other-than-humans; intra- and intergenerational relationships; self-other relationships and relationships with oneself leading to shifting inner beliefs, views and practices.	Highlighting spiritual, emotional, cultural, social and historical dimensions of self-other relationships to trigger and leverage inner potentials for transformative change.
Empowerment	Fostering social movements and building grass-roots networks, envisioning alternative pathways using critical tools, self-reflection and historically denied agency to gain recognition, representation, and rights in legal structures and other key arenas of power.	Asserting agency, power and rights of Indigenous Peoples and local communities to their Indigenous and local knowledge and overcoming historical legacies and marginalized situations.
Knowledge co-creation	Collaborative research-action interventions that build individual and collective capacities to promote desirable futures through visioning, dialogues, reflection and feedback sessions, including sharing knowledge in accessible ways.	Collaboratively generating knowledge and co-designing new products, practices and solutions through an interactive process of weaving knowledge systems.
Science & Technology	Use of new technologies and innovations, in conjunction with inclusive innovation processes; increased funding for research, education, outreach and science-policy interfaces.	Engaging as a source of knowledge for science, technology and innovation, which often draws on traditional knowledge, associated practices and biological resources that have been preserved and maintained through Indigenous and local knowledge.

beliefs and world views and a recognition of intra- and intergenerational, human and non-human relationships, leading to integrated actions across levels {3.2.3};

(d) *Empowerment approaches.* Transformative change occurs when agency and power are asserted by currently marginalized groups in ways that transform power relations for the benefit of equity and sustainability {3.2.4};

(e) *Knowledge co-creation approaches.* Transformative change is supported through the process of knowledge co-creation by a variety of actors (e.g., civil society, Indigenous Peoples and local communities or scientific actors) working together {3.2.5};

(f) *Science and technology approaches.* Transformative change happens when scientific and technical discoveries deliver new technologies, perspectives or solutions that are taken up by society and brought to scale {3.2.6}.

A10 **Despite challenges, transformative change for a just and sustainable world is possible. A wide range of case studies demonstrate transformative potential and exhibit substantial positive environmental and social consequences for nature and people within a decade *(established but incomplete)* {1.2.1, 1.4, 2.3.5, 3.1, 3.4}.** A rapidly growing number of actors, sectors and social movements are demanding and implementing changes that are equitable, just, inclusive and respectful *(well established)* {1.4}. Many existing initiatives have transformative potential, which is defined as latent capacities for generating fundamental, system-wide shifts in views, structures and practices *(established but incomplete)* {1.4}. Historical examples and contemporary initiatives demonstrate that transformative change is possible across scales to achieve a just and sustainable world *(established but incomplete)* {3.3, 2.3.5}.

An assessment of 391 case studies covering all regions of the world highlights the characteristics of initiatives with the potential to contribute to transformative change. The cases include 48 from Africa, 100 from the Americas, 68 from Asia and the Pacific and 100 from Europe and Central Asia.[16] They show that coalitions of actors are already working across scales to contribute to a just and sustainable world *(well established)* {3.4}. Many are activating transformative potential by embodying the principles of transformative change and engaging with views, structures and practices {1.4.3}. These cases show that transformative change is facilitated when enabling conditions are present and when a variety of actors engage through diverse, context-specific actions *(established but incomplete)* {3.5.4, 3.5.5, Figure 3.8}. Some cases also reveal negative and unintended consequences, which underscores the importance of adaptive learning and action *(well established)* {1.3.2, 3.5.7}.

Most of the assessed case studies involve collaboration among actor groups, including individual citizens, Indigenous Peoples and local communities, businesses, financial actors, national Governments, educators and the scientific community *(well established)* {3.5.1, 3.5.2, Figure 3.3}. An analysis of the cases reveals numerous positive impacts on nature and people, with many arising within a decade **(Figure SPM.4)** *(well established)* {3.3}. The case studies demonstrate the potential of diverse actors and forms of agency to build momentum and contribute to transformative change, and they emphasize the importance of actor coalitions and collaborative processes **(Box SPM.2)** *(established but incomplete)* {3.5.7, Figure 3.3}.

16. IPBES Transformative Change Assessment Data Management Report on the case study database with transformative potential and pitfalls (https://doi.org/10.5281/zenodo.10260233).

Translating transformative potential into deliberate transformative change for a just and sustainable world can be promoted and accelerated by addressing the underlying causes of biodiversity loss and nature's decline, by anchoring transformative pathways in inspiring visions and by drawing on diverse knowledge systems and approaches **(Figure SPM.5)** *(established but incomplete)* {1.4.1, 2.3.2, 3.5.1, 5.8}. The transformative potential of different actors and initiatives can be more fully realized by developing the transformative capacities (e.g., the knowledge, skills, attitudes and resources) necessary to realize transformative change *(established but incomplete)* {1.4.3}.

A11 Transformative change concerns the quality and direction of change. Both small-scale and large-scale initiatives contribute to transformative change when they address the underlying causes of biodiversity loss and nature's decline and include explicit visions of desirable futures. They have the potential to scale when they overcome challenges and barriers and are guided by the principles of transformative change *(established but incomplete)* {1.3, 2.3.5, 5.2}. It is misleading to think of change as being either incremental or transformative in a simple, binary sense because diverse small-scale initiatives with transformative potential can contribute to a just and sustainable world *(established but incomplete)* {1.1, 1.4.3}. Transformative change takes place over time, and seemingly small changes that address underlying causes can spread in ways that inspire or influence larger and more systemic shifts, especially when they overcome barriers and challenges *(established but incomplete)* {1.1, 1.4.1, box 1.1}. Local sustainability initiatives, such as the implementation of nature-based solutions and ecosystem-based approaches, can contribute to global sustainability through various scaling processes,

Box SPM 2 The role of actor coalitions in the co-creation of transformative change.

The co-management of the Os Miñarzos Marine Reserve in Galicia, Spain, is an example of a transformative change in small-scale fisheries co-created by fishers, scientists and the government administration after the abrupt shock of an oil spill. These actors jointly developed a new vision based on shared values that supported sustainable local fisheries and the well-being of coastal communities dependent on the marine protected area. The process of knowledge co-production began by sharing the traditional knowledge of fishers (e.g., identification of the most sensitive and productive habitats and species) with scientists and management. This practice then became part of the formal decision-making process of the management body. Co-construction has been a complex process and not without tensions and contested actions by some fishers. These tensions indicated the need to address underlying causes of transformative change, such as the prioritization of short-term, individual and material gains and disconnection from nature. More than 17 years after its implementation, this marine protected area has generated positive effects on fishing structures and practices, leading to measurable outcomes (e.g., higher abundance of species and economic revenues) and greater trust and cooperation among the actors. The marine protected area has worked with the Voluntary Guidelines for Securing Sustainable Small Scale Fisheries in the Context of Food Security and Poverty Eradication[a] and has also served as the seed to create a new network of more than 20 million small-scale fishers in Ibero American countries {1.4}.

a. Food and Agriculture Organization of the United Nations. 2015. *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication.* Rome.

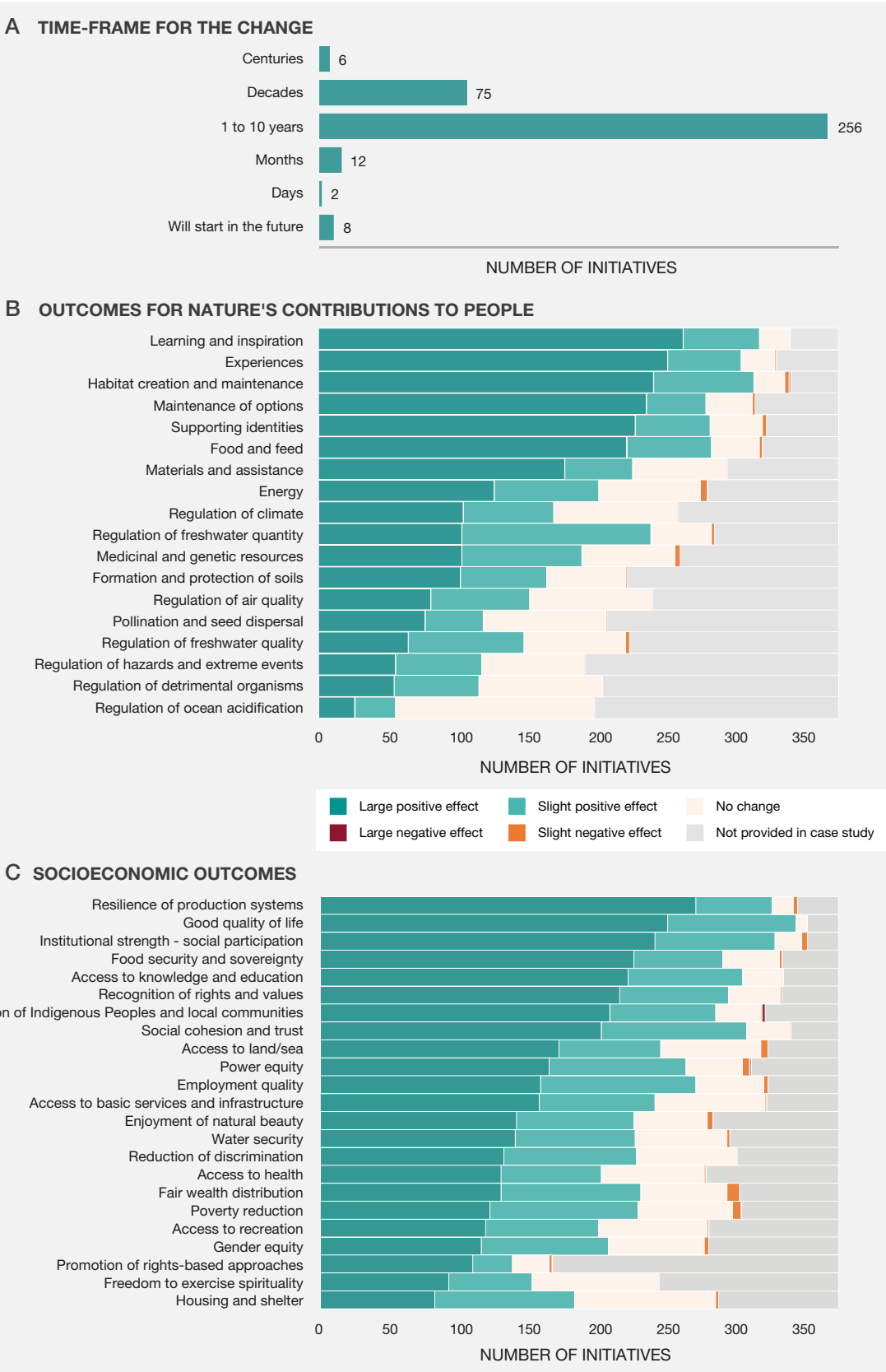


Figure SPM 4 **Positive outcomes have been evidenced within a decade or less (panel A) for a diverse set of social, economic and environmental indicators (panels B and C).**

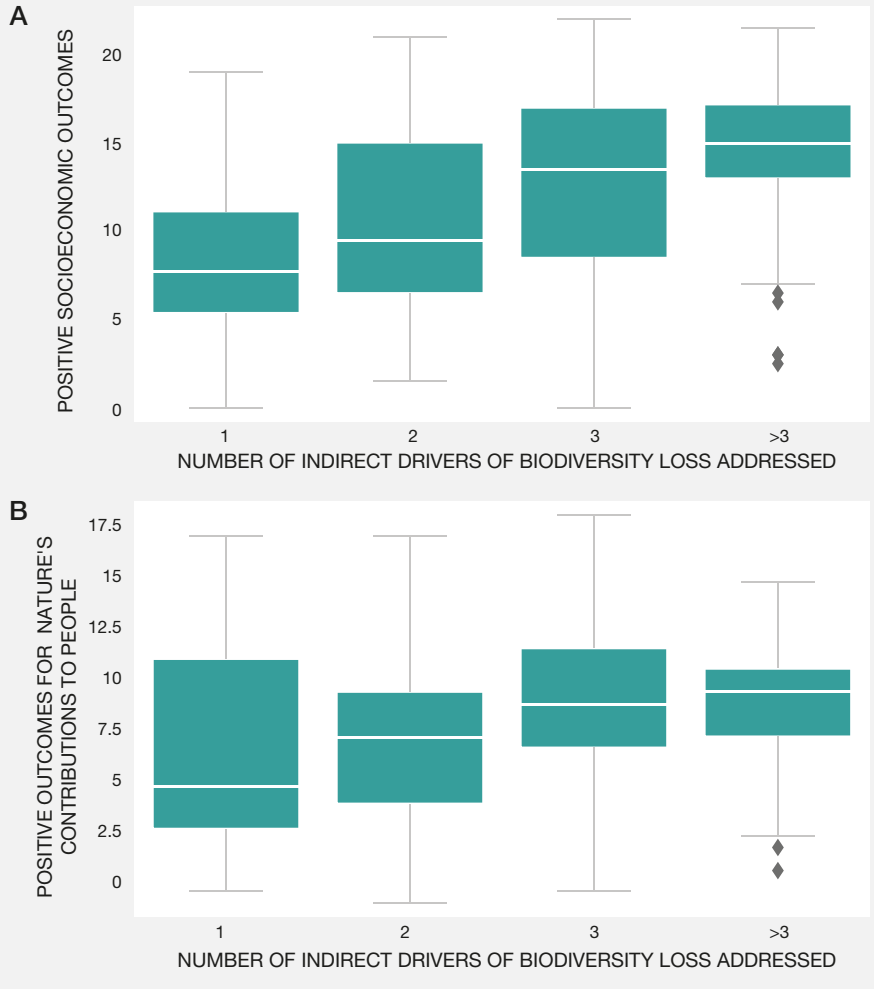
This figure shows the number of initiatives with transformative potential identified in a database of 391 case studies assembled for

the assessment, according to **(A)** the time frame for the change; **(B)** outcomes for nature's contributions to people (the typology of nature's contributions to people follows chapter 2 of the IPBES *Global Assessment*);[17] and **(C)** outcomes for socioeconomic indicators {3.4}. Not all dimensions of outcomes were measured in all initiatives.

including scaling out (e.g., replication of innovations in other geographical contexts), scaling up (e.g., institutionalizing innovations in policy, law and rules), scaling deep (e.g., shifting mindsets, paradigms and values) and forming new constellations of initiatives *(established but incomplete)* {3.5.6}. Efforts at different scales reinforce and amplify one another when they are aligned with principles of transformative change and work against each other when not aligned *(well established)* {3.5.6}.

17. IPBES (2019a): *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* Díaz, S., Settele, J., Brondízio, E. S., Ngo, H. T., Guèze, M., Agard, J., Arneth, A., Balvanera, P., Brauman, K. A., Butchart, S. H. M., Chan, K. M. A., Garibaldi, L. A., Ichii, K., Liu, J., Subramanian, S. M., Midgley, G. F., Miloslavich, P., Molnár, Z., Obura, D., Pfaff, A., Polasky, S., Purvis, A., Razzaque, J., Reyers, B., Roy Chowdhury, R., Shin, Y. J., Visseren-Hamakers, I. J., Willis, K. J., and Zayas C. N. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.3553458.

