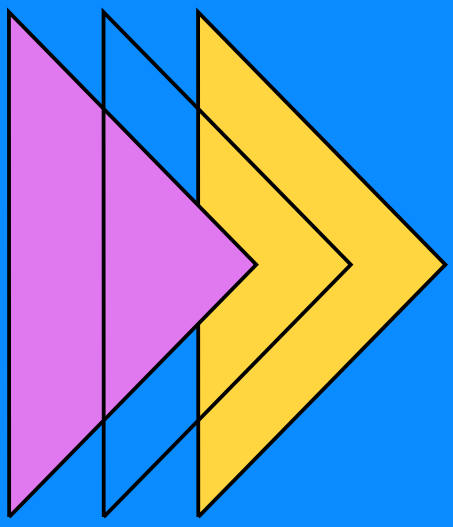

Stockholm+50: Unlocking a Better Future

An independent scientific report for the UN international meeting, 'Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity'

SEI Stockholm Environment Institute

CEEW THE COUNCIL

IN ASSOCIATION WITH STOCKHOLM+50

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About this report

Scientific research offers evidence and guidance on how to progress on critical challenges, build better societies and protect our planet. This report was written to provide a scientific basis for the UN international meeting 'Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity', held in Stockholm on 2–3 June 2022. It is intended to stimulate an informed debate on why change towards a sustainable future is not happening at pace with the challenges humans and the planet face, and guide leaders to actions they can take now, informed by relevant science.

This report is a collaboration between Stockholm Environment Institute (SEI) and the Council on Energy, Environment and Water (CEEW). During the past year, researchers at SEI, CEEW and collaborating institutions have synthesised recent scientific evidence and ideas to prepare recommendations for action, guided by an advisory panel consisting of 27 experts in the field of sustainable development science and policy.

This report has been independently prepared by SEI and CEEW, with funding from the Swedish Ministry of the Environment. We note that our discussion is carried out within explicitly normative frameworks, for example as expressed in international law, UN documents, UN metrics such as the Human Development Index (HDI), and other widely used metrics such as Transparency International's Corruption Perceptions Index.

An associated report, *Charting a Youth Vision for a Just and Sustainable Future*, presents the key actions for reaching a sustainable future, as articulated by young people themselves.

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Photo: SasinT Gallery / Moment / GettyImages

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Preface

It is time to act.

In 1972 in Stockholm, the global community heralded a new era of environmental cooperation on a global scale. Fifty years on from the 1972 Stockholm Conference, we know more than ever about the challenges of unsustainable development – but also about the solutions we must implement. In a wide range of sectors, we know that these solutions are both technically and economically viable. But incentives, institutions and behaviours are sticky and resist change.

There is an action gap. The pace of change is still alarmingly slow while the most vulnerable continue to suffer disproportionately. Time is running out for safeguarding our living planet, and to meet socio-economic development needs around the world. Halfway between the adoption of the Sustainable Development Goals and their target year 2030, the Decade of Action needs much more momentum.

This report is not just a call for change; it is a manifesto to enable change. Now and over the longer term, actions can be taken for redefining the relationship between humans and nature; ensuring lasting prosperity for all; and investing in a better future. The report has targeted analysis of the barriers to change, and how we can unlock progress by improving coherence, accountability, solidarity and a renewed multilateralism. But in order to act, we must also listen. For the technical solutions to take hold, we must build a culture of empathy with those who suffer the most but do not find their voices represented enough. And the solutions for planet and people must give agency to the voiceless.

The world is facing a deep security crisis, with mounting international tensions. The pandemic has reversed progress in sustainable development. More severe planetary shocks will unfold with growing environmental stress. These challenges are compounded now by a shifting landscape of global security and geopolitics, which will worsen human insecurity.

It impossible to discern exactly how these effects will play out. Two things can be said with certainty: The values and principles of the Stockholm Declaration, and the multilateral communities that have emerged around it over the last 50 years, will be more important than ever; and the policies and investments required to forge resilient and just societies go hand in hand with peace.

Stockholm+50 is an opportunity to move beyond gridlocked international negotiations. We know what to do, why and how. But for a renewed multilateralism, we must imagine a different world – and contemplate the consequences of not acting on time and collectively.

Måns Nilsson
Executive Director,
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Foreword

The environmental movement has travelled far since the UN Conference on the Human Environment, held in Stockholm in 1972, but we still face urgent challenges. Climate change, nature and biodiversity loss, and pollution and waste – the triple planetary crisis – are threatening the future of peace, prosperity and equity envisioned in the 2030 Agenda.

The good news is that we know far more now than we did in 1972. Science has unfolded the scale of the triple planetary crisis, and how it is hitting vulnerable communities the hardest. Science and the environmental movement have delivered an understanding of the solutions. They have sparked a will to act, which has swept the world.

The Stockholm+50 conference will be a moment to reflect on this journey, which has led us to understand that we must transform our societies and economies to protect Earth so that it may sustain us. But more importantly the conference will be a moment to find new ways to deliver on this transformation.

This report, a vital contribution to Stockholm+50, lays out many of the ideas that we can use to transform our world: recognizing the rights of nature, redefining prosperity and moving beyond GDP, de-risking finance for clean energy, defining sustainable lifestyles, carbon pricing and much more.

This report highlights that these shifts require all actors – including governments, multilateral institutions, private sector entities and individuals. Its emphasis on reforming the global governance landscape by addressing the issues of trust, solidarity and accountability resonates strongly in today's geopolitical landscape. Equally, it tells us we cannot move forward without reforming the financial system and mustering political will for bold action for a better future.

It is UNEP's hope that all who attend Stockholm+50 consider the recommendations in this report and use this moment to reflect on how they might be implemented as together we strive for a more sustainable world.

In an already unequal world, Stockholm+50 is a chance to reshape national and global interactions. It is a chance to deliver equity. It is a chance to amplify a global movement for a more caring world, one that takes on the concerns of youth and vulnerable people. It is a chance to reinvigorate multilateralism and turn commitment into action. It is, above all, a chance for us to move together, in solidarity and collective action, to finally deliver on the principles our forebears laid out in the original Stockholm conference.

As we mark a half-century of action since the 1972 Stockholm Conference, we must prepare to act now for the future, and to lay the groundwork for the kinds of systemic changes we need for a healthy planet and a better world for all.

Inger Andersen
Secretary-General for the Stockholm+50 international meeting
and Executive Director of the UN Environment Programme

Key messages

- **The legacy we leave behind:** Fifty years after Stockholm 1972, we live amid entwined crises, both planetary and human. Humans are causing unprecedented change to our climate and ecosystems, and those who contributed the least to the planetary crisis are suffering its worst impacts. The planetary crisis and the extreme inequality require transformative action and addressing our economic systems as the core driver of many of these problems. The growing inequalities extend to future generations and the quality of their lives, with accelerating environmental change and risk of tipping points being breached.

- **The 'action gap' is significant.** We do not have a gap in policies and aspirations, rather in actions. Since 1972, only around one-tenth of the hundreds of global environment and sustainable development targets agreed by countries have been achieved or seen significant progress; it is not enough. The knowledge and the means of solving our problems are known and available; implementation is missing.

- **We are better equipped for change than ever.** By harnessing momentum for change – the growing public support, faster uptake of clean technology, inclusive and innovative finance, and the robust scientific evidence on positive co-benefits of acting now – 2022 can be a new watershed moment for pursuit of our sustainable future on Earth.

- **Bold and science-based decision-making is needed to accelerate the pace of change.** Decision makers at every level will need to simultaneously compress timescales for decision-making in this decade to be transformative, and extend time horizons to avoid lock-in, accommodate time lags and reduce intergenerational discrimination.

- **We have keys to unlock a better future.** Our synthesis of scientific research and new ideas points to three broad shifts that require immediate actions now, to redefine our relationship with nature, ensure prosperity that lasts for all and invest in a sustainable future. If these actions are initiated now, they can seed transformative change.

- **Our relationship with nature needs redefining, from one of extraction to one of care.** Human-nature connectedness should be strengthened in our social norms and value systems, and in how we live our everyday lives, by integrating nature in our cities; protecting animal welfare and shifting to more plant-based diets; increasing nature-based education for children and youth; and recognizing and drawing on indigenous local knowledge.

- **It is only possible to ensure prosperity that lasts for all by completely rethinking our way of living**, and by creating the enabling infrastructures and inspiring new supportive social norms. Transformative change can be unlocked by making sustainable lifestyles the overwhelmingly preferred choice; scaling business models that focus on services delivered, not on products made; making supply chains better for both humans and the environment; aligning national statistics with sustainability goals; and shaping our innovation system after sustainability criteria.

- **We must invest in a better future, with the strongest support of our governments.** More private capital is available today than ever for sustainability investments, yet funding gaps persist in low- and lower-middle income countries. To invest in a better future, we must recognize and enhance governments' foundational role in innovation; incentivize private finance to bring innovation to the market and raise it to the needed scale; and reduce the risks to sustainability while also raising the costs of unsustainability.

- **The conditions for change must improve.** The institutions and governance system that solved the challenges of the past may have contributed to creating the challenges of the present. There are ample opportunities for leaders to tackle structural barriers that hold back effective action, by improving policy coherence and ensuring strong and consistent incentives for action; renewing multilateralism by rebuilding solidarity for the common challenges we face; and by creating a culture of accountable promises.

- **If we unlock transformative action now, we won't need a Stockholm+100.**

Summary for policymakers

Looking back at the past 50 years, the world has changed in many ways – but not in the direction called for at the UN Conference on the Human Environment, held in Stockholm in June 1972.

Today we commemorate that conference at the UN international meeting 'Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity'. The context in which the Stockholm+50 international meeting takes place is alarming: we face intertwined crises of the state of our planet and extreme inequality among people and societies. The Covid-19 pandemic continues to slow or reverse progress. And geopolitical shifts highlight our interconnectedness and vulnerabilities more than ever.

The future, 50 years ago

At the 1972 gathering in Stockholm, heads of state committed to taking responsibility for protecting and promoting human and environmental health and well-being.

Today, we can see that the track record to deliver on the ambitions of half a century ago has been poor. Our assessment of the framework for environmental action conceived in 1972 shows that, while knowledge, goals and agreements have only increased, international supporting measures – financing, technical cooperation and organizations with strong mandates – remain too weak to deliver on the goals and lead to actions in accordance with our knowledge. So far, only about one-tenth of global environmental and sustainable development targets have been achieved, and outcomes and impacts for a healthier planet remain insufficient.

Humans are causing unprecedented change to the global environment and are risking major and irreversible changes in our lifetimes. Climate change has already caused widespread adverse impacts to nature and people, and limiting global warming to 1.5°C is beyond reach without immediate, rapid and large-scale reduction of emissions. Biodiversity and ecosystems are deteriorating worldwide, and goals for conserving and sustainably using nature cannot be met by current trajectories.

Unsustainable production and consumption patterns put a healthy planet and sustainable development at risk. The use of natural resources has more than tripled from 1970, and continues to grow. The use of these resources and their benefits is unevenly distributed across countries and regions. The poorest half of the global population owns barely 2% of the total global wealth, while the richest 10% owns 76% of all wealth. Compared to 1972, overdevelopment and affluence, rather than underdevelopment and scarcity, are the drivers of unsustainable resource use. Currently, no country is delivering what its citizens need without transgressing the biophysical planetary boundaries.

The inequity among people and places in both causing deterioration and suffering from its impacts is high. The poorest half of the global population contributed 10% of emissions; the richest 10% of the global population emitted more than half of the total carbon emissions during 1990–2015. Meanwhile

climate disaster–related death tolls of potentially exposed populations during 2000–2017 indicate 16 deaths per million for high-income groups, compared to 60 per million for low-income groups. The social and economic costs of inaction are predominantly borne by the poorest and most vulnerable in society, including Indigenous and local communities, particularly in developing countries.

The coming decade is crucial for a sustainable and just future.

High-income countries must drastically reduce their footprints, especially in light of their cumulative footprints over time, to avoid closing development pathways for low-income countries and future generations. A person born today may live in a '4°C world', several degrees warmer than today, in which 16% of species would be at risk of extinction, and their exposure to heatwaves during their lifetimes may be up to seven times that of a person born in 1960.

Today, our modes of consumption, production and finance are leading to environmental changes that undermine hard-won development gains. But a 'low-carbon life' can and should be a good life – and one that is easily accessible to all. The coming decade is crucial to redirecting our trajectory toward a sustainable and just future.

From urgency to agency

The framework for environmental action conceived in 1972 has delivered political and scientific activity, but the outcomes remain insufficient. The world has already agreed on a vision for sustainable development and common future – Agenda 2030. This vision still needs to come to fruition.

There is growing momentum for change. Public opinion reflects the sense of urgency and indicates willingness to change lifestyles. Youth worldwide are both exercising and demanding more agency to fight climate change, environmental degradation and inequity. Key technological development and uptake have occurred faster than anticipated, and evidence builds of the many wins and co-benefits from taking climate and sustainability action at a policy level.

We need to compress timescales for decision-making and implementation of key investments and infrastructure, without compromising values of democratic legitimacy and inclusiveness. Simultaneously, timescales must be extended in decision-making to avoid intergenerational discrimination and committing ourselves to unsustainable infrastructure, and to enable bold, long-term transformation.

We have the means to act; we need incentives that favour actions over commitments. We are better equipped than ever to make 2022 a new watershed moment for pursuit of our sustainable future on Earth. If we unlock change now to enable delivery on a compelling post-2030 vision, we won't need a Stockholm+100.

Keys to unlock a better future

With Stockholm+50, we must unlock change that is substantial and systemic. A sustainable world should provide a good quality of life that is broadly shared and can be maintained indefinitely into the future.

Based on a synthesis of scientific evidence and ideas, we identify concrete actions under three broad shifts that would take us to a more sustainable development. If they are initiated now, they can accelerate change, large and small, for the long term.

Redefine the relationship between humans and nature

The past 50 years – and even the past 5 years – have seen huge losses and degradation of nature globally. Humans have altered 75% of the planet's land surface, impacted 66% of the ocean area, and destroyed (directly or indirectly) 85% of wetlands. Many societies value nature as an instrument, something to be used for resources; that perspective has driven the ecological decline of the past half-century and beyond. An instrumental valuation often underpins policies and economic structures that in turn shape behaviour and social norms at the individual level.

Repairing the relationship between people and nature will require redressing this imbalance, by placing more emphasis on the intrinsic and relational value of nature. Such a shift would be transformative, requiring deep changes across societies, economies and communities: how we live in our cities, how we produce food, how and what we learn, and the knowledge and rights that inform our choices.

Calls to action

- **Integrate nature in cities and urban areas** – Local governments can promote human-nature connectedness through green architecture, infrastructure and access to nature in the towns and cities where most people live and work, as a way of both seeding transformative change through shaping values and providing immediate climate, biodiversity and health benefits.

- **Protect animal welfare by mainstreaming it in sustainable development governance** – Animal welfare matters morally, but many of the ways in which we currently interact with animals also limit our ability to achieve sustainable development goals and impact the environment. Stronger protection of animal welfare will help build human-nature connectedness, and can also directly or indirectly benefit many other societal goals.

- **Expand and invest in nature-based education** – Through education policy and school curricula that connect children with nature, education authorities and teachers could contribute to a long-term, catalytic effect on repairing our relationship with nature. Inspiration can be taken from Indigenous communities' nature-based education.

- **Recognize Indigenous local knowledge and the Rights of Nature** – Greater recognition of indigenous local knowledge can make nature conservation more effective and support indigenous rights. Assigning legal rights to nature can be a way of limiting extraction of resources but can also lead to recognition of nature's intrinsic values and changed behaviour over time.

Ensure prosperity that lasts for all

The amount of natural resources extracted by humans globally each year has tripled since 1970. High-income countries have consumed most of these resources, with carbon dioxide consumption footprints that are more than 13 times the level of low-income countries. Ensuring lasting prosperity for all and bringing emission and resource footprints within ecological limits requires a complete rethink of our ways of living, and a shift in social norms and values that drive human behaviour. It requires redefining prosperity at all levels in society and economy.

Calls to action

- **Make a sustainable lifestyle the easy choice** – We are now at a point where efficiency-oriented options and nudging measures for making lifestyles more sustainable are insufficient; systemic and transformative measures are needed. These should actively create enabling infrastructures, reconfigure systems and amplify social norms around sufficiency, as well as new global governance initiatives to address equity in these transitions. In order to change lifestyles, governments must consider alternatives ways to price consumption-related resource footprints.

- **Purchase function, not product** – Material throughput can be substantially lower if households, businesses, and government agencies switch from purchasing products to acquiring functions of products. Supportive regulatory frameworks and changed social norms on ownership and reuse could have a transformative effect on scaling such business models and reducing material throughput.

- **Make supply chains better for both humans and the environment** and ensure that integrated supply chains bridge the technology and economic gap between developed and developing economies. Sustainable patterns of production should include prospects for new jobs and skills, scope for additional investment, higher interdependency in co-creating and sharing prosperity, social safety nets for the vulnerable, and environmental integrity.

- **Align national statistics with sustainability goals** – It is time to move beyond GDP as the single metric and adopt indicators that help measure progress towards the vision of sustainable development, such as indicators on inclusive wealth and indicators recognizing the caring economy. Global governance and convergence on alternative metrics are needed to reduce the risk for first-movers.

- **Change the selection environment for innovation** – The upstream selection environment for innovation has a cumulative impact on technological

development. Common sustainability standards and principles should be applied to guide innovation, international organizations should work to harmonize these and publicly funded innovation should adhere to these.

Invest in a better future

To ensure prosperity for all and redefine our relationship with nature, investing in a better future is necessary. Today, we have the paradoxical situation of a massive amount of capital ready for sustainability investments, yet persistent funding gaps in low-income countries.

The funding gap for Sustainable Development Goals (SDGs) globally has been estimated at USD 2.5 trillion by the OECD, while UNCTAD estimates that the value of sustainability-themed investment products in global capital markets increased by more than 80% from 2019 to 2020. Action is needed not only to mobilize capital for sustainability, but to ensure sufficient levels at lower costs, supporting allocation to places and sectors in need, and transitioning out of unsustainable practices and capital goods.