Transformative change may have global positive effects but may also consolidate or worsen existing inequalities. Large-scale changes alone do not generate fundamental, system-wide shifts for a just and sustainable world *(well established)* {1.4.1, 2.3.5}. For example, many technological advances (e.g., artificial intelligence and biotechnologies) have generated positive effects in terms of driving business innovation, scientific and human health progress, improved efficiency and productivity, and greater capacity to monitor environmental changes *(established but incomplete)* {2.3.3}. But they have been less successful in safeguarding sustainable uses of nature, driving more equitable economic development and ensuring that more vulnerable groups have equal access *(established but incomplete)* {2.3.3}. Some technologies may even have globally positive effects on average but may consolidate or worsen existing inequalities *(established but incomplete)* {2.3.3}. This



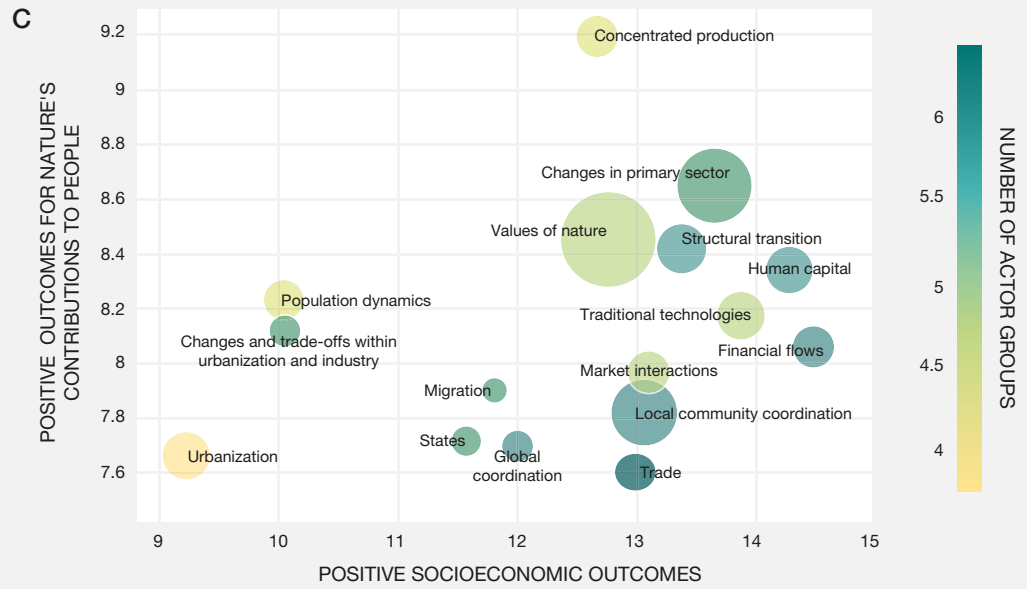


Figure SPM 5 **Positive outcomes of initiatives with transformative potential depend on the number and types of indirect drivers of biodiversity loss that are addressed.**

Initiatives with transformative potential that address more indirect drivers of biodiversity loss and nature's decline lead to more positive socioeconomic outcomes **(A)** and to more positive outcomes for nature's contributions to people **(B)**. The p-values from the analysis of variance are below 0.001 in both cases. **(C)** Addressing different indirect drivers of biodiversity loss requires collaborating with a varying number of actors (e.g., trade involves many actor groups), with contrasting outcomes. Changes in indirect drivers related to the primary sector (e.g., agriculture) can achieve the highest benefits in terms of both socioeconomic indicators and indicators related to nature's contributions to people. The size of the circles reflects the number of initiatives addressing an indirect driver. The outcomes for the socioeconomic dimension and for nature's contributions to people are a composite index (i.e., without units) of a diverse set of indicators measured in the case study database (n = 391). The complete list of socioeconomic indicators can be found in **Figure SPM.4**. The typology of indirect drivers follows chapter 2.1 of the IPBES *Global Assessment*.

underscores the importance of transformative change that addresses the underlying causes of biodiversity loss and nature's decline on the basis of the principles of equity and justice, pluralism and inclusion, respectful and reciprocal human-nature relationships, and adaptive learning and action *(well established)* {1.3.2}.

B. Strategies and actions for transformative change

B1 **A key strategy for transformative change for global sustainability is to conserve, restore and regenerate places of value to nature and people that exemplify biocultural diversity (Strategy 1) *(well established)* {5.3}.** References to place-based conservation actions are widely represented in the literature on transformative change (mentioned in 28 per cent of the references in the assessment corpus that included a mention of any action in the title or abstract and in 33 per cent of the references in the Transformative Change Assessment corpus of literature on case studies, referred to as the "case corpus") **(Figure SPM.6)** *(well established)* {5.2}. **Strategy 1** represents a transformative biocultural conservation approach with actions to conserve and sustain the places where people and nature are still flourishing with relational world views, governance structures and practices **(Action 1.1)** {5.3.1}, while envisioning new legal protections for peoples and places through rights-based approaches, respecting the rights of nature and rights of Mother Earth as recognized by some countries **(Action 1.2)** {5.3.2}, and place-based conservation based on diverse values of nature **(Action 1.3)** {5.3.3}. These actions are complemented by the establishment of regenerative views, structures and practices in extractive sectors **(Action 1.4)** {5.3.4}, which are implemented through spatial planning and policies as a pathway to establish effective conservation of biodiversity across landscapes and seascapes and across scales **(Action 1.5)** {5.3.5}.

Among the actions assessed, the literature emphasizes instruments used in conservation, management and monitoring in support of basing conservation on diverse values of nature **(Action 1.3)** **(Figure SPM.6)** *(established but incomplete)* {5.3.3}. Deliberately connecting biological conservation with cultural values, referred to as "biocultural approaches", has proved to be an actionable way to enhance place-based actions for long-term sustainability **(Action 1.3)** **(Box SPM.3)** *(well established)* {5.3.3}.

Regenerative strategies that protect and promote both biological and cultural (biocultural) diversity simultaneously provide multiple co-benefits over time **(Action 1.4)** {5.3.4}. Regeneration refers to processes by which socioecological systems revive themselves after disturbances and evolve through positive reinforcing cycles that allow for emergence (e.g., of biocultural diversity). Restoration activities are one way for humans to initiate that revival process. While restoration typically suggests humans doing things *to*

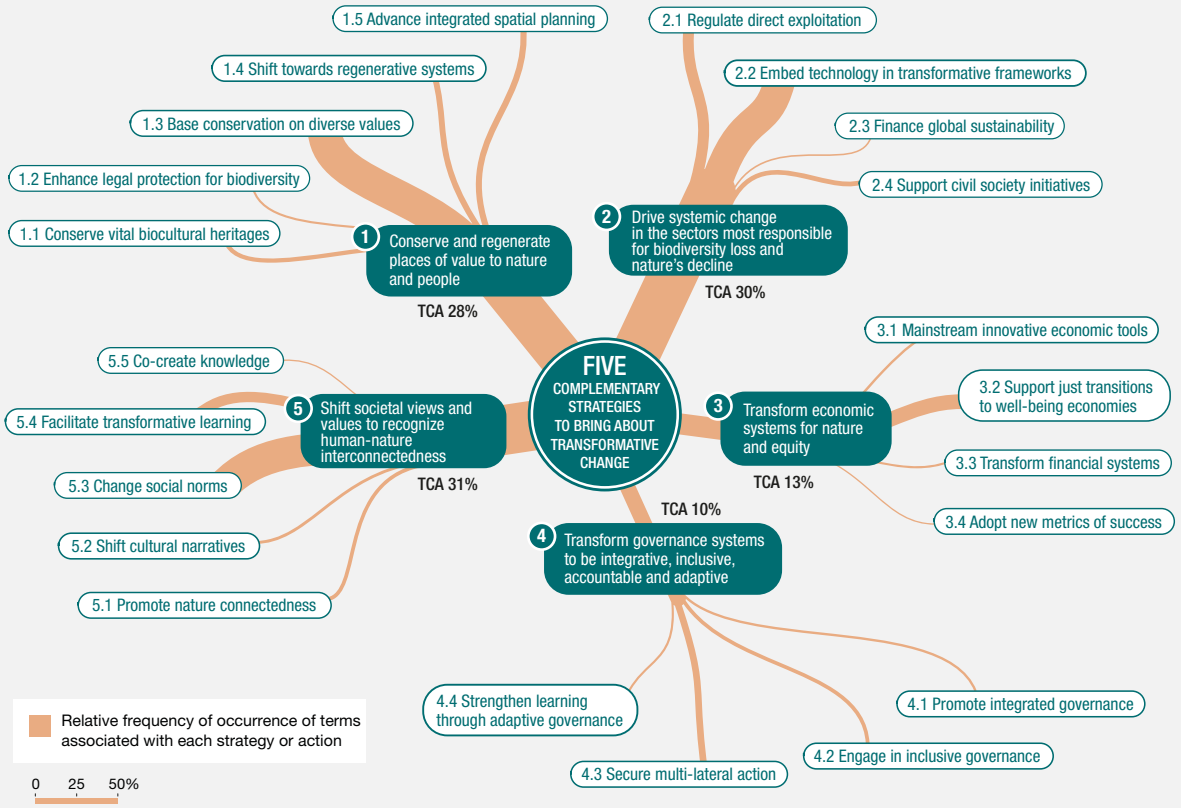


Figure SPM 6 **Dendrogram displaying the proportion of occurrences of terms associated with strategies or actions.**

The line thickness in the dendrogram depicts the relative frequency of occurrence of 566 terms associated with the 22 actions and five strategies in the titles and abstracts of documents (n = 420,523).

Box SPM 3 The transformative potential of values and placed-based conservation

The Nashulai Maasai Conservancy is an Indigenous-owned and -run conservancy located in the Maasai Mara National Reserve (Kenya), one of the world's most biodiverse ecosystems. The initiative is based on the values of coexistence, dignity, inclusivity, self-determination, empowerment and human rights. It represents a new model for conservation that simultaneously responds to species loss, loss of cultural knowledge, livelihood struggles and climate change. Through the establishment of community-managed protected areas and other initiatives, such as tree-planting and river-cleaning projects, it has been successful in creating mixed-use community areas where both humans and wildlife thrive. The Conservancy is promoting the return of wildlife and generating livelihood and cultural opportunities for Maasai families, illustrating how Indigenous biocultural practices support multiple goals. It serves as an example for inspiring and scaling change in other communities around the world {box 1.4}.

nature, regeneration refers to humans co evolving *with* and participating *as* nature. Regenerative strategies can support cultural values, sustainable production and biodiversity conservation **(Action 1.4)** *(established but incomplete)* {5.3.4}. For example, the community forestry programme in Nepal integrates decentralized forest policy into local communities' needs, views and practices to restore and manage degraded forests *(well established)* {5.3.4}. Other approaches (e.g., *satoyama* and *satoumi* in Japan, which refer to harmonious interaction between humans and nature in rural landscapes and seascapes) also take the view that culture and ecosystems are integrated and co-evolving *(well established)* {5.3.4}.

B2 **Achieving the 2050 Vision for Biodiversity involves driving systemic change and mainstreaming biodiversity in the sectors that heavily contribute to its loss and to nature's decline, including agriculture and livestock, fisheries, forestry, infrastructure, mining and energy, in particular fossil fuel sectors (Strategy 2) *(well established)* {5.4}.** For example, multifunctional and regenerative land use approaches promote multiple benefits of nature, which are evident in agroecological farming transitions that emphasize nature, healthy food production and physical and mental well-being **(Box SPM.8)**. Studies have suggested that increasing biodiversity, protecting native habitats and reducing external inputs in agricultural landscapes can enhance crop productivity, for instance, by enhancing pollinator abundance and diversity *(well established)* {5.8.2}. Such improvements elevate employment levels, promote healthy livelihoods and foster a sense of identity and spiritual connection. Phasing out ecologically harmful practices in sectors most responsible for biodiversity loss is not achieved by single instruments, but rather depends on mainstreaming biodiversity in all relevant policies, planning, support schemes and administrative procedures **(Action 2.1)** *(well established)* {5.4.1}. A parallel opportunity exists in the energy sector, in which replacing fossil fuels with biodiversity-friendly renewable energy sources can present clear solutions to biodiversity and climate challenges. This transition involves adopting renewable energy technologies, innovations and practices that conserve biodiversity and protect nature, such as smart grids, which reduce reliance on resource-intensive materials and lower mining-related impacts on biodiversity **(Action 2.2)** *(well established)* {5.4.2}.

B3 **Technologies can redirect development towards sustainability and equity when embedded in transformative frameworks (Strategy 2, Action 2.2) *(established but incomplete)* {1.3.3, 2.3.3, 3.2.6, 5.4.2}.** In transformative frameworks, technologies aim to address the underlying causes of biodiversity loss and nature's decline rather than exacerbating them *(established but incomplete)* {1.3.3, 3.2.6, 5.4.2}. Technologies in transformative change processes redirect development away from activities that drive biodiversity loss and towards regenerative practices aligned with nature-positive goals *(established but incomplete)* {2.3.3, 5.4.2}. However, for technology to be truly transformative, it must also incorporate equity and human rights considerations, ensuring that innovations and their benefits are shared fairly {1.3.2, 3.2.6, 5.4.2}. The success of technologies is context-dependent, varying across regions due to differences in social and economic conditions *(established but incomplete)* {5.4.2}. Moreover, democratic accountability throughout the technology development process is essential for the responsible use of technology. Transformative technological changes are most effective when integrated into legal frameworks, such as those applicable to intellectual property rights, and supported by long-term cooperation and capacity-building efforts, particularly in low-income countries *(established but incomplete)* {5.4.2}.

Box SPM 4 **The transformative potential of technologies for global sustainability.**

Technologies can potentially play an important role in transformative change. One example of an initiative with transformative potential facilitated by technology is Ant Forest, a mobile phone application that uses financial technology to convert a user's uptake of lower-carbon activity into what has become the largest private sector tree-planting scheme in China. Ant Forest uses the Alipay mobile payment application as its platform. Every time users perform a carbon mitigation activity (e.g., commuting to work by walking, biking or using public transport, or reducing paper and plastics), 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 in cooperation with local residents. Since its launch in 2016, Ant Forest has engaged over 500 million users and planted more than 548 million trees in 13 provinces of China. The initiative pursues a wide range of ecological and social goals, and the plants are suited to specific contexts and provide jobs in eco-agriculture and ecotourism in remote rural areas facing environmental degradation in China. Potential remains for this initiative to expand into all elements of the transformative framework. The case highlights the importance of actor coalitions, including the private sector working with citizens, and of community engagement in ecosystem restoration and reforestation facilitated by technology. See the Transformative Change Assessment case study database for more details.

Examples of technologies that can be embedded in transformative frameworks include smart energy and water management, biomimetics, the digitalization of food systems, and financial technology innovations **(Box SPM.4)** {5.4.2}. However, there is limited empirical evidence on the role of technology in driving transformative change (only 1.8 per cent of all transformative change literature analysed) *(established but incomplete)* {2.3.3, Figure 2.6}.

Technologies can also be deployed in non-transformative or even harmful ways, contributing to unsustainable consumption patterns *(established but incomplete)* {2.3.3, box 3.3}. For example, transforming energy use may involve addressing rebound effects, such as savings from energy efficiency being offset by increased demand for energy-consuming services, or patterns of extraction for rare metals being reinforced in ways that echo colonial practices *(well established)* {5.4.2}. Many emerging technologies depend on critical minerals, the extraction of which often harms ecosystems. For instance, research on deep-sea activities (e.g., mining from the ocean floor) in response to rising demand for critical minerals such as lithium, cobalt and graphite reveals the importance of increased attention to the ecological implications of such activities for deep-sea ocean functioning *(established but incomplete)* {2.3.3}.