Calls to action

- **Recognize and enhance public funding of innovation and co-development for technology** – Mission-driven public investment can contribute to sustainability-oriented innovation systems. These efforts are promising for both high-income and low-income countries. To bridge the technology gap between rich and poor countries we need **a new paradigm of 'co-development of technology'**, particularly in critical areas of clean energy, health, and sustainable agriculture. This requires jointly designed research and development programmes, pooling of resources, co-owned and shared intellectual property, local adaptation, and equitable voice in the governance of emerging technologies.

- **Incentivize active engagement in private finance** – Private finance has a critical role in bringing innovation to market, and investors should engage more actively to ensure sustainable finance becomes the norm. At a global scale, private investors are increasingly interested in monitoring the environmental, social and governance (ESG) performance of their investments, but through shareholder initiatives or direct engagement with the firms in which they invest they have much more power to transform sectors or industries.

- **Raise adequate private finance** – We need to address scale, regulation, balance and risk for emerging markets to access investments for sustainable infrastructure. Creating multi-risk, multi-country hedging platforms can lower the cost of capital and crowd in more private and institutional investment into developing countries and emerging economies.

- **Reduce risks to sustainability, enhance risks of unsustainability** – One key to increasing the scale of private finance for a sustainability transition is to alter the perceived riskiness of investments. This includes both reducing the perceived risk of sustainable investments and *raising* the perceived risk of unsustainable investments, for example through allocation mandates

on lending portfolios. Many low-income countries cannot de-risk financially underserved sectors and technologies. To overcome this barrier, risks can be pooled across countries and then de-risked through a common fund.

Improving conditions for change

Progress in these action areas are steps on our path to sustainability that would activate and accelerate the three shifts we urgently need now and hopefully lead to systemic changes. At the same time, we also need to address the systems and infrastructures we have inherited, in processes that will unfold more slowly. The governance context in which we understand these barriers has changed since 1972. Our world today has shifted even more toward multi-level, polycentric governance, where we have a complex set of actors, institutions, and sources of agency.

Decision makers and policymakers, at all levels, should dismantle barriers of political incoherence, weak multilateralism, limited accountability, and unreformed international finance, which prevent our acceleration towards sustainable and equitable societies.

Photo: sellmore / Moment / GettyImages

Calls to action

- The structural barriers of **policy incoherence, weak multilateralism and lack of accountability must be decisively tackled to enable effective action** on redefining humans' relationship with nature, ensuring lasting prosperity for all, and investing in a better future.

- With more actors and stakeholders participating in global governance today, many more routes are available to taking action. However, **conflicts of interest and uneven power relationships must also be recognized.**

- Governments and international organizations must make their policy mixes coherent and consistent towards sustainability goals, in order to **increase incentives for action, by adopting new practices and tools for more integrated and systemic policymaking**.

- The gap in trust and solidarity between countries acts as a barrier to new agreements, to raising ambition and to accelerated national implementation. Opportunities exist to renew multilateralism, to more effectively tackle environment and development crises and to rebuild solidarity: **developing multilateral responses to chronic risks, replacing technology transfer with a new paradigm of 'co-development of technology', and setting norms for the global financial system**.

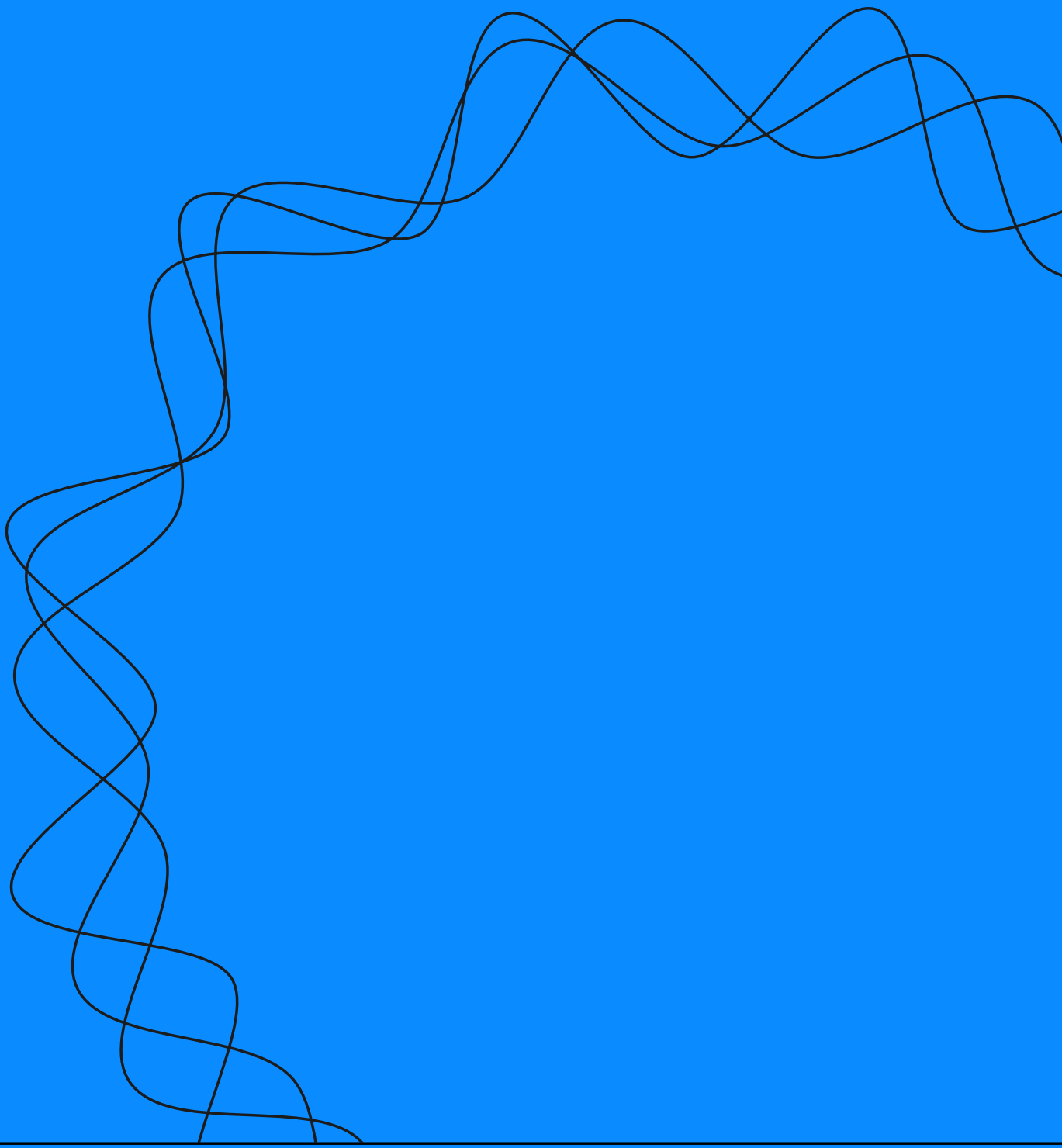
- Countries, companies and citizens have to be held accountable for their actions and their inaction. **We need new imaginative mechanisms for nurturing constructive accountability, which incentivizes and leads to bold action and change**, rather than threatens and leads to pre-emptive action and reduced ambition.

Accelerating change

We hold keys that can unlock opportunities for change. Setting small and large processes in motion today can allow us to progress on the goals that we have committed to in the past 50 years, since the first UN meeting to bring together humans and the environment.

For a new watershed moment in 2022, we repeat the same call made in the 1972 UN Stockholm Declaration:

> *A point has been reached in history when we must shape our actions throughout the world with a more prudent care for their environmental consequences. Through ignorance or indifference we can do massive and irreversible harm to the earthly environment on which our life and well-being depend. Conversely, through fuller knowledge and wiser action, we can achieve for ourselves and our posterity a better life in an environment more in keeping with human needs and hopes.*



Recommendations for unlocking a better future

Redefine the relationship between humans and nature

Integrate nature in cities and urban areas

- Local governments and architects should apply biophilic design principles in new and retrofitted urban architecture and housing policy, to enable human-nature connectedness as well as provide direct climate, biodiversity, and health benefits.
- Local planners should 'green' urban infrastructure such as water treatment, for example by learning from biomimicry and smallholder practices.
- Access to nature in urban areas should be promoted through empowered local communities and national accessibility standards and higher economic valuation of green space.

Protect animal welfare by mainstreaming it in sustainable development governance

- Governments should elevate the importance of animal welfare for sustainable development, and sustainable development for animal welfare, in international instruments.
- Support policies that benefit humans and non-human animals alike, particularly policies that use informational, financial and regulatory measures to benefit animals more and harm them less. Animal welfare impact assessments can play a valuable role here. Governments could phase down public subsidies for animal products and harmful agriculture, and increase support for plant-based food production, in a way that avoids regressive effects on low-income households. Governments should require or encourage voluntary action on disclosure of animal welfare, health and environmental risks by food companies to investors.
- Researchers, experts and policymakers should expand the interpretation of the One Health framework to recognize animal health and welfare as an end in itself, and not just instrumental to human health outcomes.

Expand and invest in nature-based education

- Education authorities and Indigenous communities should collaborate on weaving in Indigenous principles of environmental education into modern educational systems.
- To build a deep relationship with nature, education authorities and teachers should not just focus on ecological knowledge but also include practical skills, learning about local environmental issues and taking ownership, through hands-on engagement in community projects.
- UN organizations, such as UNESCO and UNEP, should start a global campaign to promote development of more diverse educational materials, and include practical skills, drawing more on cases from the Global South.

Recognize Indigenous local knowledge and the Rights of Nature

- National policies related to nature conservation should more strongly include

the role of traditional and Indigenous knowledge, in line with international agreements.
- National legislative and judicial bodies should consider whether establishing Rights of Nature will help protect nature in specific contexts, based on comprehensive consultation with stakeholders and analysis of what capacities and resources would be needed for effective enforcement.
- The Human Right to clean, safe and sustainable environment should incorporate a Rights of Nature rationale, whereby human responsibility and interests for the protection of Nature as a legal entity with personhood are clearly articulated.

Ensure prosperity that lasts for all

Make a sustainable lifestyle the easy choice

- Transformative change requires a long-term vision, but it can be enabled through near-term actions: local and national governments should identify the barriers in infrastructure that prevent individuals from shifting to more sustainable lifestyles and begin to remove them, combined with more effective and ambitious mixes of policies that edit out unsustainable choices, in order to accelerate change.
- The use of local policy labs and learn-by-doing experiments for sustainable lifestyles should be scaled up, where the individual is an active co-creator and network influencer.
- A regular UN forum on sustainable lifestyles should be established, to enable international peer learning and elevate action on SDG12. A collective global exercise to co-develop pathways for sustainable lifestyles and parameters that can measure progress should be convened.

Purchase function, not product

- Businesses should shift to offering functions and services rather than products as much as possible.
- Government should adapt legal frameworks to remove bias against business models that switch from selling products to functions.
- Governments should help create and expand markets for use- and result-oriented product service systems through public procurement.
- Government and businesses should pioneer more neutral language around consumption and reuse, to enable new social norms to develop around the status of ownership and new products.

Make supply chains better for both humans and the environment

- The UN Global Compact and its members should consider increasing the level of ambition of the environment-related Ten Principles, to more actively demote unsustainable options and practices.
- National governments and international organizations should consider more binding due diligence requirements and greater harmonization, but with aim of bridging not widening the technology divide
- Relevant international organizations, supported by member states, business,

trade unions and youth organizations, should consider co-developing more knowledge and best practices for maximizing synergies between green jobs, decent work and youth employment.

Align national statistics with sustainability goals

- Global leaders must collectively recognize the need to redefine prosperity through alternative indicators, to generate buy-in and not deter 'first movers'.
- Governments should mainstream the narrative of redefined prosperity within countries through consultative approaches, including with subnational government.
- National statistics offices should more widely adopt consumption-based accounting and life-cycle accounting, and national governments should set goals and strategies for reducing footprints, with support for low-capacity institutions from relevant UN bodies.

Change the selection environment for innovation

- Businesses should adopt voluntary sustainability standards and principles so that they become market-leading and influence innovation and product development.
- Governments should develop binding standards and classification schemes when voluntary standards are not aligning with sustainability goals or they are not sufficiently influential.
- International organizations should seek to harmonize standards, with special concern to entry requirements for low- and middle-income countries, so that they can access new markets for sustainable products and align their innovation systems to ambitious selection environments.
- Publicly funded innovation should demand adherence to standards.

Invest in a better future

Recognize and enhance public funding of innovation and co-development of technology

- Increase public research and development funding to missions co-defined with stakeholders (industry, civil society, local communities affected, academia) to achieve sustainability goals.
- Target international finance to low- and middle-income countries to develop and implement green industrial strategies, as well as their co-defined and nationally owned missions and innovation systems, especially countries faced with a phase-down of fossil fuel production.
- Replace ineffective technology transfer mechanisms with a new paradigm of 'technology co-development'.

Incentivize active engagement in private finance

- Financial actors and investors should engage more in active approaches to investing to support rapid action on climate change, especially with high-emitting sectors.

- Governments should provide enabling conditions for viability of sustainable investment at early stages of commercialization or start-up.

Raise adequate private finance

- Multilateral climate finance institutions should substantially enhance grant finance, to support capitalization of catalytic instruments that help make available domestic credit to sustainable investments in developing countries.
- Governments should coordinate to harmonize financial regulation frameworks (e.g. taxonomies, disclosure standards) in developing countries with international frameworks. to remove barriers to mobilising and accessing finance internationally.

Reduce risks to sustainability and raise the costs of unsustainability

- Governments should reduce investor risk by providing a stable Governments should reduce investor risk by providing a stable policy environment with long-term goals set in key areas of sustainability. International agreements are an effective way of setting shared long-term, binding goals.
- Governments and international financial institutions should consider joint de-risking initiatives to meet the sustainability investment needs in low-income countries and emerging markets, where domestic credit to the private sector is insufficient.
- Educate investors on novel and emerging sustainability technologies and solutions, to enable accurate assessments of risk.
- Regulators should consider mandates for minimum allocation of lending portfolios to sustainable assets, in order to enhance the perceived risk of unsustainable investment portfolios.

Improve conditions for change

Ensure stronger and more consistent incentives for action

- Incoherent policies with a bearing on sustainability goals must be better mapped, analysed and addressed, by many societal actors, to unlock effective action.
- National governments and international organizations should only use integrated and systemic approaches to policymaking. They should use tools for systematically analysing SDG interlinkages (synergies and trade-offs), apply wider system boundaries and extended timescales to account for future generations, and use frameworks for sequencing policy interventions to trigger positive tipping points.
- National governments and international organizations should set and enforce higher standards for transparency and public participation in the procedures for policymaking, to enable multiple perspectives on the resolution of goal conflicts and pursuit of synergies. This includes perspectives of future generations.

Foster renewed multilateralism

- International organizations, in collaboration with national governments, should develop new ways of communicating about procedure and performance to build trust with citizens, and engage specifically with sceptics.

- New multilateral initiatives and mechanisms should be developed for dealing with chronic global risks and especially for protecting the vulnerable who lack social safety nets.
- A new paradigm of 'technology co-development' should replace ineffective technology transfer mechanisms; Stockholm+50 should provide a first UN platform for exploring it.
- Multilateral institutions should use their norm-setting power to make sustainability a customary practice for private finance and international harmonization efforts of financial regulations, and standards for sustainable finance should be inclusive of developing countries.
- High-income countries should deliver on climate finance goals as an essential means of rebuilding trust.

Ensure a culture of accountable promises

- Multilateral agreements and processes (UNFCCC, CBD, etc.) should strengthen systematic tracking of action and progress on multi-stakeholder pledges. Tracking should be simultaneously conducted by secretariats and by independent third parties, drawing both on official data submitted through national reporting and other data sources.
- Develop proxy indicators of progress to measure the pace of transformation, if and when the target is far in the future and ultimate indicators will take time to show progress.
- Convene a UN Climate Accountability Summit at the UN General Assembly or at COP meetings or other major meetings, start with an accountability forum to give a dedicated and high-status platform for follow-up and review of performance to date, before announcement of new pledges and commitments. Set criteria where high achievers – in terms of demonstrating effective action or demonstrating high ambition in relation to starting point – are given a platform to inspire and incentivize accelerated action and implementation.
- Build a community of practice within (and across) environmental domains around tracking progress and convene diverse actors who can build the knowledge bank, e.g. national statistics offices, academia, civil society and philanthropic organizations. Research and philanthropic funders should invest more in datasets and evaluation methodologies to enable accountability mechanisms to be effectively used.