B4 **Efforts to conserve, restore and sustainably use biodiversity, nature and nature's contributions to people, including ecosystem services, are significantly underresourced in relation to the global economic value generated by activities dependent on nature (Strategy 2) *(well established)* {1.2.1, 4.2.3, 5.4.3}.** More than half of the world's total GDP ($58 trillion in 2023) is generated by sectors that are dependent on nature to a moderate or high extent **(Action 2.3)** **(Figure SPM.7)** {5.4.3}. In 2020, industries highly reliant on nature generated 15 per cent of global GDP and moderately dependent industries generated 37 per cent of global GDP **(Action 2.3)** *(established but incomplete)* {5.4.3}. Eliminating, phasing out, reforming or redirecting economic incentives that are harmful to biodiversity can significantly reduce pressures on nature and make it possible to repurpose these resources to conserve, restore and sustainably use biodiversity **(Action 2.3)** *(well established)*. Estimates of global explicit public subsidies to sectors directly driving nature's decline ranged from $1.4 trillion to $3.3 trillion for 2023, depending on the source consulted. Agriculture ($610 billion–$939 billion) and fossil fuels ($577 billion–$1,390 billion) are the sectors receiving more subsidies. Road and irrigation infrastructure ($311 billion–$938 billion), forestry ($64 billion–$175 billion) and fisheries ($48 billion–$61 billion) are also heavily subsidized. No global estimates are available for the mining sector *(well established)* {5.4.3}.

The same economic sectors create environmental impacts in the form of air and water pollution or soil degradation that are not accounted for in market exchanges (i.e., they generate negative externalities) and were estimated to be as high as $10.7 trillion per year in 2023 **(Figure SPM.7)** *(well established)* {5.4.3}.

By comparison, the estimated annual support needed to sustainably manage biodiversity and maintain ecosystem integrity is between $722 billion and $967 billion per year, leaving a biodiversity financing gap of $598 billion to $824 billion per year, depending on the source consulted. Currently, $135 billion to $156 billion (adjusted for inflation to 2023) per year are spent on biodiversity conservation **(Figure SPM.7)**. Restoration and regeneration efforts will require even greater investments, likely exceeding one trillion dollars annually **(Action 2.3)** *(well established)* {5.4.3}.

Financial and economic instruments – such as payments for ecosystem services, taxes, subsidies and tradable permits – and mechanisms aimed at compensating for the additional costs of biodiversity conservation (e.g., reducing emissions from deforestation and forest degradation (REDD-plus) and European Union agri-environmental schemes), in accordance with national legislation, are designed to guide economic decisions through price signals *(well established)* {5.5.1, 5.6.1}. However, these instruments have not been widely adopted, and when they have been, their impact has often been limited *(established but incomplete)* {5.4.1, 5.5.1}. The voluntary nature of certain mechanisms, along with insufficient enforcement, monitoring and sanctioning systems, limit their uptake and effectiveness **(Actions 2.1, 2.3 and 3.1)** *(well established)* {1.2.3, 5.5.1}.

A number of approaches show how to increase resources, funding and investments for biodiversity and nature conservation. These include internalizing environmental externalities, reforming subsidies in sectors that contribute to biodiversity loss and nature's decline, reassessing global debt structures and fostering greater engagement from the private sector **(Actions 3.2 and 3.3)** *(well established)* {5.5.2, 5.5.3}. Global coordination, policy alignment, impact monitoring and redistributive measures are needed to support all relevant stakeholders, in particular vulnerable populations, during the transformation of economic sectors **(Action 2.3)** *(well established)* {5.4.3}. True cost accounting and taxing environmental externalities ensure that those responsible for environmental degradation bear the associated costs. Establishing sustainability as a core tax principle and reducing tax avoidance could also generate significant financial resources for sustainability efforts **(Action 3.2)** *(established but incomplete)* {5.5.3}. Moreover, reconsidering global debts could free up funding for social and environmental objectives **(Action 3.2)** *(established but incomplete)* {4.2.2, 5.5.3}. Notably, the private sector currently accounts for only 17 per cent of total investments in nature-based solutions globally, leaving the remaining 83 per cent to the public sector *(well established)* {5.4.3}.

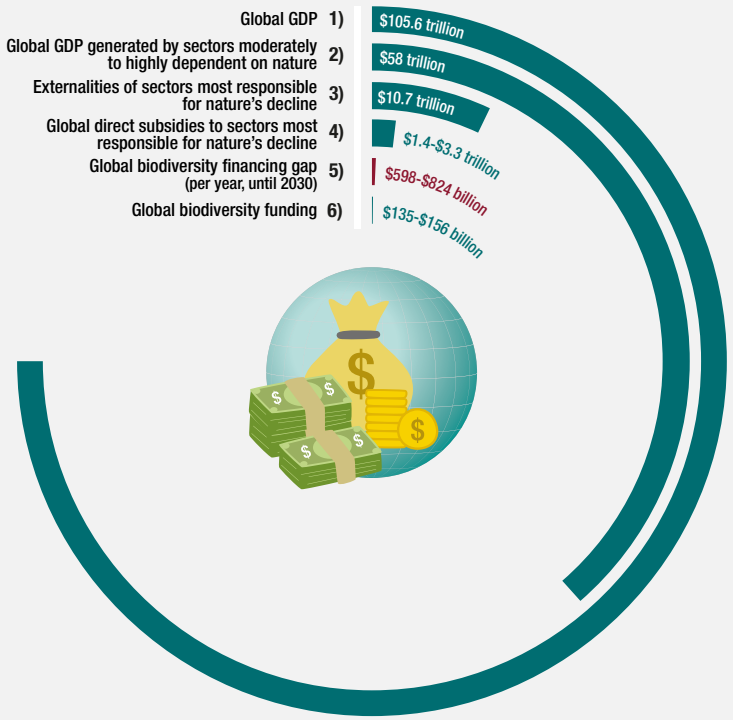


Figure SPM 7 **The economic landscape of global sustainability: interdependencies and funding gaps.**

The figure illustrates the sharp contrast between economic sectors' dependence (2) and impact (3) on nature, and between public investment in economic sectors driving nature's decline (4) and biodiversity funding (6). The length of the arcs is adjusted for inflation to represent a share of global GDP in 2023 (estimated at $105.6 trillion). **1)** Global GDP in 2023 ($105.6 trillion); **2)** Global GDP moderately to highly dependent on nature in 2023 ($58 trillion); **3)** Externalities of sectors most responsible for nature's decline, estimated at $10 trillion in 2021 ($10.7 trillion adjusted for inflation to 2023); **4)** Global direct subsidies to sectors most responsible for nature's decline, estimated between $1.3 trillion and $3.1 trillion in 2021 ($1.4 trillion–$3.3 trillion adjusted for inflation to 2023); **5)** Global biodiversity funding gap ($598 billion – $824 billion per year until 2030); **6)** Global biodiversity conservation funding, estimated between $124 billion and $143 billion in 2019 ($135 billion – $156 billion adjusted for inflation to 2023).

As most of these tools and methodologies are still at early stages of development, many countries would require enhanced technical and financial support to develop the capabilities necessary for their implementation and use.

B5 Current global supply chain arrangements encourage unsustainable sourcing and overproduction, leading to overexploitation of nature {Figure 4.7}. Ensuring sustainability, including through targeted and just downscaling of consumption and production, alongside cultures of sufficiency, contributes to reducing global footprints to sustainable levels across all countries. Overcoming inequities in consumption and production patterns, through governance that is coherent and effective along the whole supply chain, is essential for transformative change (Strategies 3 and 4) *(established but incomplete)* {5.5.2, 5.6.3}. International trade is primarily driven by the for-profit economic and financial sectors, where government regulation of land- and sea-use activities that are harmful to nature is often insufficient *(established but incomplete)* {5.5.2}. Noting uncertainties in the model used, according to one estimate, over the period 1990–2015 high-income countries obtained without adequate compensation in equivalent terms through trade with low-income countries the equivalent of 12 billion tons of embodied raw material equivalents, 822 million hectares of embodied land, 21 hexajoules of embodied energy and 188 million person-years of embodied labour, worth $10.8 trillion – enough to end extreme poverty 70 times over *(well established)* {5.5.2}. Over that period, the losses of low-income countries came to $242 trillion. Low-income countries' losses due to unequal exchange outstrip their total aid receipts over the period by a factor of 30 *(established but incomplete)* {5.5.2}.

Mitigating ecologically unequal exchange between producer and consumer countries has the potential to reduce excess consumption and ecological footprints **(Action 3.2)** *(established but incomplete)* {5.5.2, 5.6.3}.

Similarly, regulating entire global supply chains to reduce their reliance on ecologically harmful extractive processes and practices is a powerful means of reducing negative impacts of trade on biodiversity and ecosystems and can be supported by positive incentives by, for example, adjusting taxes, subsidies, payments for ecosystem services, permits, standards or regulations **(Action 3.1)** *(established but incomplete)* {5.5.1}. Current dominant approaches to economic activities remain significantly coupled with environmental pressures. Economic growth is pursued by all but is unevenly distributed around the world and exacerbates ecological overshoot while threatening possibilities for just and sustainable development **(Action 3.2)** *(established but incomplete)* {4.2.2, 4.2.4, 5.5.2}. Policy instruments that impose declining caps on resource use or support not-for-profit models (e.g., foundation-owned limited liability companies, consumer cooperatives, credit unions or mutual companies) can foster a transition to a just, sustainable economy and avoid trade-offs between investor interests and social and environmental benefits **(Actions 3.1 and 3.2)** *(established but incomplete)* {5.5.2}. Revising procedures of multilateral collaboration and designing coherent and consistent policies between countries linked by trade and other interdependencies can be a powerful lever for overcoming global inequalities and institutional misfits **(Action 4.3)** *(established but incomplete)* {5.6.3}.

B6 **Redefining goals, metrics and indicators to acknowledge economic, social (including cultural) and environmental dimensions as well as the many different values of nature can promote new paradigms of progress that centre on justice and sustainability (Strategy 3)** ***(established but incomplete)*** **{4.4.2, 5.5.3, 5.5.4, 5.6.3}.** Although it is a measure of economic flow, GDP is widely used as a proxy for economic growth *(well established)* {5.5.4}. The measure has been criticized due to its reliance on marketed goods and services alone *(well established)* {5.5.4}. Beyond GDP, alternative metrics of development that go beyond the limited paradigm of economic growth have been proposed, which include other social, cultural, economic and ecological dimensions of quality of life. These metrics either adjust traditional GDP metrics (e.g., green GDP, the Genuine Progress Indicator, genuine savings, gross ecosystem product), replace it with more inclusive indices that account for human well-being and environmental impact (e.g., the Happy Planet Index, inclusive wealth, gross national happiness) or supplement it to account for nature's contributions to economic well-being in the mainstream metrics of economic progress (e.g., the System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA-EA)) *(well established)* {5.5.4, Figure 5.10}. Options for assuring the inclusion of nature in global financial flows include elevating nature to become a central criterion in financial bonification of private companies, government fund allocation, and development funds and aid *(established but incomplete)* {4.4.2, 5.5.4}. Compliance with these obligations is tied to transparency and monitoring, as well as to institutional arrangements that evaluate and enforce the accountability of actors with regard to biodiversity values *(established but incomplete)* {5.5.4, 5.6.3}. Such reforms imply establishing mechanisms that facilitate socially and ecologically fair access to resources globally and new roles for central banks and other funders *(established but incomplete)* {5.5.3}. Frameworks are emerging on how to identify, measure, evaluate, disclose and act on business's relationship to nature, including the High-level Business Actions on Nature (ACT-D) or the LEAP framework *(established but incomplete)* {5.5.4}. Sector-specific tools and guidance materials are being developed to leverage natural capital accounting by assessing and disclosing businesses' nature-related risks, impacts, dependencies and opportunities (e.g., the Task Force on Nature-related Financial Disclosures, the Global Reporting Initiative, SEEA EA and the Product Biodiversity Footprint) *(established but incomplete)* {5.5.4}. Some business sectors and financial institutions are currently testing recommendations by the Task Force on Nature-related Financial Disclosures, but those sectors and institutions call for improved quantification methodologies to assess the financial implications of biodiversity loss and nature's decline for the institutions' clients or investees and for improved internal capacity-building and better understanding *(well established)* {5.5.4}.

B7 **Governance systems that effectively reduce biodiversity loss and nature's decline integrate biodiversity into sector policies and decision-making, engage diverse actors and hold actors accountable (Strategy 4) (Box SPM.5)** ***(well established)*** **{1.4, 3.2, 5.6}.** Institutional options to foster integrated and nexus governance include joint planning procedures, assigning legal responsibilities, co-developing practical solutions, fostering collaborative structures and facilitating co-evaluation processes *(established but incomplete)* {5.6}. Positioning biodiversity and its advocates in land-, sea- and resource-use decisions, project approvals, financial incentives and criteria for allocating funds and investments strengthens the integration of governance systems and thereby fosters support for nature and biodiversity **(Action 4.1)** *(well established)* {5.6.1, 5.6.3}. Inclusive governance systems that engage diverse actors ensure the representation of a plurality of world views, practices and knowledge systems **(Action 4.2)** *(well established)* {3.2.2, 5.6.2}. Consistent participation and collaborative structures strengthen perceived responsibilities among actors and provide opportunities to shift decisions towards just and equitable transformations **(Action 4.2)** *(established but incomplete)* {3.5.5, 5.6.2}. Global interdependencies among causes and effects of biodiversity loss, climate change, pollution, poverty and other sustainability issues require effective and integrated multilateral and bilateral agreements that coordinate balanced solutions **(Action 4.3)** *(established*

Box SPM 5 **Examples of governance systems with transformative potential.**

Governance systems that place biodiversity at the core of policies and legislation are better equipped to mitigate harmful actions that contribute to biodiversity loss and nature's decline {5.6.1}. For example, the Common Agricultural Policy of the European Union has gradually adopted and strengthened financial incentives for agri-environmental and climate measures and introduced conditionality in farmer support schemes to encourage biodiversity-friendly practices {5.6.1}. Such practices include incorporating landscape elements, buffer strips, fallow land, organic farming or agroforestry to maintain wildlife habitats and promote sustainable farming. These efforts have the potential to drive transformative changes in land use across Europe. For instance, the share of fallow land (which is important for biodiversity and ecosystem services) in the overall cropland area has drastically changed in response to changes in support schemes {5.6.1}.

However, the transformative potential of Common Agricultural Policy measures has been hampered by an underrepresentation of environmental advocates in decision-making and overshadowed by the dominance of vested interest groups and constant policy redesign that undermine evaluation and learning procedures. This has resulted in imbalanced regulatory power and only a limited share of the budget being allocated to effective biodiversity measures, despite biodiversity being one of the 10 objectives of the Policy. Literature on the Policy suggests that biodiversity, nature and sustainable rural development could be better supported by phasing out direct farmer support and replacing it with targeted incentives or regulations {5.6.2}. Transforming the Policy will, however, require increased transparency, support for stakeholder engagement, strengthening of evaluation procedures and enhancement of policy learning {5.6.1, 5.6.2, 5.6.4}.

Another example of governance that benefits both nature and people is the ecosystem-based spatial management approach in the Galapagos Marine Reserve, which supports sustainable fisheries and tourism – a vital source of livelihood for over 30,000 residents and 300,000 annual visitors to the Galapagos Islands. However, climate change, local waste management and water treatment remain major challenges impacting the food security, nutrition and health of residents. This illustrates the importance of ensuring that governance systems are adaptable in order to incorporate policy innovations and accommodate changing social and structural conditions {1.3.2, 3.2.6, 5.6.1}. Such adaptability enables governance systems to respond more effectively to lessons learned from ongoing monitoring and evaluation processes {5.6.4}.

but incomplete) {5.6.3}. Effective governance of nature and biodiversity in producing systems further depends on complementary regulation of consumption patterns, with attention to the role of high-consuming actors *(well established)* {5.6.3}. Governance systems hold actors accountable by clearly assigning responsibilities and defining time frames, providing complementary institutional mandates and iteratively and transparently evaluating and revising policies and regulations as well as trade agreements to ensure fair and sustainable governance of nature **(Action 4.4)** *(well established)* {5.6.3, 5.6.4}.