Photo: Jordan Siemens / DigitalVision / GettyImages

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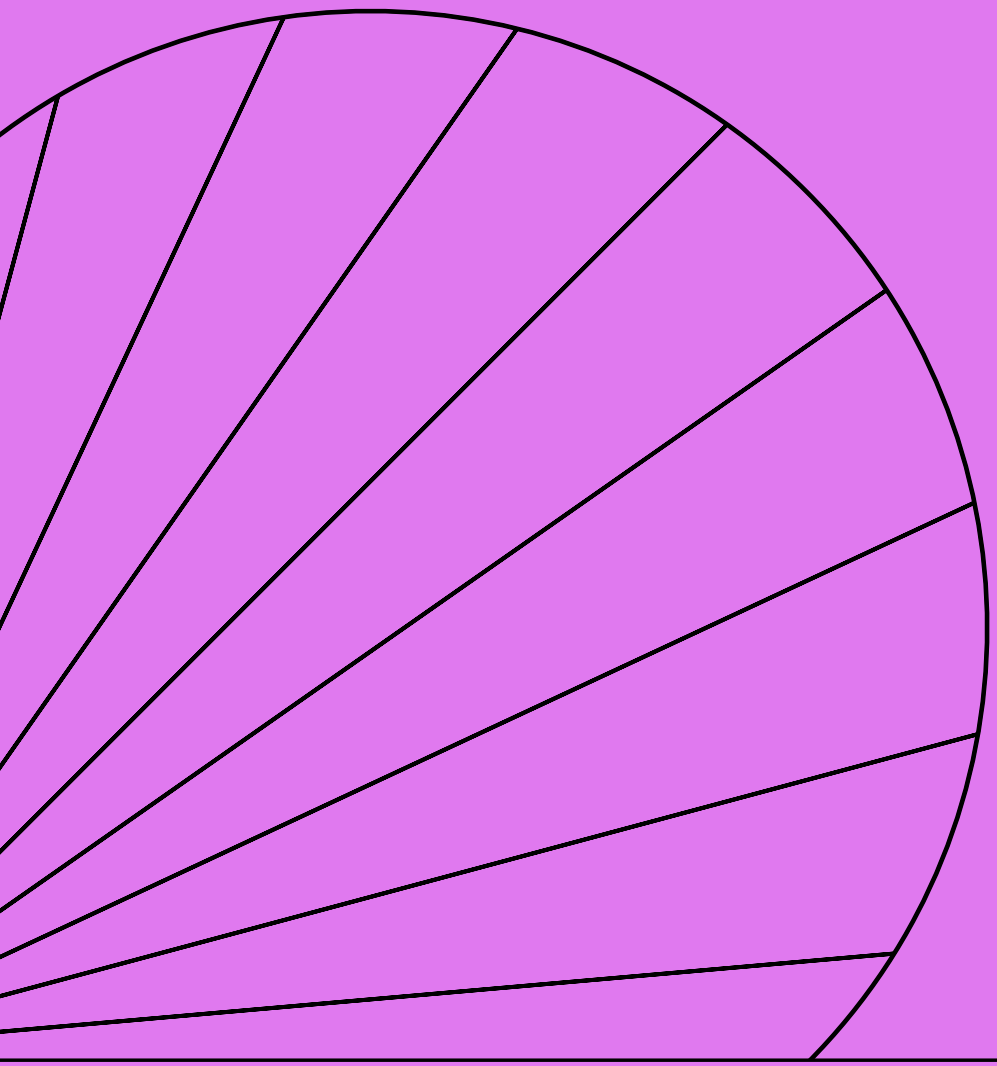


A legacy of change

Alone in space, alone in its life-supporting systems, powered by inconceivable energies, mediating them to us through the most delicate adjustments, wayward, unlikely, unpredictable, but nourishing, enlivening, and enriching in the largest degree – is this not a precious home for all of us earthlings? Is it not worth our love? Does it not deserve all the inventiveness and courage and generosity of which we are capable to preserve it from degradation and destruction and, by doing so, to secure our own survival?

– Ward & Dubos, 1972, p. 220

With intellectual curiosity and an emotional call, a 152-member committee presented their Only One Earth report to the 1972 Stockholm UN Conference on the Human Environment. In this spirit, we seek to present up-to-date scientific evidence and compelling, actionable ideas to the UN international meeting, 'Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity'.

Fifty years ago, the UN Conference on the Human Environment called for member states to accept responsibility for the stewardship of Earth and for defining what should be done to keep our planet suitable for human life – immediately and for future generations (UN, 1973). This watershed moment linked economic growth, environmental degradation and human well-being in all parts of the world (UN, 1973). Since then, the world has changed in many ways – but not in a direction called for at the conference.

In June 2022, member states and stakeholders will gather again in Stockholm to commemorate the 50 years since the UN Conference on the Human Environment. The Stockholm+50 meeting will open discussions on the urgent need for actions to achieve a healthy planet and prosperity of all. On the table will be many questions, focused on how the environmental dimension of sustainable development can accelerate the implementation of commitments in the context of the Decade of Action and achieve a sustainable and inclusive recovery from Covid-19.

The aim of this report is to synthesize science relevant to the Stockholm+50 meeting, based on background papers commissioned from SEI and CEEW researchers, the scientific community and our partners, as well as keystone reports from relevant organizations and community actors in this space. It aims to provide new thinking on how we can build a sustainable future, by asking how we can reset the relationship between humans and nature, how we can achieve lasting prosperity for all, and how to invest in a better future.

We set the scene by revisiting the 1972 Stockholm Declaration; it takes stock of progress in implementing the framework for environmental action that was presented then, which can be pinpointed as the start of international cooperation of environment and development (Chapter 2). The following overview of the state of the planet and of human development 50 years later recognizes the intertwined crises of the urgency of our planetary state and

extreme inequality. This overview highlights the impact on life prospects for future generations, as well as children and youth today; such impacts motivate the need to move from a state of urgency to one of agency and action.

Chapter 3 looks to the future, based on the present: our common vision for a sustainable future, expressed in Agenda 2030, needs to come alive. How can we increase the pace of change towards sustainability? Momentum for change is growing, in terms of public support, technological co-development, evidence for co-benefits of climate action, and the agency of youth. The discussion concludes with how considering timescales in decision-making can increase the pace of change, including speeding up socially robust decisions, but extending the time horizon in planning.

Chapter 4 proposes actions that can be taken now, to point us in the direction of the changes we want to see happen at longer timescales. One report cannot present all the actions needed for achieving a better future; this report focuses on areas relevant to Stockholm+50 themes and where we see opportunities for systemic change that could be seeded today. The report spotlights policy actions in three areas: redefining our relationship with nature, achieving lasting prosperity for all, and investing in a better future.

Chapter 5 brings us back to the question of why we are still here, debating how to become sustainable. We address some of the overarching barriers posed by our political systems for effective cooperation within and between countries: policy incoherence and missing incentives to act, weak multilateralism, and lack of accountability.

We conclude this report with the reminder that we hold the keys to unlocking opportunities for change. If we can set processes in motion today, with steps that are both small and large, we would make progress on the goals that were established 50 years ago, at the first UN meeting to bring together humans and the environment. We won't need Stockholm+100 if we act now.

Photo: Yutaka Nagata / UN Photo

2

A watershed moment, then and now

Highlights

- The 1972 Stockholm Conference established a framework for action and set a global agenda for humans and the environment. Fifty years later, we need a new watershed moment to achieve the vision.
- Reflecting on the last 50 years, many targets have been set for global environment protection and sustainable development; the problem is less of a policy and aspiration gap and more of an action gap.
- International supporting measures – financing, organization, technical cooperation – remain too weak to translate what we know into effective outcomes for the health of the planet.
- Today, in 2022, we live amid entwined crises – planetary and human. The planetary crisis, where humans are causing unprecedented change to our climate and ecosystems, calls for transformative action and addressing our economic systems as the core driver. Preparedness for tipping points in the Earth system and emerging environmental issues is needed.
- Despite major advances in human development, extreme income and wealth inequality means that prosperity is not for all. Those who contributed the least to the planetary crisis, will suffer most from its impact on societies.
- No country today is delivering to its citizens what they need for a good life without transgressing biophysical planetary boundaries or having an excessive ecological footprint. High-income countries and high-emitting individuals must dramatically reduce their footprint, to avoid closing development pathways for low-income countries.
- Children are already more vulnerable to environmental change and we see growing inequalities in life prospects between current and future generations, unless change is accelerated.

> *It is clear that the environmental crisis which is confronting the world will profoundly alter the future destiny of our planet. No one among us, whatever our status, strength or circumstance, can remain unaffected. The process of change challenges present international policies. Will the growing awareness of 'one Earth' and 'one environment' guide us to the concept of 'one humanity'? Will there be a more equitable sharing of environmental costs and greater international interest in the accelerated progress of the less developed world? Or will it remain confined to a narrow concern, based on exclusive self-sufficiency?*
>
> – Indira Gandhi, Prime Minister of India, Statement in Plenary Session, 14 June 1972

The 1972 Stockholm Declaration and Action Plan established a comprehensive set of principles and recommendations for managing the environment. It also laid the foundation for today's global sustainable development governance by linking economic development, environmental degradation and human well-being in all parts of the world (UN, 1973).

Developed in the shadow of a global nuclear threat, it articulated the interdependence of sustainable development and peace (Background paper, BP, Michel). In tune with the pre-conference scientific report (Ward & Dubos, 1972), the Stockholm Declaration made a strong commitment to harness science and technology for the public good, in developed and developing economies alike.

The 1972 Stockholm Conference was a watershed moment, connecting environment and development. It was also a watershed moment in recognizing the environmental impacts of both under- and overdevelopment, and establishing international cooperation on the environment, through institutions, agreements and action plans. A shared narrative of 'Only One Earth' echoes today, and the conference paved the way for broad stakeholder participation in multilateral processes.

Yet the tension between human and economic development and safeguarding the environment has persisted for the past half-century. In the lead-up to the 1972 Stockholm Conference, developing countries did not believe that it was their responsibility to resolve issues of environmental pollution and resource scarcity. The developed world bore sole responsibility. The year before the conference, the UN report *Development and Environment*, known as the Founex Report, helped to bridge the divide between developed and developing countries for the purposes of the 1972 Stockholm Conference (Haq & Jolly, 2008, p. 82). The report suggested a concept of environmentally sound, people-centred development.

Later, when the UN decided to convene a conference in Rio in 1992 to commemorate the 1972 Stockholm Conference, developing countries demanded that it be called the UN Conference on Environment *and*

Development; subsequently other major conferences also tried to articulate this balance (Bodansky, 2010, p. 33, emphasis in original). For five decades, the effort has been to ensure that sustainable human development did not mean that the goal was to 'sustain human deprivation' (Ponzio & Ghosh, 2016).

The subsequent Cocoyoc Declaration in Mexico in 1974 represented one of the earliest attempts by the UN to connect environmental protection and redistribution of global economic and social resources (UNEP/UNCTAD, 1975):

> *We recognize the threats to both the 'inner limits' of basic human needs and the 'outer limits' of the planet's physical resources. But we also believe that a new sense of respect for fundamental human rights and for the preservation of our planet is growing up behind the angry divisions and confrontations of our day.*

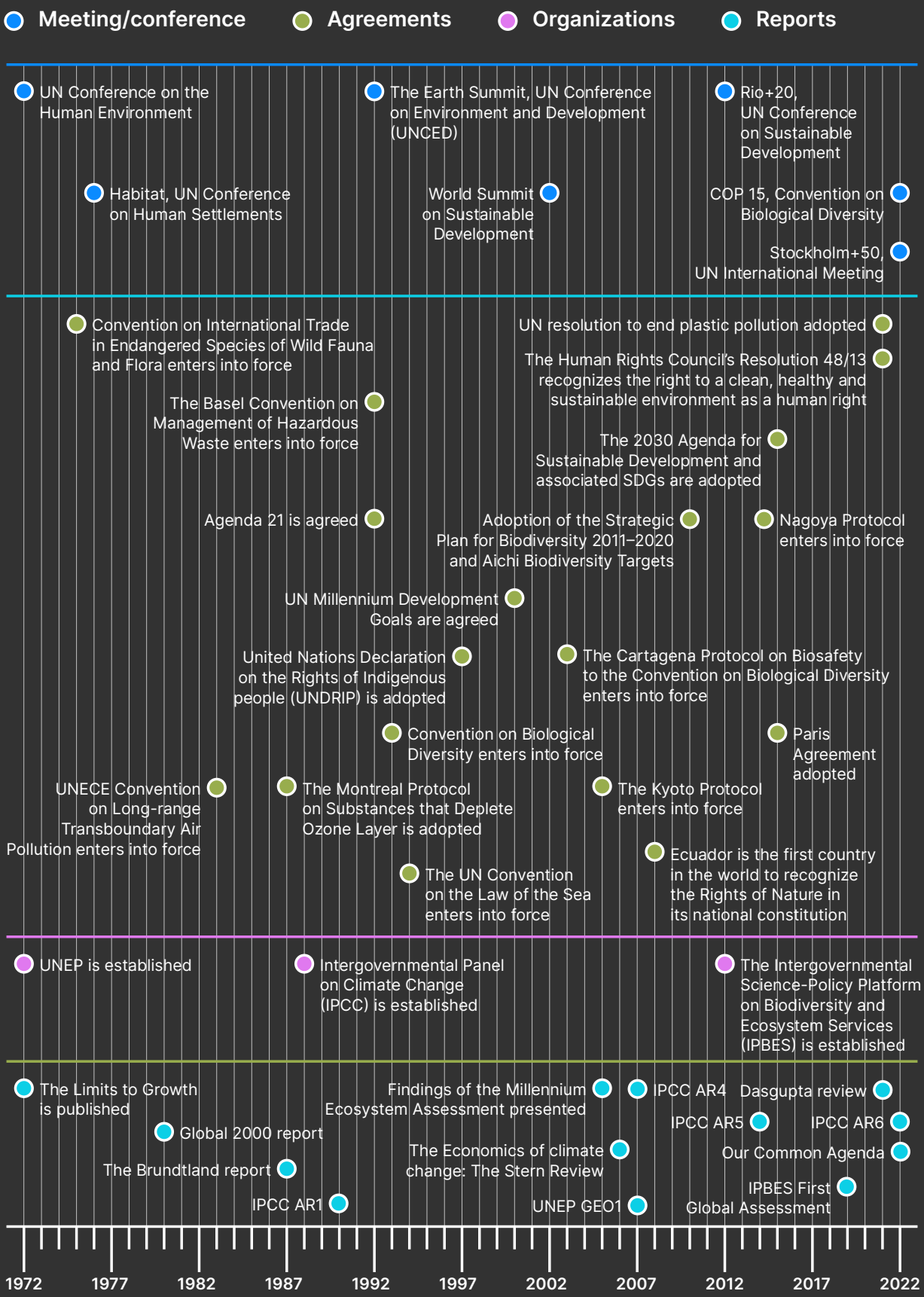
The principles of this statement continue to be reflected in current research on sustainability and the approaches we take in this report (see the Doughnut, from Raworth, 2017); and calculations on sustainability within 'planetary boundaries' (Fanning et al., 2020; O'Neill et al., 2018).

Reflecting on the 1972 Stockholm Declaration 50 years later, it is apparent how **the insights back then are still relevant today** – on the 'unprecedented scale' of human transformation of the environment, on the need to reconcile human development aspirations with protection of the planet, and on the need to fundamentally address equity in this endeavour. Today, the scale is larger. As this report will show, so far, our development pathways have not aligned with the principles established in 1972. While making positive change at the margins, outcomes have not been fair and equitable, and we have lost sight of protecting the planet. At the same time, there are more opportunities and momentum for change than before – technological, financial, and social, among them.

This calls for a new watershed moment at Stockholm+50, for sustainable development, for global governance and for unlocking a better future for humanity and Earth.

Figure 2.1

Sustainability milestones 1972–2022



2.1 Taking stock of the past 50 years

As a watershed moment, the 1972 Stockholm Conference successfully helped set global agendas, stimulate integrative thinking and legitimize global governance (BP Michel). Because of that and subsequent meetings, today we have institutional frameworks for environmental governance at both international, national and subnational levels (see Figure 2.1). This moment also unfolded in a geopolitical context that included Cold War and ongoing decolonization (Linnér & Selin, 2021; Mobjörk & Lövbrand, 2021).

International and local efforts have successfully reduced – if not completely eliminated – many environmental problems. At the global level, countries successfully cooperated on reducing stratospheric ozone depletion. Concerted efforts have mitigated acid rain, removed lead from gasoline, and expanded access to safe drinking water. Air, water and chemical pollution from point sources, such as industrial facilities, has been tackled in many places, improving human and environmental health.

Yet at the global level, the international community has not managed to meet the many environmental and sustainable development targets it has set for itself. Looking at major sets of global goals since 1972, Figure 2.2 shows that measurable targets have been achieved only to a very modest extent (see Appendix and also Box 2.1). **There is a significant 'action gap' between intention and results.**

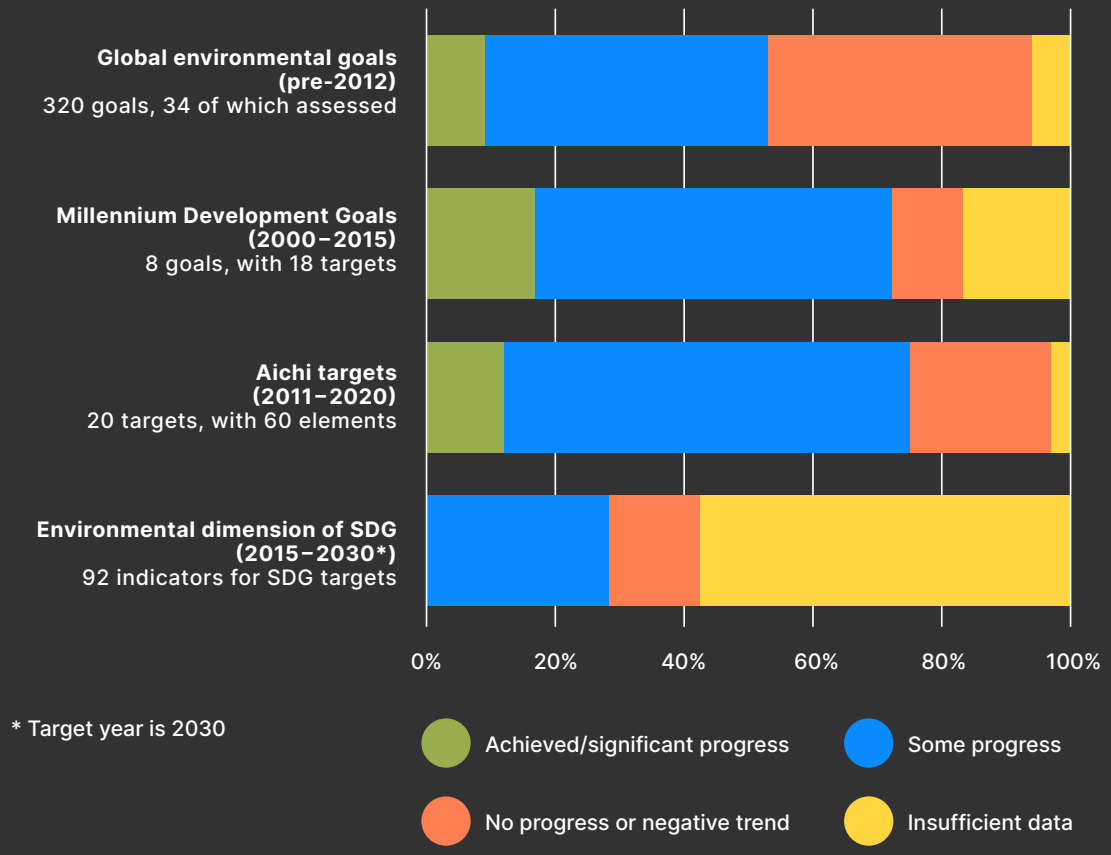
One-tenth of targets show significant progress or can be considered achieved.