B8 Adaptive learning and action address uncertainties associated with transformative change (Strategy 4) *(well established)* {1.3.2, 3.4, 5.6.4}. Transformative change is a complex and dynamic process that is characterized by emergent and unexpected outcomes and may therefore require a combination of different approaches to achieve the expected results *(well established)* {1.1, 1.3.2, 3.4}. For example, Costa Rica has experienced an inspiring transformation in relation to biodiversity conservation and forest recovery but still faces challenges, such as conflicts among stakeholders, including Indigenous Peoples, and water pollution {Figure 3.5}. The dynamic nature of transformative change highlights the importance of processes that facilitate adaptive learning and the effective implementation of context-specific actions in response to such learning **(Action 4.4)** *(well established)* {1.3.3, 3.4, 3.5.1, 5.6.4}. Transparent and inclusive monitoring that engages a diversity of actors and hence a diversity of perspectives, learnings and evaluative frameworks that go beyond predefined metrics and enable empowerment, participation and reflection and allow the identification of targeted actions to address such unintended consequences *(established but incomplete)* {1.3.2, 5.6.4}. Adaptive governance supporting these processes is based on flexible structures, provisions for experimentation and evaluation as well as positive coordination, which can be fostered through policy entrepreneurship and knowledge brokerage, new coalitions, co-creation and co-evaluation, as well as flexible structures in dynamic network governance arrangements *(established but incomplete)* {5.6.4}.

B9 Strengthening human-nature interconnectedness addresses underlying causes of biodiversity loss and nature's decline and is a powerful driver of transformative change. Shifting dominant societal views and values, alongside transforming cultural narratives and social norms around production and consumption, fosters a just and sustainable world (Strategy 5, Actions 5.1, 5.2 and 5.3) *(established but incomplete)* {5.7.1, 5.7.2, 5.7.3}. Feelings of connectedness to nature are associated with pro-environmental behaviours and support individual and collective engagement in nature conservation, including environmental activism **(Action 5.1)** {5.7.1}. Language,

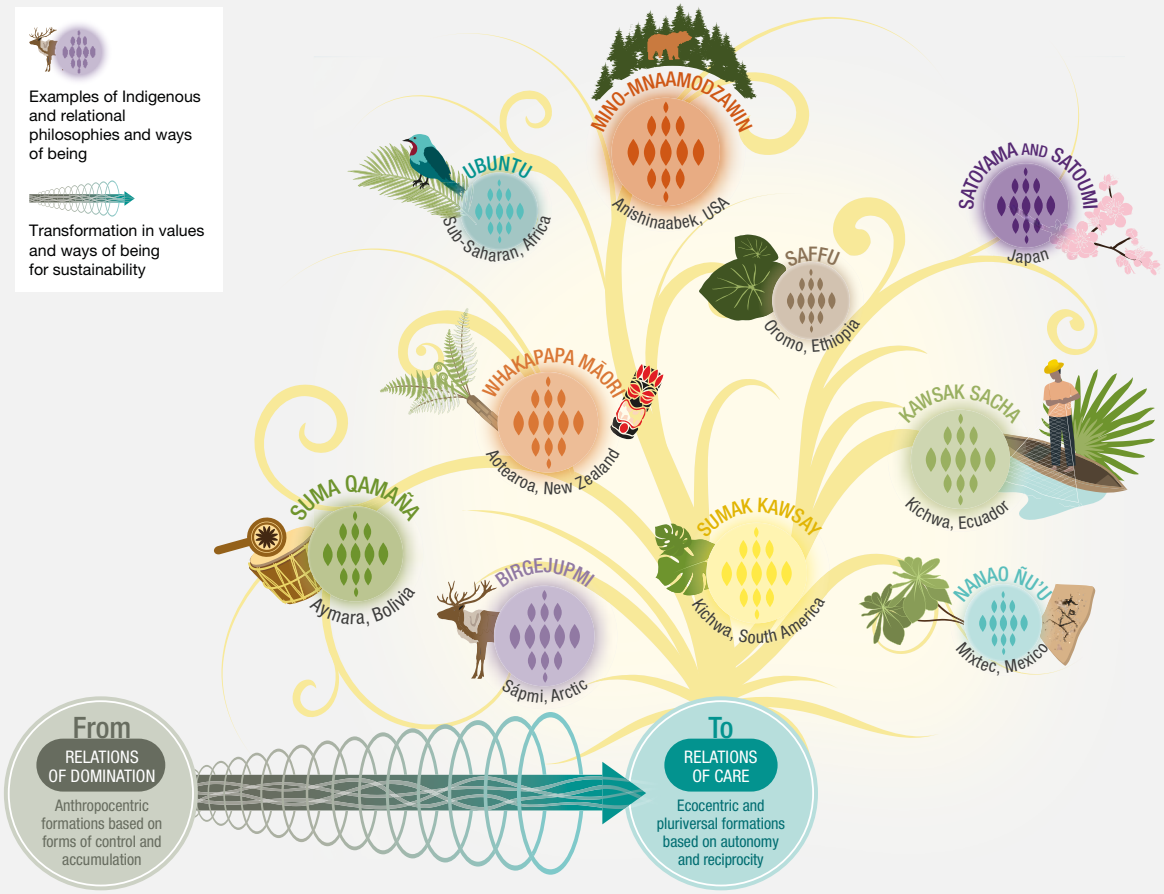
concepts and practices reflecting harmony and interdependencies with nature based on ethics of care are central to the world views, values and practices of many Indigenous Peoples and local communities, as well as other groups *(well established)* {2.3.4, 5.3.1, 5.3.3, 5.3.4, 5.7.1, Figure 5.13, Table 5.3, Figures 5.14 and 5.6}. **Figure SPM.8** provides examples of relational world views and values held by Indigenous Peoples and local communities that embody relations of care. Such world views and values are evident and expressed in many other cultures, philosophies and initiatives with transformative potential. Increasing awareness of and exposure to alternative views of nature can be facilitated through formal and informal education and can contribute to transformative learning *(well established)* {5.7.4}.

Shared narratives and imaginaries also shape relationships between humans and non-humans **(Action 5.2)** *(well established)* {5.7.2}. New social imaginaries, which are sets of widely accepted ideas that influence and structure how people envision the present and future, can shift core understandings of human-nature relationships and provide guidance for pathways to achieving them *(established but incomplete)* {2.4.2, 5.7.2}. An example of this is eco-social contracts, which propose societal agreements that serve all of life and reflect an understanding that humans are part of and fully interdependent with nature in all they have, do, consume, wear and inhabit {2.4.2}.

Changes in social norms are essential to new behaviours and practices that strengthen human-nature connectedness and accelerate transformative change **(Action 5.3)** *(well established)* {5.7.3}. Understanding the mechanisms behind the spread of new social norms and behaviours is crucial for designing effective strategies for transformative change **(Action 5.3)** {5.7.3}. Many behaviours are habitual and learned in certain social and environmental conditions, and they can be changed **(Action 3)** *(well established)* {4.2.4, 5.7.3}. The propagation of new ideas, social norms and behaviours often occurs through complex processes in social networks, starting slowly, until a critical mass of early adopters is reached. This process is influenced by similarities among interacting individuals, the alignment of new norms with existing values and the practicality of the behaviours being promoted **(Action 5.3)** {5.7.3}. Strategically enhancing the visibility of desired behaviours and deploying targeted policy measures catalyse and sustain new social norms and behaviours **(Action 5.3)** *(well established)* {5.7.3}. The spread of misinformation or disinformation among the public through social networks and social media is also influential and may pose challenges to transformative change, which involves decolonizing academia and making space for Indigenous and local knowledge *(well established)* {5.4.2, 5.7.3, 5.7.4}. Transitioning to new behaviours often entails significant costs, and supportive policies such as subsidies and infrastructure investments facilitate behavioural transitions *(well established)* {5.4.1, 5.4.2, 5.4.3, 5.8.2}.

B10 **Transformative learning promotes holistic and experiential understandings and engagement with biodiversity and sustainability challenges. It reshapes identities and fosters a sense of responsibility towards nature (Strategy 5, Action 5.4) *(established but incomplete)* {5.7.1, 5.7.4}.** Formal and informal education, including education based on Indigenous and local knowledge, plays an important role in supporting transformative change for a just and sustainable world *(established but incomplete)* {3.2.2, 3.5.2, 5.7.1, 5.7.4}. Collaboration across different educational approaches can help to foster transformative change **(Box SPM.6)** {3.2.2, 5.7.4}. For example, complementing scientific ways of producing knowledge with approaches based on Indigenous and local knowledge has the potential to shift views, structures and practices in ways that expand the potential for transformative change {3.2.4}.

Experiential nature-related activities and relational values and practices are essential for shifting perceptions and values towards biodiversity and crucial for promoting sustainable behavioural and structural changes **(Action 5.1)** *(established but incomplete)* {5.7.1}. Integrating education on biodiversity into formal, non-formal and informal educational programmes, developing teaching curricula on biodiversity conservation and sustainable use, and promoting knowledge, attitudes, values and behaviours that are consistent with living in harmony with nature can all support transformative change **(Actions 5.1, 5.4 and 5.5)** {5.7.1, 5.7.4, 5.7.5}. Education that includes materials on nature's contributions to people, including ecosystem services, nature-based solutions and ecosystem-based approaches, and Mother Earth-centric actions for conservation and restoration can help to develop capacities to address multiple intersecting challenges and crises **(Actions 5.1, 5.4 and 5.5)** {5.7.1, 5.7.4, 5.7.5}. Universities, colleges, trade schools and apprenticeships can, for example, offer training for future workforce in sustainability, regenerative agriculture, forestry, design and finance, and include training in empathy and compassion, nature appreciation, systems thinking and transdisciplinary learning **(Action 5.4)** {5.7.4}. Furthermore, developing knowledge, skills and attitudes relevant to transformative learning and adaptive learning among education providers at all levels provides a strong foundation for designing curricula and training programmes to support transformative change in education, outreach and awareness-raising initiatives **(Action 5.4)** {5.7.4}. Recognizing diverse knowledge systems, including Indigenous, local and scientific knowledge, supports transformative learning by helping people better understand and value the interdependencies



Birgejupmi Sápmi, Arctic	Living in a modest way with interactions between humans and non-humans based on care and respect.
Kawsak Sacha Kichwa, Ecuador	'The living forest,' a conscious living being who is the subject of rights and is inhabited by beings that protect ecosystems and animal and plant species.
Mino-mnaamodzawin Anishinaabek, USA	The value of respect for the spirit in all things.
Nanao ñu'u Mixtec, Mexico	To rediscover human-nature bonds and reconnect with values of equity, respect and care with nanao ñu'u (our mother).
Saffu Oromo, Ethiopia	A principle impelling people to respect and do justice to their ayyaana (spirit) and that of other beings.
Satoyama and Satoumi Japan	The harmonious interaction between humans and nature in rural landscapes and seascapes.
Suma Qamaña Aymara, Bolivia	Living well together with harmonious relationships of all forms of life in the totality of Mother Earth as a living being.
Sumak Kawsay Kichwa, South America	Broad values that guide human-human and human-nature interconnections based on valuing and appreciating the distinctiveness of others as well as spirituality or lifestyle.
Ubuntu Sub-Saharan, Africa	Values system that focuses on reciprocity, dialogue and collective humanity.
Whakapapa Aotearoa, New Zealand	A cultural connectedness that encompasses both ancestry and nature and determines relationships and obligations.

Figure SPM 8 **Examples of Indigenous and relational philosophies and ways of being.**

Many Indigenous philosophies are expressed through relational languages, concepts and practices based on an ethics of care that acknowledges the importance of respect and reciprocity between humans and nature {table 5.3}. Revitalization of and support for such cultures, languages and philosophies present opportunities to move from anthropocentric relations of domination towards ecocentric relations of care for all. The figure represents a small sample of concepts and practices that are aesthetically placed to illustrate the diversity of Indigenous and other relational philosophies.

Box SPM 6 Education as a catalyst for transformative change.

Educators and education programmes across all levels play an important role in fostering shifts in views, structures and practices. The *GemüseAckerdemie* ("Vegetable Academy") is an educational programme for children from 8 to 12 years old (grades 3 to 6) that focuses on creating school gardens and promoting cooking skills and dietary changes in Austria, Germany and Switzerland.[a] In Germany, more than 115,000 children have completed the programme. Pupils experience first-hand how food is produced and where it comes from; together they take responsibility for their school gardens and gain a better understanding of the impacts of their actions on the environment. The programme helps to increase connections to nature, shifts social norms and conveys knowledge about sustainable food and culinary and gardening skills among children, parents and cooks in schools. Similar initiatives related to supporting more sustainable, regenerative food systems exist at all educational levels and in professional training.

a. IPBES Transformative Change Assessment data management report on the case study database with transformative potential and pitfalls (https://doi.org/10.5281/zenodo.10260233).

of humans and nature in complex and dynamic webs of life **(Actions 5.4 and 5.5)** *(established but incomplete)* {5.7.1, 5.7.4, 5.7.5}.

B11 Embracing Indigenous and local knowledge and processes of knowledge co-creation fosters transformative change for a just and sustainable world (Strategy 5, Action 5.5) *(established but incomplete)* {2.3.4, 3.2.4, 3.5.1, 5.7.5}. Recognizing different ways of knowing, linking knowledge to action and finding ways to transcend the limits of imagination are crucial for transformative change *(established but incomplete)* {2.2.1, 2.2.2, 2.2.3, 2.4.2, Box 2.1, 3.5.1, 3.5.5, 5.7.5}. Doing so involves decolonizing academia and making space for Indigenous and local knowledge, as well as social sciences, arts and humanities, and public engagement. Indigenous Peoples and local communities provide many visions of transformative change related to their diverse histories and socioecological, cultural and spiritual contexts *(well established)* {2.3.4}. Acknowledging and embracing such knowledge is consistent with a move from relations of domination to relations of care {5.7.1, 5.12, 5.13, Figure 5.12}. An ethics of care recognizes the agency and sentience of non-human entities, such as plants, animals and rivers, affording them value, respect and reciprocal relations of care {5.7.1, 5.7.2, Figure 5.13}.

Knowledge co-creation enhances biodiversity management and nature's contributions to people by combining different knowledge systems, including Indigenous and local knowledge and scientific knowledge, ensuring that strategies are culturally appropriate, scientifically robust and ecologically viable *(established but incomplete)* {3.2.5, 5.7.5}. Co-creation principles such as equity, respect, recognition and collaboration emphasize inclusivity and prioritize the needs of marginalized groups, facilitating transformative interventions *(well established)* {5.7.5}. A review of empirical studies shows that knowledge co-creation improves processes (e.g., power redistribution and reflexivity) and is associated with both short-term outcomes (e.g., an expanded knowledge base, increased capacities) and long-term outcomes (e.g., well-being and product improvement, changes in knowledge systems) *(established but incomplete)* {5.5, 5.7.5}. Examples include increased adaptive capacity in Arctic communities, disaster preparedness in communities in Nepal and the establishment of adaptive management of climate change monitoring in a rural community in the United Republic of Tanzania *(well established)* {5.7.5}.

The marginalization of Indigenous and local knowledge hinders transformative change *(well established)* {2.3.4, 4.2.1, 4.2.5}. Several specific policy instruments based on the principles of consent, intellectual and cultural autonomy and justice exist, or have been proposed, with a view to supporting and providing accountability {5.7.5}. These instruments mostly focus on knowledge co-creation with Indigenous Peoples and local communities and include free, prior and informed consent, recognition of customary law, intellectual property rights, Indigenous data governance, sovereignty and capacity-building for the use of technology *(well established)* {5.7.5}. While these instruments cannot address all barriers, their absence makes knowledge co-creation unlikely if not impossible. The expansion of their use and their full implementation have powerful transformative potential *(established but incomplete)* {5.7.5}.