Although comparison across goals of different nature is difficult, it is still indicative that typically only one-tenth of targets show significant progress or can be considered achieved. In the case of the Millennium Development Goals, only one of four targets under MDG7 on environmental sustainability was achieved. For the environment-related targets for the Sustainable Development Goals (SDGs) – for which there is still time to make progress before 2030 – there are negative trends for material footprints, sustainable fish stocks, forested area and endangered species (UNEP, 2021e).

What this overall picture suggests is that at the global level, the action gap stems less from a policy gap, i.e. a lack of targets, policies and strategies, and more from an implementation gap, i.e. lack of effective implementation of existing targets. **The too-slow rate of progress calls for acceleration in action and implementation, not just setting new targets.**

Generating real action requires **supporting measures**, including financing, technical cooperation and organizations with strong mandates. Such supporting measures were recognized as a cornerstone in 1972 for effective environmental action; our assessment of key indicators shows that, on the whole, international supporting measures remain too weak to deliver on the

Figure 2.2
Achievement of global environment and sustainable development targets



* Target year is 2030

Source: Based on data from (Secretariat of the Convention on Biological Diversity (2020); UNEP (2012b, 2021e); United Nations (2015). For methodological detail, see Appendix.

goals (Box 2.1; Figure 2.3). The framework for environmental action conceived in 1972 has delivered many *outputs*, in terms of political and scientific activity, but *outcomes* and *impacts* for a healthier planet remain insufficient.

BOX 2.1 Assessing implementation of the 1972 Stockholm framework for environmental action

The 1972 Stockholm Conference resulted in a comprehensive package: a declaration with 26 principles and an Action Plan with no less than 109 recommendations. An overarching 'Framework for Environmental Action' was introduced, with three key elements: environmental assessment, environmental management, and international supporting measures (United Nations, 1973, p. 6).

Today, 50 years later, we can assess its implementation, as a basis for more specific efforts and actions ahead (see Figure 2.3; additional information in Appendix). Overall, knowledge has been generated, goals have been set and agreements have been made, but the supporting measures are too weak to deliver on the goals and lead to actions in accordance with our knowledge.

Looking back gives greater urgency to closing the action gap between targets and results in 2022. By failing to provide strong supporting measures, inequity persists in the pursuit of sustainable development. Turning to the present, the framework established in 1972 needs to be transformed so that it responds to the challenges and urgency of today, and reflects the implementation lessons learned from the past 50 years.

2.2 The world we live in

The planet has changed dramatically over the past half-century, due to human impact. In 1972, the climate crisis had yet to come to the fore. Biodiversity was richer. Now we understand more about how our planet and its systems function as we sit at the edge of tipping these systems beyond their current form.

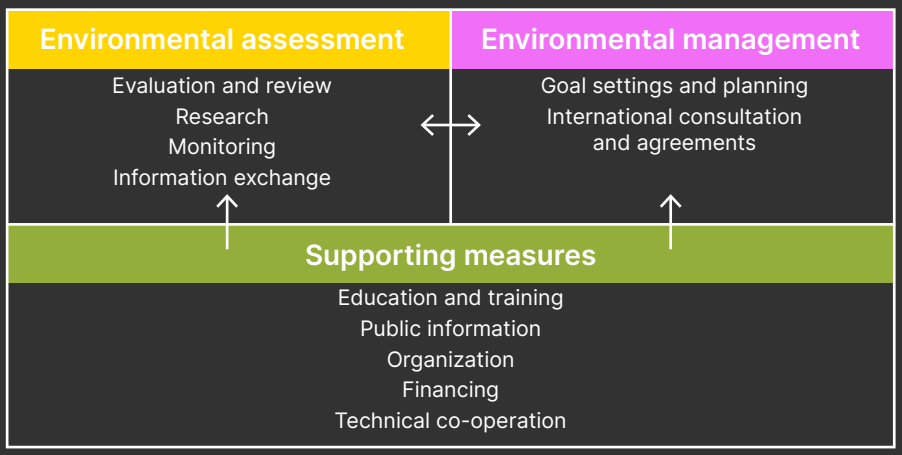
Meanwhile, many people lead better lives today than their parents expected for them. We live longer, with access to more – more clean water, material goods, food and healthcare, among other needs and wants.

However, many people do not. Billions of people still live without clean water and sanitation, and millions of households are still cooking with polluting traditional biomass or the dirtiest fossil fuels. The Covid-19 pandemic has reversed past progress, throwing millions more people into extreme poverty and hunger, as well as conditions where health, education, and other basic needs are lacking (see Box 2.2).

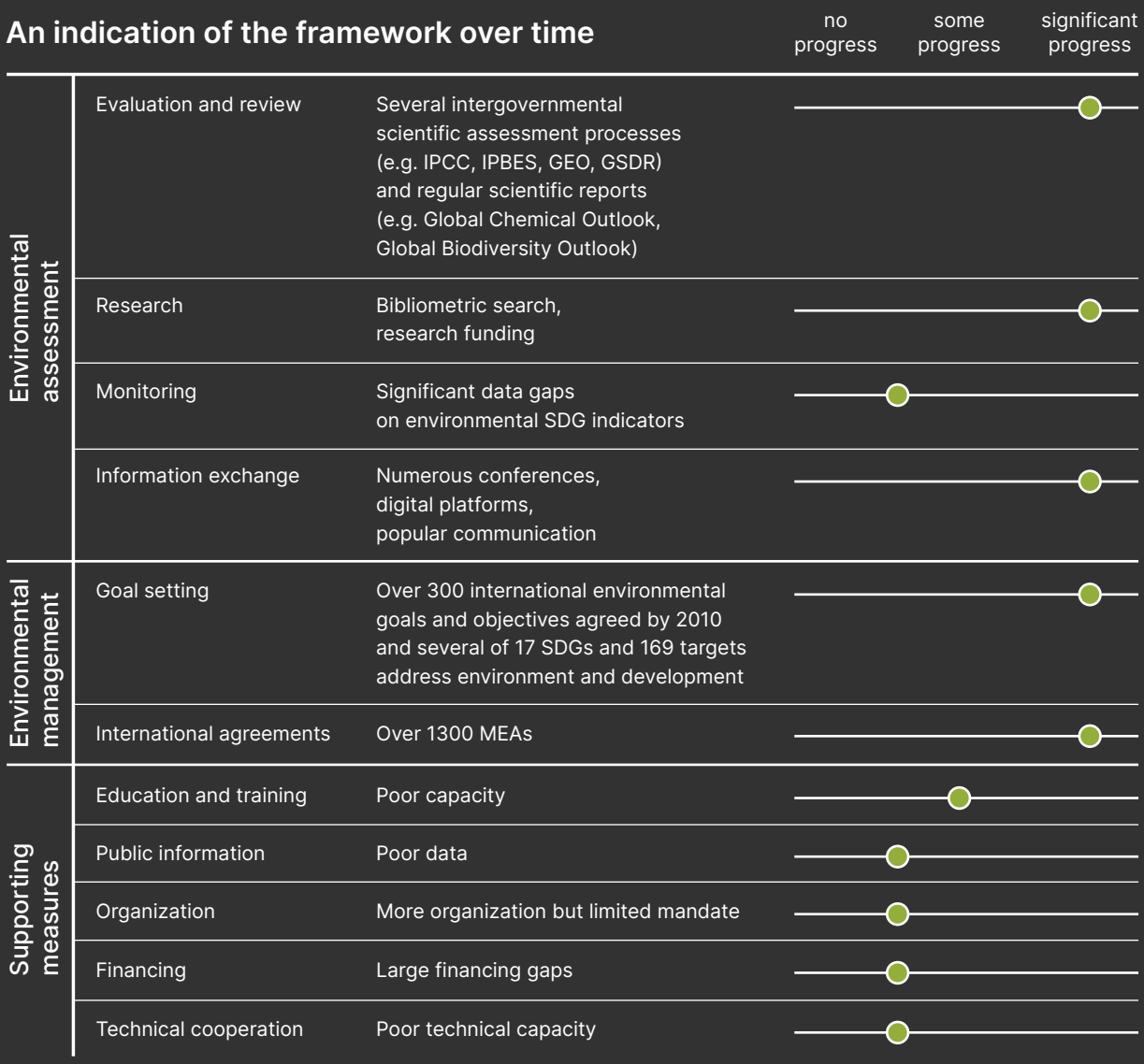
Figure 2.3

Assessing the 1972 Stockholm environmental action framework

Framework for environmental action set out in the 1972 Stockholm Action Plan for the Human Environment



An indication of the framework over time



Source: see Appendix.