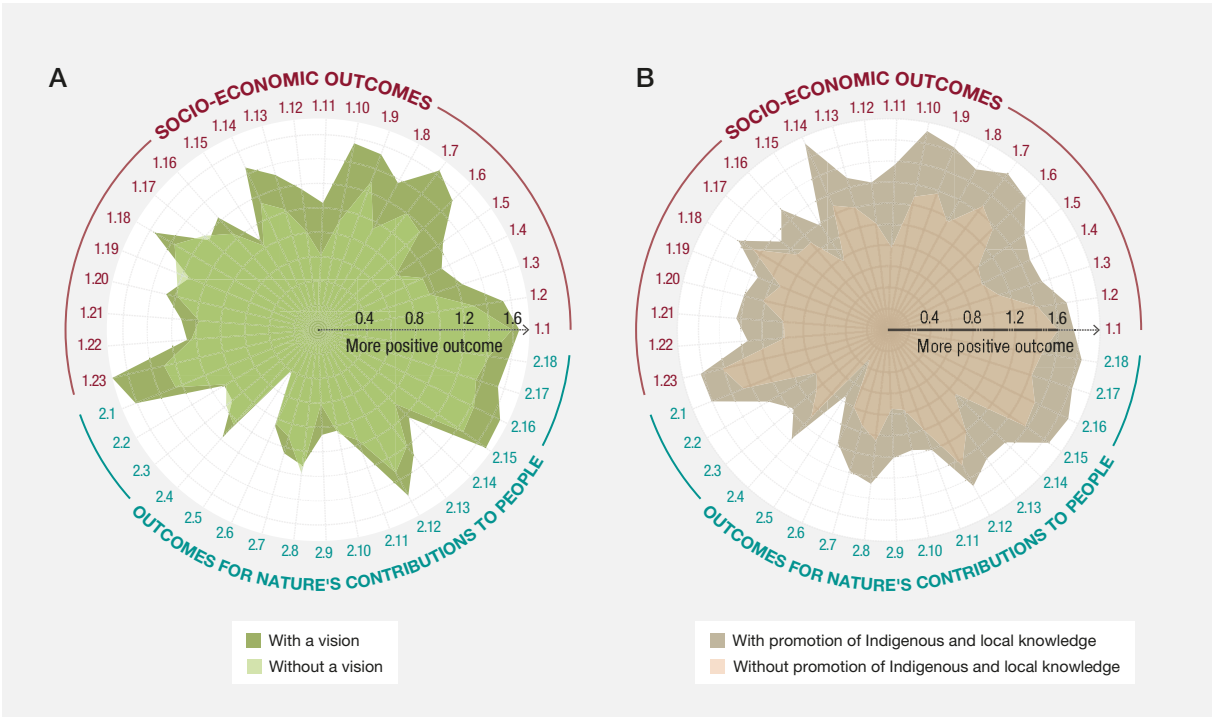
B12 Context-specific, timely and dynamic communication can convey powerful messages to trigger actions for transformative change *(well established)* {2.2.1, 3.4, 5.3.3, 5.4.2, 5.7.2}. Well-designed messages inform diverse stakeholders about the meaning, intention and actions associated with aspirational and impactful visions. An assessment of the literature shows that media plays an important role in communications, but that many other actors, including youth, civil society organizations, Indigenous Peoples and local communities, social media activists, political leaders and artists are also important in communicating messages about transformative change *(well established)* {2.2.2, 2.2.3, 2.2.4, 5.6.2}.

An assessment of frequency of occurrence in the assessment corpus indicates that actors in the media and communication sectors are not prominently featured in the literature, appearing in about 4 per cent of the assessed contributions. This highlights a significant gap in understanding how media can raise awareness regarding transformative change among the broader population *(established but incomplete)* {5.2, Figure 5.4}. In addition, visions collected from social media that capture instrumental values (related to the mining, shipping, tourism and fashion industries) were found to be more likely to operationalize sustainability discourses for marketing purposes, implying higher greenwashing potential *(established but incomplete)* {2.3.2}.

Journalists, creators and influencers on social media can promote narratives that help to shift values, paradigms and goals in support of transformative change based on ethics of care *(established but incomplete)* {2.3.2}. Social media can help people organize and resist biodiversity-damaging dominant views, structures and practices to advance alternatives that embody ethics of care {5.7.2}. However, communications technology has also been able to speed up the pace of pervasive and massive exposure of citizens to disinformation that can threaten biodiversity and nature {5.4.2}. To counter this, education and transformative learning play critical roles in supporting transformative change *(established but incomplete)* {5.7.4}.

C. Enabling transformative change: roles for all

C1 Visions of a sustainable world for nature and people are shaped by values and world views {2.1}. They are of fundamental importance for inspiring transformative change (Figure SPM.9). The diversity of societies, economies, cultures and peoples in the world means that no single vision is appropriate across contexts and scales and that shared transformative visions for a just and sustainable world are more likely to inspire change *(well established)* {2.3, 3.5.3}. An assessment and analysis of 881 visions reveals five core themes: (a) regenerative and circular economies; (b) community rights and empowerment; (c) biodiversity and ecosystem health; (d) spiritual reconnection (between humans and nature) for behavioural change; and (e) innovative business and technology *(established but incomplete)* {Figure 2.4, 2.3.1}. These thematic visions can also be clustered into four cross-cutting categories: (a) integrated or holistic visions that simultaneously address both ecological and social issues; (b) predominantly ecological visions oriented towards better human-nature relationships; (c) predominantly social visions oriented towards greater equity and other social dimensions;



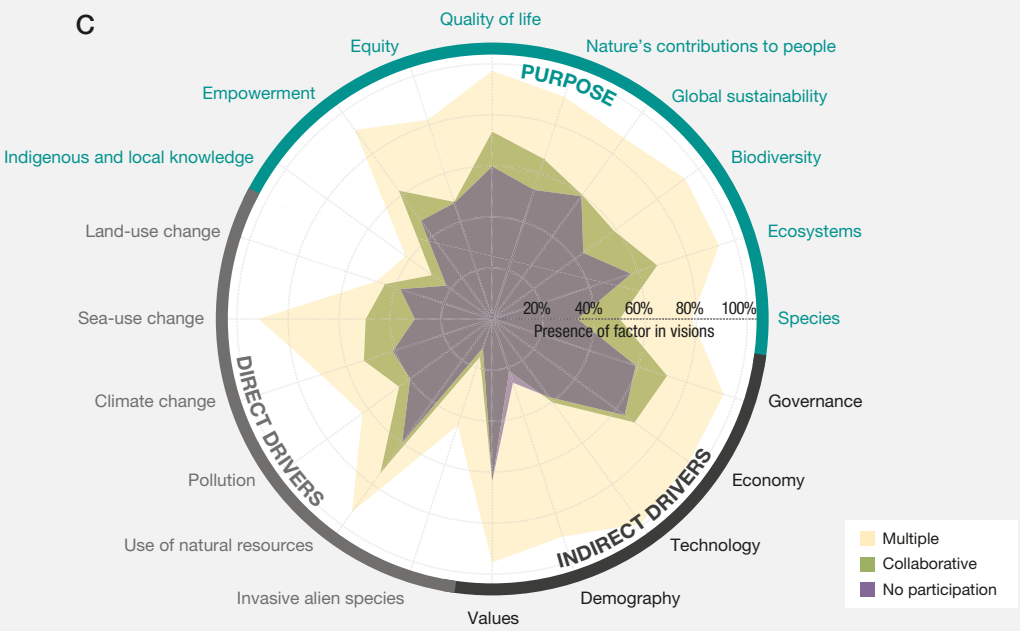


Figure SPM 9 **Realizing transformative changes through visions.**

(A) Transformative cases with explicit or implicit visions behind them are associated with more positive socioeconomic outcomes and environmental outcomes for nature's contributions to people. **(B)** Transformative cases in which Indigenous and local knowledge is promoted are associated with more positive socioeconomic outcomes and outcomes for nature's contributions to people. **(C)** Visions with higher levels of participation address a more comprehensive set of purposes and consider more comprehensive sets of direct and indirect drivers. A direct driver is a factor that unequivocally influences ecosystem processes and can be identified and measured with varying degrees of accuracy, whereas an indirect driver primarily serves as a catalyst, influencing or triggering changes that guide the system towards a desired future. Multiple: different stakeholders involved in the visioning process; Collaborative: two-way dialogue to seek input from different individuals in the visioning process. Data for panels A and B were taken from the Transformative Change Assessment case study database {1.4.2, 3.4}. Values denote the following: 0 = neutral; 1 = slightly positive, 2 = largely positive. The values on the radar plots represent the average across cases. Socioeconomic outcomes include: 1.1, good quality of life; 1.2, food security and sovereignty; 1.3, water security; 1.4, gender equity; 1.5, reduction of racial, religious, cultural and linguistic discrimination; 1.6, social cohesion and trust; 1.7, institutional strength, revival and social participation; 1.8, power equity; 1.9, recognition of rights and values; 1.10, inclusion of Indigenous Peoples and local communities; 1.11, freedom to exercise rituals/spirituality; 1.12, access to recreation and leisure; 1.13, enjoyment of natural beauty; 1.14, promotion of rights-based approaches; 1.15, housing and shelter; 1.16, access to land/sea; 1.17, access to basic services and infrastructure; 1.18, access to knowledge and education; 1.19, access to health; 1.20, employment and job quality; 1.21, reduction of inequality/fair wealth distribution; 1.22, poverty reduction and 1.23, conservation of the productive capacity/resilience of the ecosystem. Outcomes for nature's contributions to people include: 2.1, habitat creation and maintenance; 2.2, pollination and dispersal of seeds; 2.3, regulation of air quality; 2.4, regulation of climate; 2.5, regulation of ocean acidification; 2.6, regulation of freshwater quantity; 2.7, regulation of freshwater quality; 2.8, formulation and protection of soils; 2.9, regulation of hazards and extreme events; 2.10, regulation of detrimental organisms; 2.11, energy; 2.12, food and feed; 2.13, materials and assistance; 2.14, medicinal and genetic resources; 2.15, learning and inspiration; 2.16, experiences; 2.17, supporting identities; and 2.18, maintenance of options. Data for panel C were taken from the vision database, in which 0 indicates the absence and 1 indicates the presence of purposes and drivers. The values on the radar plot represent the average across visions {2.3.2}.

and (d) visions with a relatively narrow social or ecological focus *(established but incomplete)* {Figure 2.3, 2.3.1}. Various visions illuminate the interdependency of humans and nature in advancing towards a flourishing future and transformations towards a just and sustainable world *(established but incomplete)* {2.3.5}.

C2 Values play an important role in supporting visions of transformative change. Of the three types of nature-related values recognized by IPBES, which include intrinsic (nature for nature), relational (nature as culture/one with nature) and instrumental (nature for society), relational values are considered essential for humans to live in harmony with and as part of nature and Mother Earth as recognized in the IPBES Nature Futures Framework *(well established)* {1.3.2, 2.3.3, 3.5.3, 5.7.1, 5.7.5}. Just as there are many ways of "living in harmony with nature", there are also multiple

pathways towards transformative change for a just and sustainable world, as elaborated in the IPBES Values Assessment[18] and the Nature Futures Framework[19] *(well established)* {1.3.2, 2.3.2, 5.8}. The most transformative visions for change recognize and prioritize combinations of relational, intrinsic and instrumental values *(established but incomplete)* {2.3.2}. Instrumental values remain prominent in many visions of transformative change *(established but incomplete)* {2.3.2}. Relational values are fundamental to all four identified principles of transformative change and, in particular, to the principle of respectful and reciprocal human-nature relationships {1.3.2}. The recognition of relational values and responsibilities acknowledges human-nature connectedness and the extensive damage done by relationships based on objectification and exploitation and is emphasized as a necessary normative principle for transformative change *(well established)* {1.2.2, 1.3.2, 5.7.1}. There has been an evolution of values over time from largely instrumental and intrinsic ones to greater inclusion of relational values, as suggested by an analysis of key texts related to the Sustainable Development Goals, the Convention on Biological Diversity and the Kunming-Montreal Global Biodiversity Framework *(well established)* {2.3.2}. The Kunming-Montreal Global Biodiversity Framework recognizes all three types of values, demonstrating the possibility of reconciling three different sets of nature values for transformative change *(well established)* {2.3.2}. There is room for deliberate improvement of the transformative potential of visions {2.3.2}. The importance of comprehensiveness of visions for transformative change and support for consequential decision makers suggest options for advancing existing and newly developed visions towards greater transformative capacity *(established but incomplete)* {2.3.2}. Such improvements occur through greater emphasis on the role of power dynamics to improve achievability, broadening the scope of visions by dealing with more aspects that enable change, and emphasizing implementation pathways to bring aspirations closer to reality {Figure 2.5-A}.

C3 **Deliberate transformative change is founded on visions grounded in sustainability-aligned values that are equitable, inclusive, respectful and adaptive and have impacts beyond any single scale *(well established)* {1.3.2, 2.3.3}.** Inclusive and innovative visions for sustainable and equitable futures support the well-being of nature and people. Global visions need fundamental changes in mindsets and current paradigms about human-nature relationships and recognition of alternative world views and knowledge systems. They are foundational to transformative change for a just and sustainable world. Participatory visioning processes, when they guide transformative change, provide hope and inspiration *(established but incomplete)* {2.3.1}. Evidence from an analysis of visions and ongoing initiatives for transformative change shows that visions are more transformative when they incorporate shifts related to views, structures and practices, are equitable and inclusive and address underlying causes and direct drivers of biodiversity loss *(established but incomplete)* {2.3.2}. More participatory visions have more holistic purposes (both for nature and people), and they take into consideration a greater variety of direct and indirect drivers. Visions for living in harmony with nature are more likely to succeed when they emerge from inclusive, rights-based approaches and stakeholder processes and when they incorporate cross-sectoral collaboration for change *(established but incomplete)* {2.3.1, 5.6.4, 5.6.1, 5.6.2}. These initiatives also show that transformative changes that are guided by explicit visions have more positive outcomes in the ecological, economic and social dimensions of nature's contributions to people **(Figure SPM.9)** *(well established)* {2.3.1}.

An analysis of initiatives with transformative potential shows that visions in which Indigenous Peoples and local communities played a meaningful role had a greater likelihood of advancing transformative change compared with visions in which they did not have a role **(Figure SPM.9)** *(well established)*. Many Indigenous Peoples and local communities have long-standing, powerful and holistic visions for living in harmony with nature and can support new ways of thinking and understanding in other knowledge systems *(well established)* {1.3.2, 2.3.4, 3.2, 5.7}. Their ways of life have often proved to be sustainable for biodiversity over time, yet their world views, values and knowledge systems are marginalized in conservation science, policy and practice *(well established)* {1.3.2, 2.3.4, 3.2}. Respectful, reciprocal and responsible relations between humans and nature can be embedded in policies that shift patterns and relationships among views, structures and practices, independent of scale *(well established)* {2.3.2, 2.3.4, 2.4.2}.

C4 **New ways of imagining the future are critical to shift people's relationships with nature. One way to achieve such changes is through stronger imaginative efforts across different partners and stakeholder groups, including Indigenous Peoples' and local communities' world views, values and knowledge to envision positive futures for a just and sustainable world *(established but incomplete)* {2.2.1, 2.2.3, 2.4.2}.** Visions of a better future for humans and for nature are abundant, yet most do not change the status quo *(well*

18. IPBES (2022): *Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* Balvanera, P., Pascual, U., Christie, M., Baptiste, B., and González-Jiménez, D. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.6522522.

19. IPBES (2023). The Nature Futures Framework, a flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth, and its methodological guidance, version July 2023, IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.8171339.

established) {2.3.2}. Constrained engagement with imaginative ways of envisioning the future has limited the possibilities for transformative changes that move beyond the constraints of dominant narratives and harmful practices. Achieving stronger imaginative efforts demands more comprehensive, creative and inclusive visioning processes that include silent voices and non-human perspectives **(Box SPM.7)**. Co-creative or collaborative visioning captivates people's imaginations, instils hope and inspiration and supports transformative change {Figure 2.7}, providing guidance on what changes are needed and how to make them. Participatory methods of visioning can foster deliberative discussions and help bridge different values and cultures, as well as historical and cultural contexts {2.2.3}. This calls for stronger imaginative efforts, including greater attention to the visions of Indigenous Peoples, local communities and underrepresented groups. Imagination is a vital ingredient in creating a vision because it allows people to move outside the patterns of existing behaviours that reinforce systemic problems. Examples of such visions include new eco-social or natural social contracts, which can shift core understandings of human-nature relationships and provide guidance for pathways to achieving them *(established but incomplete)* {2.4.2}. Such visions emphasize greater equity and well-being for all and the use of regenerative practices that preserve biodiversity and nature {2.3.1, 2.3.2}.

C5 Diverse actors and actor groups play important roles in transformative change based on their capacities, goals and contexts. Different roles of actors include innovating and creating change, adopting and following change, raising awareness, unlocking changes for others and/or influencing powerful actors to create change *(well established)*. The diversity in their capacities and interests means that there is substantial potential for more collaboration among actor groups and for the development of new coalitions *(well established)* {1.4.1, 3.3, 3.5.5, 5.2, 5.4.4}. Many different actor groups contribute to advancing and accelerating transformative change *(well established)* {1.4.2, 5.4.4}. Transformative actions of decision makers in civil society, government, the private sector and other domains are related to the five strategies of transformative change identified in the assessment **(Figure SPM.6)** *(well established)* {5.2}. Coalitions of actor groups **(Figure SPM.10)** {Figure 5.4, Figure 5.5}, including individual citizens, Indigenous Peoples and local communities, civil society organizations, non-governmental organizations, trade unions, funders, faith-based organizations, governments at multiple levels, the private sector, financial institutions and the scientific community, are more effective in pursuing transformative change *(well established)* {1.4.2, 1.5, 5.2, 3.4, Figure 3.3}. As citizens, people often hold multiple overlapping aspects of their identities across their professional and personal lives and mobilize action around these identities. For example, women, youth and Indigenous Peoples and local communities have instigated change by speaking and acting on the basis of these specific identities *(well established)* {1.4.2, 1.5}. Within these identities, people employ different mechanisms and actions to innovate and create change, adopt or follow change, raise awareness, unlock broader change for others and influence powerful actors to create change *(established but incomplete)* {1.4.2}.

C6 The underlying causes of biodiversity loss and nature's decline also create inequalities and injustices. Those who have benefited most from economic activities associated with biodiversity loss and nature's decline have greater capacity to act. Upholding the principle of equity and justice depends on mobilizing these capacities. Doing so while involving others in balanced decision-making processes can unleash agency as well as resources to effect change *(established but incomplete)* {1.4, 1.2}. Some people have more opportunities and resources to achieve change, as a result of having greater wealth and power *(well established)* {1.2.2, 1.3.2, 1.4.2}. In particular, wealthy actors have benefited more from processes of

Box SPM 7 **Cultural approaches to transformative change: the role of theatre.**

Cultural initiatives such as music, storytelling, documentaries, film and theatre support transformative learning by fostering imagination and emotional engagement with ecological issues {2.2.4, 5.7.2}. For example, Empatheatre is an award-winning, research-based theatre company that emerged from a sense of solidarity among artists, writers, theatre makers, academic researchers and sensitive citizens and has been responsible for the implementation of several pioneering projects in South Africa over the past decade. Empatheatre has developed innovative new ways of building transformative spaces for equitable public dialogue to explore different ways of being, thinking and doing. This includes dialogues about complex social challenges, ranging from rural communities under pressure from coal mining companies, stories of vulnerability of female migration, and homelessness and inequalities in urban land justice, to supporting sustainable governance of the oceans. This initiative represents a new form of participatory justice and is expanding into both international policy dialogues and grass-roots engagement (see the Transformative Change Assessment case study database).

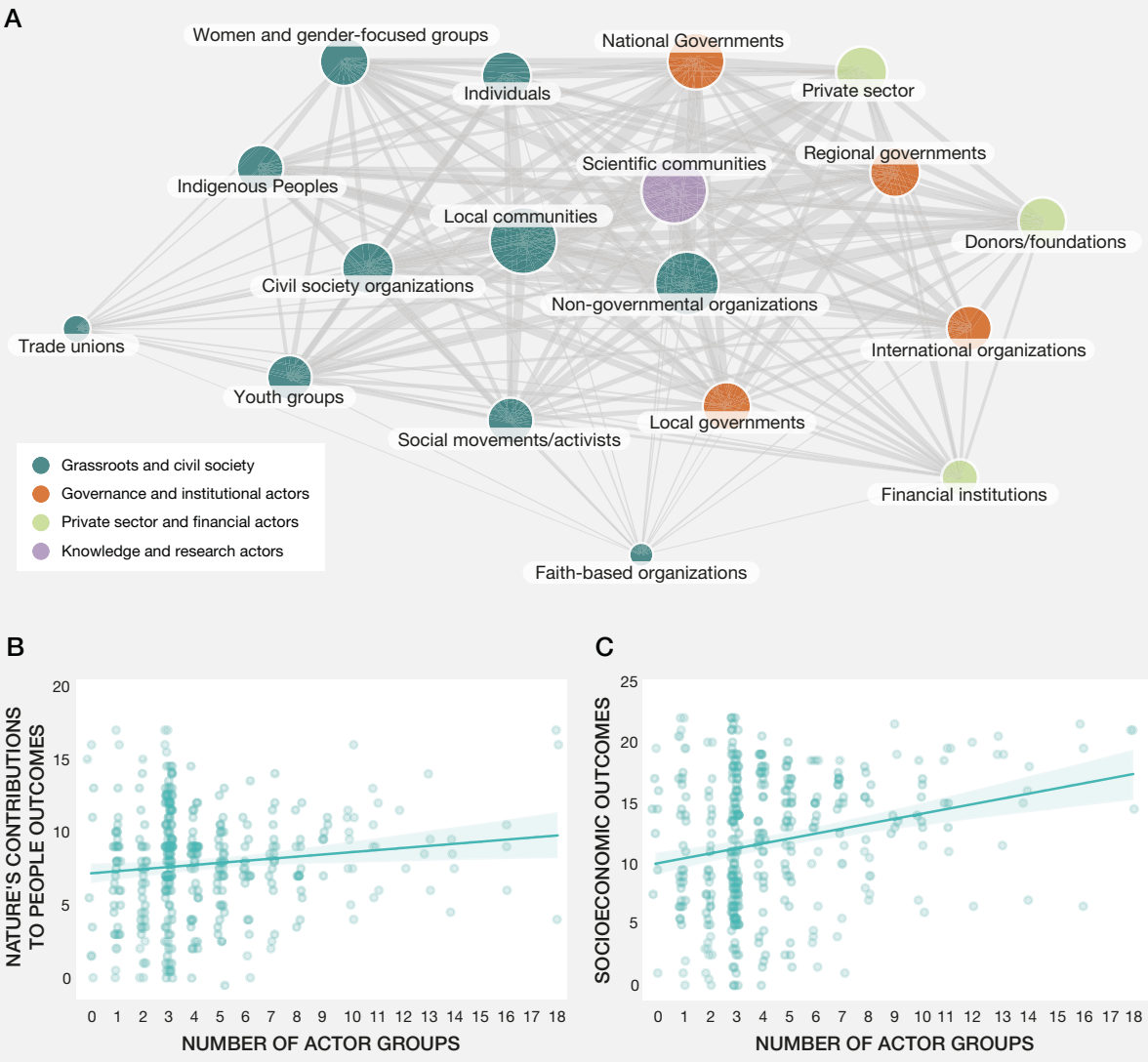


Figure SPM 10 **Different actor groups collaborate closely with one another, and initiatives involving greater collaboration among actor groups achieve more positive outcomes.**

Echoing examples demonstrating that all actor groups can collaborate in various combinations, a network analysis (see the data management report for the chapter 3 case study database for details) of initiatives with transformative potential in the Transformative Change Assessment case study database reveals that four groups of actors interact closely to pursue transformative change **(A)**. The thickness of the lines represents the number of initiatives that two actor groups share, while the size of the circles corresponds to the number of initiatives in which each actor group is involved. Panels **(B)** and **(C)** show that when more actor groups collaborate, the initiatives achieve more positive outcomes for nature's contributions to people and socioeconomic outcomes ($p < 0.01$). These outcomes are a composite index of a diverse set of indicators (see **Figure SPM.4** for the complete list of indicators).

dominating nature and serving their own material gains, often with negative effects on nature and exacerbating the marginalization of other people *(well established)* {1.2.2, 5.5.3}. Government decision makers, business leaders and individuals with high levels of wealth occupy positions of power with the potential to incentivize cascading transformative changes across different problems, sectors and levels *(established but incomplete)* {1.4.2}. These roles imply that positions of power come with additional capacities for engaging in and enabling transformative change *(established but incomplete)* {1.2.2, 1.4.2}. Upholding the principle of equity and justice depends on mobilizing the capacities of those who have thus far benefited most from biodiversity loss and nature's decline

(established but incomplete) {1.4.2}. Governments can take actions to overcome power asymmetries in decision-making by adjusting legal responsibilities, reorganizing the roles of actors in decision-making structures and ensuring transparency, while reallocating resources and strengthening the role of key environmental agencies *(well established)* {5.6.1}. The example of the Common Agricultural Policy of the European Union illustrates that agri-environmental measures can be an effective tool for strengthening biodiversity in agricultural landscapes, but that this potential is hampered by an underrepresentation of environmental advocates in decision-making and overshadowed by a dominance of vested interest groups and constant policy redesign that undermine evaluation and learning processes **(Box SPM.5)** *(established but incomplete)* {5.6.1}.

C7 Coalitions of actors and actor groups are more effective for transformative change than when actors pursue change individually. Such coalitions for change run the risk of co-optation by higher-level or more powerful actor groups *(well established)* {3.4}. Past experiences and ongoing examples provide crucial insights into how agents work together for transformative change in various contexts **(Figures SPM.9 and SPM.10)**. For example, in many parts of the world, community-based agroecological initiatives exemplify the principles of equity and justice *(established but incomplete)* {5.6}. These projects involve local communities in decision-making processes, respecting their traditional knowledge and fostering a sense of ownership of agricultural practices. Community-supported agriculture models in which consumers directly support local farmers exemplify how agroecology can create relational values and responsibilities between producers and consumers **(Box SPM.8)** {5.8.2}. It has been shown that countries where there is greater crop diversity also support more agricultural employment {5.3.4}. Specific groups can facilitate change with their power of steering networks and influencing powerful actors to create change *(established but incomplete)* {5.4.4, 1.4.2}.

The multiple databases assembled for the assessment consistently show that specific actors and actor groups work together more frequently with each other, but not with others {3.4, 5.2}. Network analysis of the case study database shows that governments (local, regional and national), international organizations, the scientific community and the private sector are inclined to collaborate more closely with each other; such arrangements are referred to in the assessment as "top-down" initiatives **(Figure SPM.10)** {3.4, Figure 5.5}. On the other hand, another set of examples with transformative potential arises from citizen-led initiatives, in which local communities connect various positive initiatives involving individual citizens, civil society organizations, women and gender-focused groups, youth, social movements, trade unions and faith-based organizations **(Figure SPM.10)** {3.4}. Such initiatives are critical to countering threats and power imbalances in environmental governance and contribute to more just and sustainable futures {5.4.4}. Bringing together a diversity of actors is therefore critical for developing options and metrics for transformative change. This evidence shows that everyone can play an important role in creating transformative change for a just and sustainable world.

C8 The pursuit of transformative change by Governments contributes to policy coherence when it is based on a whole-of-government and nexus approach.[20] Such an approach reinforces support for policies and plans across different sectors, minimizes the likelihood that policies will be at cross purposes across agencies and reduces unintended tensions *(established but incomplete)* {4.2, 5.1, 5.6.4}. Current governmental actions for transformative change are undermined by institutional misfits, such as those between the scale of biodiversity challenges and the jurisdiction of the institutions involved {4.2.3}. In this sense, the length of time it takes for a policy to demonstrate its effectiveness may be longer than the length of time between elections that may bring new political authorities to power who oppose that policy. Such misfits are exacerbated when there are conflicts between the interests of consumers, activities in extractive sectors and uncoordinated subsidies and regulations *(established but incomplete)* {4.2.3, 5.4.1, 5.6.1}. These complex interactions among actors can undermine policy autonomy, particularly when countries find themselves dependent on extractive industries or external financing with a vested interest in maintaining the status quo {4.2}. Effective implementation is therefore dependent on the ability of Governments to position and prioritize biodiversity-related values in relevant decision-making and policies across sectors and scales, and within a legal framework that holds governmental and non-governmental actors accountable *(established but incomplete)* {5.4, 5.4.2, 5.6.1}.

Governments at all levels are key actors in engaging various State and non-State actors and can facilitate collaborative approaches and new societal contracts to strengthen engagement, ownership and accountability in line with the principles of transformative change {5.4}. The global reach

20. IPBES (2024). *Summary for Policymakers of the Thematic Assessment Report on the Interlinkages among Biodiversity, Water, Food and Health of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* McElwee, P. D., Harrison, P. A., van Huysen, T. L., Alonso Roldán, V., Barrios, E., Dasgupta, P., DeClerck, F., Harmáčková, Z. V., Hayman, D. T. S., Herrero, M., Kumar, R., Ley, D., Mangalagiu, D., McFarlane, R. A., Paukert, C., Pengue, W. A., Prist, P. R., Ricketts, T. H., Rounsevell, M. D. A., Saito, O., Selomane, O., Seppelt, R., Singh, P. K., Sitas, N., Smith, P., Vause, J., Molua, E. L., Zambrana-Torrelio, C., and Obura, D. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.13850289.

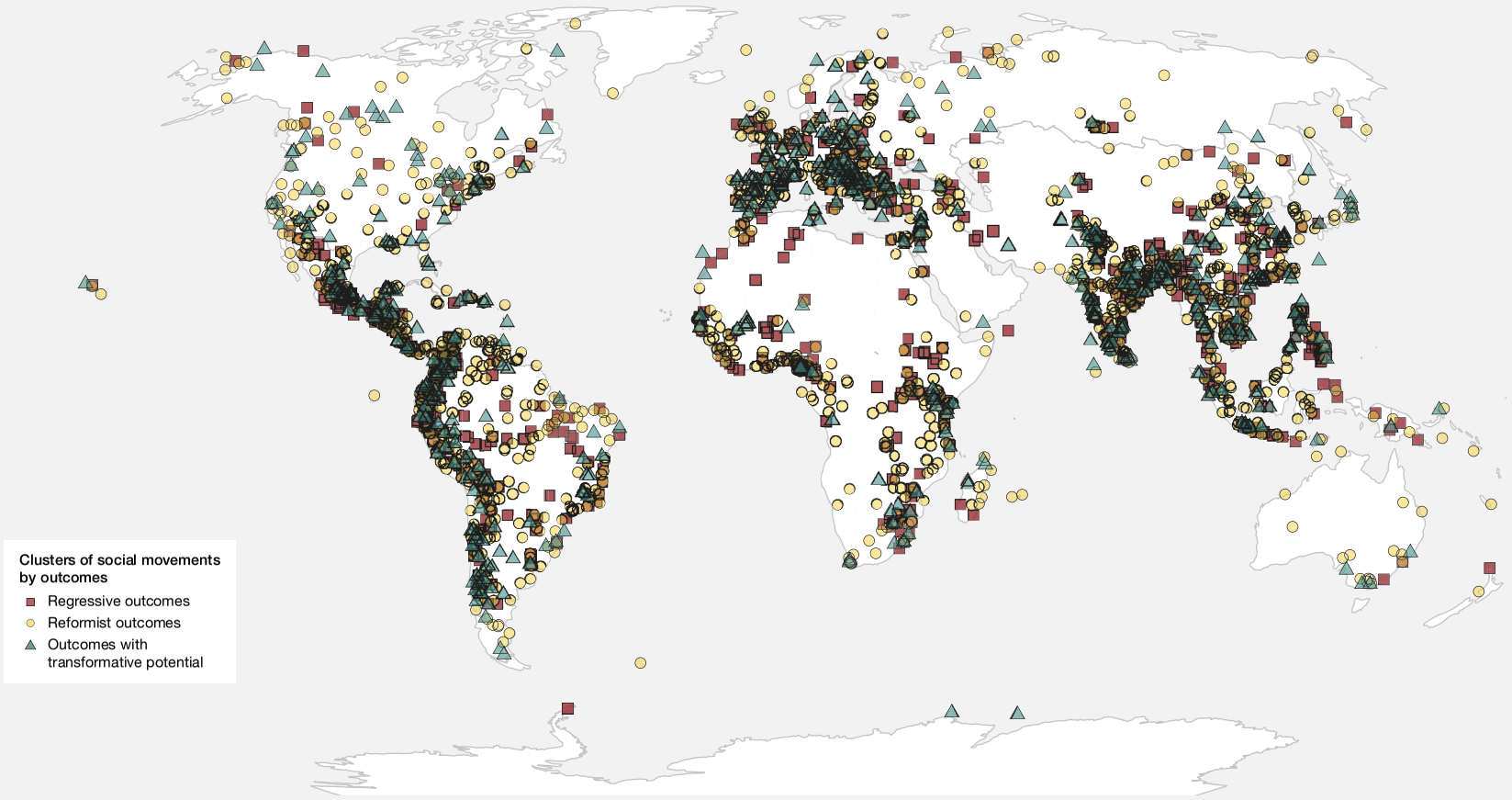


Figure SPM 11 **Map illustrating that social movements play a crucial role in challenging drivers of biodiversity loss and fostering transformative change.**

The map illustrates the critical role that social movements play in challenging direct drivers of biodiversity loss and fostering transformative change, including in areas of high priority for conservation. The geometric shapes show the location of social movements contesting threats to the Kunming-Montreal Global Biodiversity Framework targets (n=2,802). Squares represent social movements resulting in regressive outcomes (e.g., failed court decisions, criminalization and violence); circles represent social movements resulting in reformist outcomes (e.g., environmental improvements and technical solutions); triangles represent social movements resulting in outcomes with transformative potential (e.g., cancellation or withdrawal of the activity threatening nature).

of underlying causes (and indirect drivers) of biodiversity loss and nature's decline requires collaborative and coherent policy solutions within and beyond national jurisdictions *(established but incomplete)* {5.6.1, 5.6.2}. Institutional lock-ins can be overcome by engaging new actors in participatory approaches and revising procedural rules *(established but incomplete)* {5.6.1}. The effectiveness of adaptive learning processes is improved by engaging governmental actors across sectors, political parties and levels in order to ensure accountability beyond terms of office {5.6.4}.

C9 **Many existing policies that comprise financial, economic and regulatory instruments (e.g., regulations, taxes, fees and tradable permits) have substantial negative effects on nature-friendly practices. However, these instruments have the potential to become transformative. Some Governments have revised their regulatory instruments, as exemplified by subsidies that are based on environmental criteria *(established but incomplete)* {5.5.1, 5.5, 5.4.3}.** Governments heavily subsidize economic sectors that substantially contribute to biodiversity loss and nature's decline, such as the agriculture, livestock, fisheries, forestry and fossil fuel sectors *(well established)* {5.4.3, Figure 5.8}. The Organisation for Economic Co-operation and Development found that during the period 2020–2022, farmers received $630 billion per year in environmentally harmful subsidies. Since 2021, the total public funding for such subsidies has increased by 55 per cent *(well established)* {5.4.3}.

National Governments, international organizations (e.g., the World Trade Organization) and internationally adopted instruments (e.g., the Kunming-Montreal Global Biodiversity Framework, the Paris Agreement and the 2030 Agenda) are aimed at or contribute to subsidies reform, but progress has been limited. Moreover, an analysis of whether subsidies are presented as positive, neutral or negative for nature and biodiversity shows an increasingly stable trend towards presenting subsidies as positive in the literature *(established but incomplete)* {5.4.1}. Nonetheless, several countries have endeavoured to reform subsidies to benefit nature and people. Examples of such reforms include the fisheries subsidy reform in New Zealand, which includes strict sustainability criteria as a condition for access, the reallocation of funds to climate-smart agriculture and biodiversity conservation in Zambia, or the Lafkenche Act in Chile, under which resources were reallocated to Indigenous communities to promote their involvement in coastal management {5.4.3}. Subsidy reforms are politically challenging, but they are more feasible and effective when they include an emphasis on redistributive policies to address the needs of those left vulnerable due to reforms, greater policy coherence across sectors, coordinated action that extends beyond specific locations, and contextualization and monitoring of multiple impacts for adaptation *(established but incomplete)* {5.4.6, 5.4.8}. These key elements of meaningful reforms have substantial potential to yield positive outcomes *(established but incomplete)* {5.4.6, 5.4.8}.

C10 **Civil society plays an important role in bringing about transformative change, and it is more effective in an enabling environment. It does so by mobilizing citizens, creating initiatives that propagate and holding governments and the private sector accountable for harmful environmental practices. Supporting and amplifying civil society initiatives for a just and sustainable world, and protecting environmental defenders from violence and rights violations, support transformative change (Action 2.4) *(well established)* {5.4.4}.** Education, including citizenship education, plays a critical role in fostering active engagement in sustainability practices *(well established)* {5.7.4}. By fuelling public debate and scrutinizing companies' impacts on biodiversity, citizens have contributed to creating voluntary market standards for sustainable production and trade and promoting market adoption of these standards *(well established)* {5.4.4}. Civil society organizations have also experimented with social innovations that can help to curb nature's decline *(well established)* {5.4.4}. A systematic review of 100 empirical case studies of rural social innovations across Europe during the period 1970–2024 illustrates the variety of social innovation and deliberate change in the agrifood, tourism and forestry sectors *(well established)* {5.4.4}.

An analysis of 2,802 environmental social mobilizations during the period 1992–2022 provides evidence of a total of 46,955 incidents that undermined 13 of the 23 Kunming-Montreal Global Biodiversity Framework targets. Approximately 40 per cent of social mobilizations (1,083) occurred in areas that fell within the top 30 per cent of priority regions for species conservation *(well established)* {5.4.4}. Social movements identified threats of biodiversity loss, soil contamination, climate change impacts, landscape degradation, deforestation, surface and groundwater degradation and waste overflow. Many mobilizations (54 per cent) led to reformist outcomes (e.g., technical solutions, application of existing regulations and compensation) and about one fourth (27 per cent) ended in regressive outcomes, including not only the failure of court proceedings, but also repression and violence against environmental defenders. Nineteen per cent of social mobilizations had outcomes with transformative potential, resulting in the withdrawal, cancellation or temporal suspension of the activity triggering the social mobilization **(Figure SPM.11)** *(well established)*. Despite their critical importance, actions led by environmental movements and civil society organizations have received limited scholarly attention **(Figure SPM.10)**. Inclusive

governance processes and the recognition of individual rights can reduce the vulnerability of socio-environmental initiatives and enable actors to contribute to transformative change as collaborative participants, rather than as opposing forces *(established but incomplete)* {5.4.4, 5.6.2}. Governmental efforts to create corporate due diligence policies and trade agreements that incorporate support for the United Nations Declaration on the Rights of Indigenous Peoples and human rights law, and divestment campaigns targeting corporations involved in rights violations, have the potential to amplify the impact of civil society initiatives for transformative change towards a just and sustainable world *(well established)* {5.4.4}.

C11 Pathways to transformative change involve diverse actor working collectively to implement integrated and purposive actions associated with strategies to achieve desired visions (Figure SPM.12). Many context-specific initiatives have promoted, accelerated and scaled transformative change for a just and sustainable world where humans and nature thrive together *(established but incomplete)* {2.2, 3.1,

Figure SPM 12 **Synergies among principles, visions, approaches and strategies address barriers and challenges and guide actions and initiatives along pathways to transformative change for a just and sustainable world.**

Transformative strategies and actions can be identified and implemented to achieve global objectives, such as the 23 targets of the Kunming-Montreal Global Biodiversity Framework {Table 5.8.1}. For example, in the case of target 14 (Integrate biodiversity in decision making at every level), the key implementation challenge is inadequate policies and unfit institutions {4.2.3}. Identified actions include strengthening biodiversity in integrated governance and strengthening learning through informed, accountable and adaptive governance {5.8, Table 5.4}. Desired outcomes are facilitated through the development of transformative capacities, which refer to the knowledge, skills, attitudes and resources necessary to realize transformative change {1.4, 1.2}. Realizing the potential for transformative change for a just and sustainable world involves a whole-of-society and whole-of-government approach with roles for everyone. The Transformative Change Assessment demonstrates that principles, visions, approaches and strategies can work synergistically to overcome barriers and challenges to transformative change. It concludes that transformative change is difficult, complex and challenging, but also urgent, necessary and possible.

3.5.5, 5.8}. Transformative change is rarely the outcome of a single event, driver or actor. It is better understood as a pathway or process of change involving collective agency and multiple cascading changes that trigger and reinforce one another, often in unexpected ways *(well established)* {3.2, 3.5}. Transformative pathways emerge and unfold through continuous and sequential actions in any given context that align with visions, strategies and principles of transformative change. Enabling conditions facilitate transformative pathways informed by diverse values and knowledge systems to achieve future visions *(well established)* {2.3.2, 3.2, 5.8.2}. Customized bundles of economic, governance and legal options can be combined to achieve different desirable futures for humans and nature, based on different value framings; however, these are not mutually exclusive and can be operationalized in various combinations depending on different needs *(established but incomplete)* {3.2.2, 3.2.4, 3.5.1}. Complex interdependencies, path dependencies, lock-ins and barriers, together with changing contextual factors, demonstrate the importance of iterative and reflexive approaches to planning, implementing, monitoring, evaluating and reviewing transformative change initiatives (see **Box SPM.9** for knowledge gaps) *(well established)* {1.3.2, 5.6.3, 5.6.4}.

Box SPM 8 Agroecological transitions as examples of transformative change.

Agroecological transitions offer a potent example of transformative change in food systems, redirecting unsustainable agricultural practices towards biodiverse and equitable solutions {5.8.2}. In recognition of the pivotal role of small-scale farmers, these transitions address food security, poverty, biodiversity restoration, climate change adaptation and disaster risk reduction. Aligned with transformative change principles {1.3.2}, agroecology emphasizes equity, pluralism and relational responsibilities. It champions sustainable agrifood systems, challenging dominant discourses on industrial agriculture while promoting distributive justice and biodiversity restoration. Agroecology embodies holistic values encompassing ecological diversity, synergies, resilience and social values such as equity and dignity {2.4}. Knowledge co-creation and empowerment, which are central to agroecology, enable grass-roots movements to drive change {3.2.5, 5.7.5}. Agroecology proposes actionable knowledge to restore soils and make agriculture more sustainable and resilient across all countries, as demonstrated by the 30 per cent of farms (mainly small-scale) around the world that have adopted some agroecological practices or redesigned their production systems {5.8.2}.

Barriers to scaling up agroecology include entrenched narratives favouring industrial agriculture and asymmetries in research funding {4.2.5}. Investments in agricultural innovation favour technologies and approaches that dissociate agriculture from nature and make it dependent on non-renewable resources and technologies provided by a few multinationals. Such asymmetries in the investment of public and private funds in research and development contribute to sustaining a productivity gap of an estimated 20 per cent between industrial and alternative farming systems {5.8.2}, although other studies point to substantial yield increases, elevated employment and farm profitability under agroecological practices {5.3.4, 5.8.2}, or to the co-benefits of greenhouse gas reduction and biodiversity conservation {5.8.2}. Indeed, examples worldwide showcase the efficacy of agroecology in enhancing climate resilience, recycling resources and promoting circularity. Community-based initiatives exemplify relational values, fostering local economies and social cohesion.

Lessons from agroecology for transformative change

1. **Diverse entry points:** Agroecological transitions demonstrate that transformative change can occur through diverse entry points. Whether through changes in crop selection, farming practices, consumer demand, community engagement or conducive policies, there are multiple pathways to achieving sustainability.

2. **Context-specific approaches:** Recognizing the diversity of context-specific approaches is crucial. Far from prescribing blueprints or recipes, agroecology emphasizes understanding and respect for local values, norms and customs. What works in one region may need adaptation to fit the ecological and cultural context of another.

3. **Iterative learning and adaptation:** Agroecological transitions involve an iterative and transdisciplinary process of monitoring, evaluation and learning. This dynamic approach ensures that practices evolve on the basis of local conditions, fostering a dialogue of wisdom, continuous improvement and resilience.

4. **System-wide reorganization:** Agroecology showcases the importance of fundamental, system-wide reorganization across technological, economic and social domains. This aligns with the transformative change required to address the root causes of biodiversity loss and nature's decline.

Some examples of agroecological transitions are listed in the table below (more details of each example can be found in the case study database) {5.8.2}.

Box SPM 8

Enhanced process	Examples
Climate resilience	Following Hurricane Mitch in Central America in 1998, biodiverse agroecological farms, including those that engaged in agroforestry, contour farming and cover cropping, retained 20–40 per cent more topsoil, suffered less erosion and experienced lower economic losses than neighbouring farms practicing conventional monocultures. Pastoralist households of North Patagonia exhibited greater resilience to 10 years of frequent droughts and a faster recovery from a massive volcanic ashfall in 2011. They were able to diversify, relying on local and adapted landraces and knowledge, and household decisions were shared between male and female pastoralists.
Recycling and pest regulation	In Asia, integrated rice systems combine rice cultivation with other products such as fish, ducks and trees. Rice and fish form a symbiosis: the rice provides the fish with shelter, shade and reduced water temperature, along with herbivorous insects and other small animals that feed on the rice. Rice benefits from nitrogenous waste from the fish, while the fish reduce insect pests such as brown planthoppers and diseases such as sheath blight and weeds. Push-pull cropping systems in East Africa combine species that repel insect pests and attract their natural enemies through volatile semiochemicals; such combinations of species (e.g., cereals, legumes and grasses) may provide other services, such as fodder production, biological nitrogen fixation and erosion control.
Synergies through diversification	Agroforestry systems that include deep-rooting trees can capture nutrients lost beyond the roots of annual crops, improve the soil water balance for crops and grasslands and improve animal welfare. Globally, biological nitrogen fixation by pulses in intercropping or rotation systems generates close to $10 million in savings on nitrogen fertilizers every year, while contributing to soil health and climate change mitigation and adaptation. It has been shown that countries where there is greater crop diversity also support more agricultural employment.
Circularity through crop-livestock integration	Nutrient cycling accounts for 51 per cent of the economic value of all non-provisioning ecosystem services. Integrating livestock into crop systems plays a crucial role, as it promotes recycling of organic materials by using manure for composting or directly as fertilizer and using crop residues and by-products as livestock feed. About 15 per cent of the nitrogen applied to crops comes from livestock manure, highlighting the synergies resulting from crop-livestock integration. Mixed farming allows alternating cropping-pasture rotational cycles that promote regenerative soil fertility management.
Promoting human values and local economies	In many parts of the world, community-based agroecological initiatives exemplify the principles of equity and justice and contribute to their social resilience (e.g., when facing food shortages during the coronavirus disease (COVID-19) pandemic). These initiatives involve local communities in decision-making processes, respecting their traditional knowledge and fostering a sense of ownership over agricultural practices. Community-supported agriculture models, in which consumers directly support local farmers, exemplify how agroecology can create relational values and responsibilities between producers and consumers. The *Unión de Trabajadores de la Tierra*, which started in Argentina after the 2001 economic crisis, is an example of food system transformation at scale and now includes 22,334 farming families (out of a total of 33,400 small family farms in the country) that produce agroecological food at affordable prices through 420 sales points and online sales, independent of government support.

Box SPM 9 Knowledge gaps in assessing the underlying causes of biodiversity loss and determinants of transformative change to achieve the 2050 Vision for Biodiversity.

The transdisciplinary field of research on transformative change is growing, but it is still young. The field has not integrated fundamental insights from many theories and frameworks that do not explicitly state that they are about transformative change. Beyond issues associated with the lack of such theoretical integration, the Transformative Change Assessment identifies multiple types of knowledge gaps, ranging from geographical, jurisdictional and linguistic ones to gaps related to the impacts of interventions or the relationships between interventions for transformative change and their multidimensional impacts {Table 1.4}. Each chapter identifies specific knowledge gaps related to its focus. On the basis of those gaps and a broader assessment of the field, it is important to highlight some general knowledge and knowledge-action gaps, including the gaps set out below.

Monitoring and valuing transformative change

1. **Metrics and indicators.** While the development of new metrics and indicators for assessing transformative change is under way, much remains to be done in terms of evaluating the impacts on both nature and people, including the effects of subsidies, social movements and other interventions {1.3.2, 2.3.5, 2.6, 4.2.1, 4.2.2, 5.5.4}. There is also a need for more reliable early indicators that predict successful transformative changes. An additional challenge is to include indicators based on different knowledge systems, world views and values {1.5, 4.2.5}.

2. **Monitoring across scales.** There is a significant gap in monitoring and evaluating transformative actions at multiple scales and contexts, especially in terms of their long-term effectiveness {1.5, 2.6, 3.5.6, 4.2.3, 5.6.2, 5.6.3, 5.6.4}.

3. **Integration of different approaches.** It is unclear how to integrate evidence of the social and ecological dimensions of transformative change processes, as well as qualitative and quantitative approaches {1.5, 2.3.5, 2.6, 3.3, Figure 3.4, Table 3.2}. There is a gap in coordinating knowledge for effective sustainability transitions {2.2.3, 3.5.1, 4.4, 5.7.5}. In addition, tools to assess surprises and uncertainties in these processes are underdeveloped, in particular regarding their differential impacts on both nature and people {4.4, 5.4.2}.

Overcoming challenges to transformative change

1. **Benefits and trade-offs**. There is little documentation and assessment of the benefits and trade-offs (including both the intended and unintended impacts) of different transformative actions, particularly with regard to the principles of equity and justice, pluralism and inclusion, and respectful and reciprocal human-nature relationships over time {1.5, 2.3.5, 3.5.4, 5.7.1}.

2. **Vision development and participatory processes.** Although visions for a sustainable world are critical for inspiring transformative change, there is a gap in understanding how these visions are developed across diverse cultures and contexts {2.2.3, 2.3.5}. Participatory processes, in particular those involving Indigenous Peoples and local communities, are not sufficiently integrated into the development and evaluation of these visions {2.2.3, 2.3.5, 3.5.4, 5.7.5}.

3. **Technological innovations.** Assessment of the transformative potential of technological innovations for achieving just and sustainable futures, including critical assessment of negative impacts and unintended consequences and distributional effects over time {2.3.3, 3.2.5, 3.2.6, 4.4, 5.4.2}.

4. **Governance and institutional structures.** Attention to the institutional factors and power relations influencing and shaping governance strategies, including the role of lobbying, misinformation and corruption in challenging or blocking transformative change processes, as well as global interdependencies and dependencies in underlying actor networks {4.2.3, 4.4, 5.2, 5.6.1}.

5. **Relations of domination as barriers to transformative change.** While there is extensive literature that examines how relations of domination are underlying causes of biodiversity loss, the literature that examines how the elements of these relations manifest as barriers to transformative change is limited. The number of empirical studies on relations of domination as barriers to transformative change is very small, and they address the question implicitly rather than as the central research question {4.1, 5.3.1, 5.3.2, 5.7.1, 5.7.5}.

6. **Science-policy relations.** Science-policy relations, the incorporation of different knowledge systems in transdisciplinary learning processes, and the underlying power structures need to be better understood {5.6.4}.

Building capacities for transformative change

1. **Case study research.** There is a significant knowledge gap in integrating case studies of transformative change from different time periods to draw general conclusions. These case studies are essential to understanding how transformative processes unfold in practice and can provide valuable insights into the factors that lead to success or failure. More robust documentation and analysis of real-world cases (including both historical and current cases) are needed to build a solid empirical foundation for scaling up transformative actions {3.4, Figure 3.5, 5.2, 5.4.4}.

Box SPM 9

2. **Imagination gap.** Addressing the imagination gap in envisioning positive futures where humans are seen as an integrated part of nature and living in harmony with nature (Box 2.1, Figure 2.2}.

3. **Cultural insights and social dimensions.** The cultural dimensions of transformative change remain underexplored, especially regarding how different cultures and societies envision positive futures where humans and nature are integrated harmoniously and how shifts in cultural values can be supported to advance transformative change for a just and sustainable world {5.3.1, 5.3.3, 5.3.4, 5.7.1, 5.7.2, 5.7.3, 5.7.4, 5.7.5}. The specific needs and issues of concern for diverse social actor groups are also underrepresented in work on transformative change {1.5, 5.2, 5.3.1, 5.7.1}. More research is needed on how different social actors and cultural perspectives can inform broader sustainability transformations {1.5, 3.2.1, 3.5.5, 5.2, 5.7}.

4. **Philosophical and theoretical foundations.** Assessment of the underlying philosophical and theoretical assumptions and epistemologies of transformative change, including how they link to adult learning and development {5.7.4}.

5. **Inner transformations and empowerment.** Assessment of the role of transformative capacities, including inner transformations and empowerment, in transformative change processes, and how to cultivate those capacities {2.3.4, Figure 2.5, 3.2.1, 5.2, 5.7}.

Prioritizing these gaps through integrative and actionable transdisciplinary research can guide and activate science, policy and society for transformative change. The amount of general research on transformative change for global sustainability is two orders of magnitude larger than that of research featuring case studies. This suggests an implementation gap that can be addressed by linking knowledge and action to produce context-specific and measurable results for transformative change.

APPENDICES

APPENDIX 1

Communication of the degree of confidence

Figure SPM A 1 **The four-box model for the qualitative communication of confidence.**

Confidence increases towards the top-right corner, as suggested by the increasing strength of shading. Source: IPBES (2016).[21] Further details of the approach are documented in the *IPBES Guide on the Production of Assessments*.[22]

In this assessment, the degree of confidence in each main finding is based on the quantity and quality of evidence and the level of agreement regarding that evidence **(Figure SPM.A1)**.

The evidence includes data, theory, models and expert judgement.

- **Well established:** there is a comprehensive meta-analysis or other synthesis or multiple independent studies that agree.
- **Established but incomplete:** there is general agreement, although only a limited number of studies exist; there is no comprehensive synthesis, and/or the studies that exist address the question imprecisely.
- **Unresolved:** multiple independent studies exist but their conclusions do not agree.
- **Inconclusive:** there is limited evidence and a recognition of major knowledge gaps.

21. IPBES (2016): *Summary for Policymakers of the Assessment Report on Pollinators, Pollination and Food Production of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Potts, S.G., Imperatriz-Fonseca, V. L., Ngo, H. T., Biesmeijer, J. C., Breeze, T. D., Dicks, L. V., Garibaldi, L. A., Hill, R., Settele, J., Vanbergen, A. J., Aizen, M. A., Cunningham, S. A., Eardley, C., Freitas, B. M., Gallai, N., Kevan, P. G., Kovács-Hostyánszki, A., Kwapong, P. K., Li, J., Li, X., Martins, D.J., Nates-Parra, G., Pettis, J.S., Rader, R. and Viana, B.F. (eds.). IPBES secretariat, Bonn, Germany. http://doi.org/10.5281/zenodo.2616458.

22. IPBES (2018): *IPBES Guide on the Production of Assessments. Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, Bonn, Germany. Available at: https://ipbes.net/guide-production-assessments.

APPENDIX 2

Practical guidance for realizing the transformative potential of policies, projects and other initiatives in any sector to address biodiversity loss and nature's decline

This appendix provides practical guidance on how to use the Transformative Change Assessment to help in achieving the goals and targets of the Kunming-Montreal Global Biodiversity Framework as well as the Sustainable Development Goals. Transformative change is a process that involves moving away from fragmented, partial and instrumental approaches that fail to address the underlying causes of biodiversity loss and nature's decline towards integrated initiatives that are guided by the principles of transformative change.

In order to achieve the goals mentioned above, it is necessary to recognize that all actor groups can contribute to transformative change. The strategies and actions assessed in this report help in achieving visions for a just and sustainable world when they: (a) address the underlying causes of biodiversity loss and nature's decline; (b) draw on a range of theories and approaches; and (c) contribute to overcoming overarching challenges that have constituted barriers to transformative change.

Figure SPM.A2 offers 10 steps for practical guidance on using this assessment to generate transformative change. The aim is to encourage a whole-of-government and whole-of society approach to transformative change. The 10 iterative steps described in the figure are not a checklist, but rather provide practical guidance for realizing the transformative potential of policies, projects and other initiatives in any sector to address biodiversity loss and nature's decline.

1

Identify a policy, project or any other initiative with transformative potential to address biodiversity loss and nature's decline (see chapters 1 and 5). What results are desired?

Which actors are involved in the development and implementation of this initiative (see chapter 5)?

Directly:

Indirectly:

2

What values are foundational to your initiative? In other words, what do you care deeply about (see chapter 1)?

Are these values aligned with the four principles of transformative change?

☐ YES ☐ NO ☐ DON'T KNOW

If yes, please describe how.

If not, how can those principles be included?

PRINCIPLES

- Equity and justice
- Pluralism and inclusion
- Respectful and reciprocal human-nature relationships
- Adaptive learning and action

STRATEGIES

3

- Conserve and regenerate places of value to nature and people
- Drive systemic change in the sectors most responsible for nature's decline
- Transform economic systems for nature and equity
- Transform governance systems to be integrative, inclusive, accountable and adaptive
- Shift views and values to recognize human-nature interconnectedness

To which of the transformative strategies does this initiative contribute (see chapter 5)? (it can be one, multiple, none, or other)

UNDERLYING CAUSES

4

- Disconnection from and domination over nature and people
- Concentration of power and wealth
- Prioritization of short term, individual and material gains

2

Does the initiative address any underlying cause(s) of biodiversity loss?

☐ YES ☐ NO **If no, revisit Step 2.**

If yes, please elaborate:

VISIONS

5

- Regenerative and circular economy
- Community rights and empowerment
- Biodiversity and ecosystem health
- Spiritual reconnection and behavioural change
- Innovative business and technology

Describe the vision or visions to be achieved:

Is the vision inclusive (engaging and considering all actor groups) and comprehensive (multidimensional)?

☐ YES ☐ NO ☐ DON'T KNOW **If no, revisit Step 1.**

If not, how can it be adjusted or complemented?

1

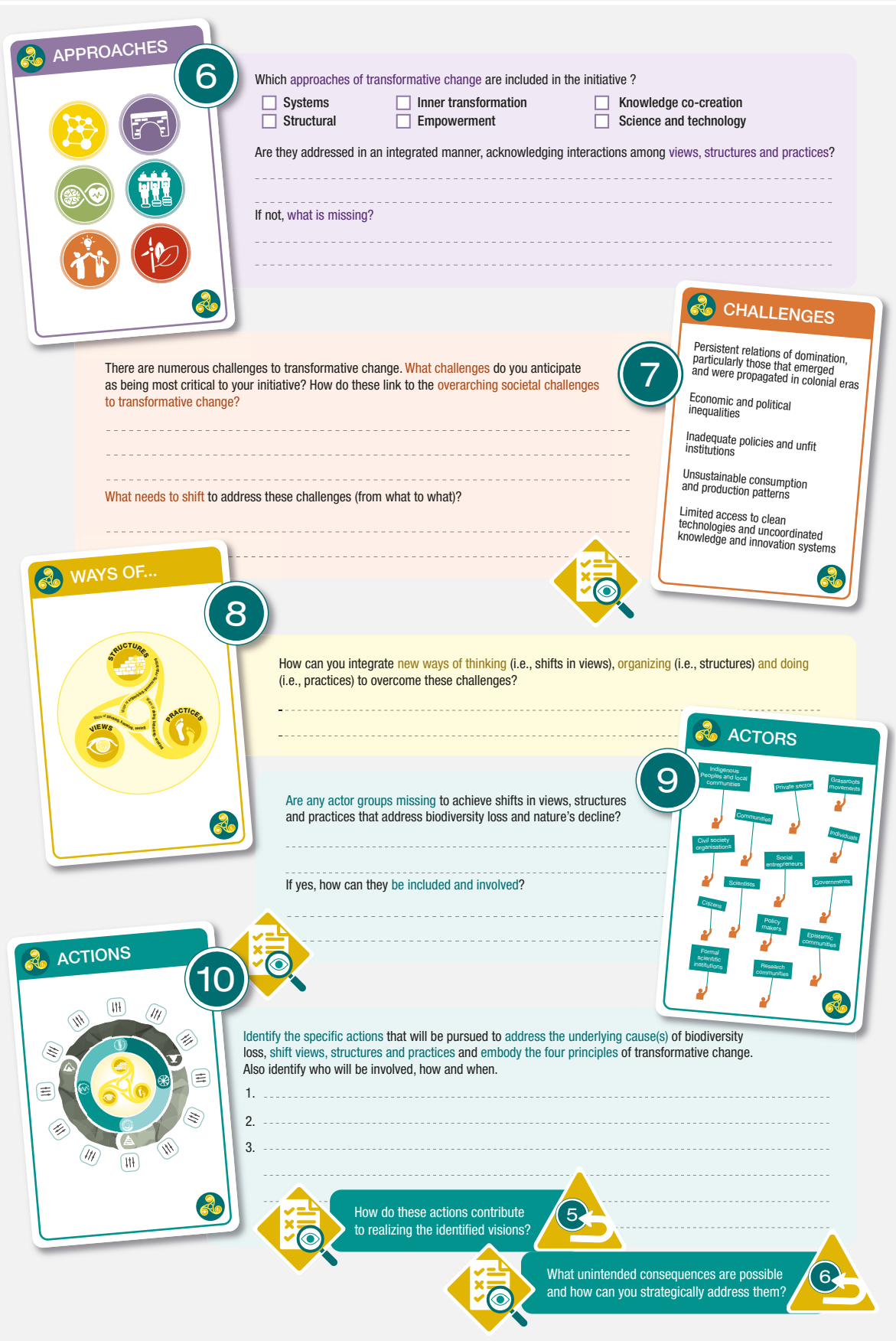


Figure SPM 14 **Practical guidance for realizing the transformative potential of policies, projects and other initiatives in any sector.**

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

is the intergovernmental body which assesses the state of biodiversity and ecosystem services, in response to requests from Governments, the private sector and civil society.

The mission of IPBES is to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development.

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