BOX 2.2 Covid-19 and the sustainability agenda

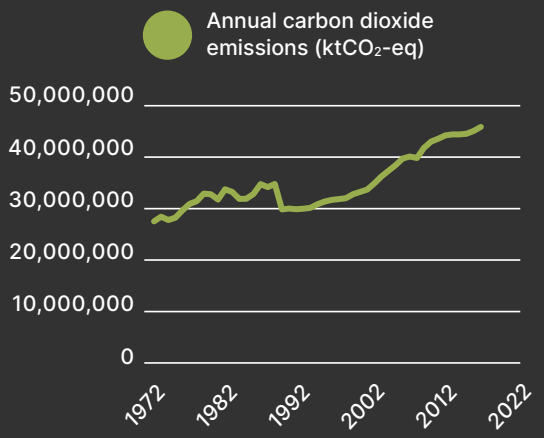
The world as a whole is far from escaping the virus. According to WHO's Coronavirus Dashboard (https://covid19.who.int/), at the end of March 2022, over half of the world's population was fully vaccinated. But those figures were 72% and 73% for upper-middle and high-income countries, 48% for lower middle-income countries, and only 12% in low-income countries. Moreover, Gross Domestic Product (GDP) per capita further correlates to the variation in vaccination rates between countries (Basak et al., 2022). While high-income countries might see signs of recovery (Cuerpo, 2022), that is not the case for lower-income countries (Dinh, 2022), particularly those that were already highly vulnerable (Rajah & Dayant, 2022).

The world as a whole is even farther from recovering from the pandemic. Even before Covid-19-related fiscal recovery funds began to flow, calls had been made for a 'green and inclusive' recovery. The OECD (2020b) highlighted the opportunities opened by a green recovery for jobs and income, as well as growth; Shawoo and Verkuijl (2020) pointed out how Nationally Determined Contributions (NDCs) to climate mitigation and long-term low-emission development strategies (LT-LEDS) can help 'build back better' through a just transition; Krebel and colleagues (2020) argued for 'a recovery plan for a greener, fairer future'; and the UN Department of Economic and Social Affairs (UN DESA, 2020) identified risks, challenges, and opportunities for 'recovering better' by using the Sustainable Development Goals (SDGs) as the compass. Funding is more than sufficient, with recovery funds 'dwarfing' the finance needed for clean energy (Andrijevic et al., 2020). There is no shortage of policy instruments, either, with high potential for both economic stimulus and climate impact (Hepburn et al., 2020).

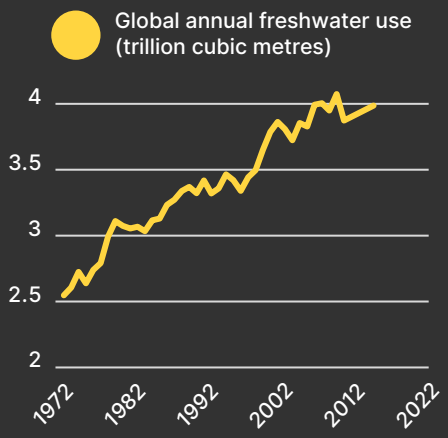
Yet the calls have largely gone unheard. Le Quéré and co-authors (2021) reported that most Covid-19 recovery plans contradict climate commitments, while Shawoo and Verkuijl (2020) noted that the opportunities they had identified for NDCs and LT-LEDS had yet to be reflected in climate pledges. The 2021 *Production Gap Report* (SEI et al., 2021) showed that Covid-19 recovery commitments from the G20 nations mainly supported fossil energy sources; only 6% of total stimulus spending was allocated to areas that cut emissions, and 3% targeted activities that are likely to increase global emissions (Nahm et al., 2022). While the commitments vary considerably from one country to another, the current trends are not encouraging.

Moreover, the response to the pandemic has been highly unequal (see BP Ghosh & Raha), with high-income countries 'hoarding' vaccines, leading to what some have called 'vaccine apartheid' (Gupta, 2022). Yamin (2022) argues that this is not only immoral, it is self-defeating: equitable distribution of the vaccine would more effectively limit the emergence and spread of new variants. The response to the Covid-19 pandemic – which is very obviously a global challenge requiring coordinated action, where the science is well-understood – is sobering. The scale of the sustainability challenge is much larger, less immediate, and more uncertain, yet the need for coordinated action is just as great – if not greater. Yet our experience with Covid-19 need not be a sign of things to come. It can be a wake-up call.

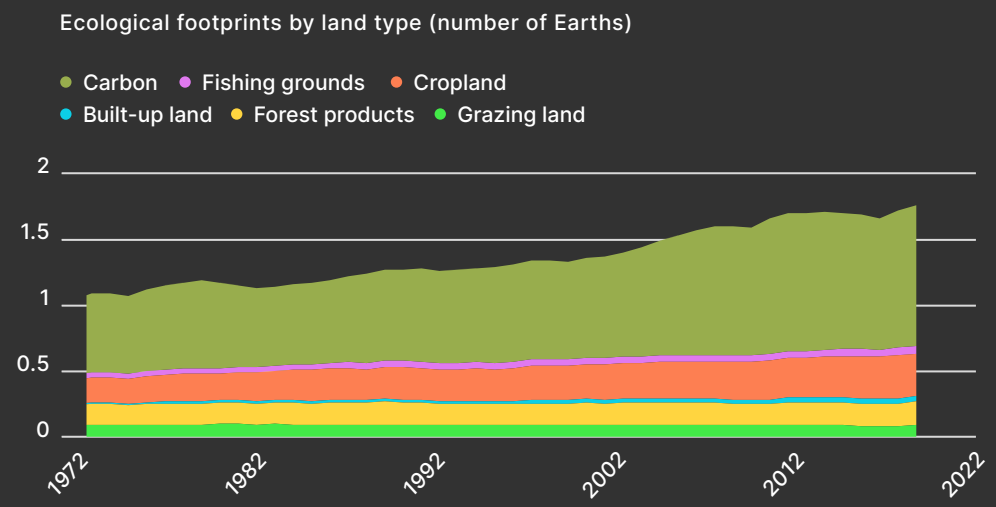
Figure 2.4
Environmental indicators, 1972–2022



Source: World Development Indicators database.



Source: Global International Geosphere-Biosphere Programme (IGB).



Source: Footprint Network, 2022 National Footprint and Biocapacity

Looking at the scientific evidence, **we live amid entwined crises** – planetary and human. The evidence shows just how much our human well-being relies on the planetary systems that we are changing. The natural systems that support life on Earth have been breached, and the human systems remain plagued by inequalities.

2.2.1 The state of the planet

Fifty years after the 1972 Stockholm Conference, the human population has doubled, the global economy has grown nearly 4-fold and global trade has grown 10-fold, together driving up the demand for energy and materials (IPBES, 2019b). And the warnings that our planet is in crisis continue to be clear, as reflected in trends on a number of environmental indicators (see Figure 2.4). Recent research on chemical pollution showed that we have now crossed the fifth of the nine 'planetary boundaries' that define the biophysical limits of Earth's major systems (Persson et al., 2022).

Taken together, the evidence base in recent international scientific assessments sends consistent and clear messages (see Box 2.3; for more trends and data, see (Independent Group of Scientists appointed by the Secretary-General, 2019; IPBES, 2019b; IPCC, 2021, 2022a; IRP, 2019; UNEP, 2012a, 2021d):

- humans are causing unprecedented change;
- the inequity among people and places in both causing deterioration and suffering impacts is high;
- action must be urgent and transformative; and
- we increasingly must address our economic system (consumption, production and finance) as the core driver.

Photo: Basia Aszta̧bska / Moment / GettyImages

Box 2.3 Key messages from recent international scientific assessments

Climate change – IPCC Sixth Assessment Report, Working Groups I (2021), II (2022) and III (2022)

- The scale of recent changes across the climate system as a whole are **unprecedented** over centuries to thousands of years.
- Many changes due to past and future greenhouse gas emissions are **irreversible** for centuries to millennia, especially changes in the ocean, ice sheets and global sea level.
- Unless there are immediate, rapid, and large-scale reductions in greenhouse gas emissions, **limiting warming to 1.5°C will be beyond reach (IPCC, 2021).**
- 'The climate we experience in the future depends on our decisions now' (IPCC, 2021).
- Climate change has **already caused widespread adverse impacts** to nature and people, beyond natural climate variability, and across sectors and regions the most vulnerable people and systems are observed to be disproportionately affected.
- Approximately **three billion people live in contexts that are highly vulnerable** to climate change, and current unsustainable development patterns are increasing exposure of ecosystems and people to climate hazards.
- Increased evidence of climate action and options available are now in every sector that can at least halve emissions by 2030; **1.5°C is attainable only with net-zero emissions** (IPCC, 2022b).

Biodiversity and ecosystems – IPBES Global Assessment, 2019

- Nature and its vital contributions to people, which together embody biodiversity and ecosystem functions and services, are **deteriorating worldwide**.
- Since 1970, trends in agricultural production, fish harvest, bioenergy production and harvest of materials have increased, but 14 of the 18 categories of contributions of nature that were assessed, mostly **regulating and non-material contributions**, have declined.
- Goals for conserving and sustainably using nature and achieving sustainability cannot be met by current trajectories, and goals for 2030 and beyond may **only be achieved through transformative changes** across economic, social, political and technological factors.

Natural resources – IRP Global Resources Outlook, 2019

- The use of natural resources has **more than tripled** from 1970 and continues to grow.
- The use of natural resources and the related benefits and environmental impacts are **unevenly distributed** across countries and regions.
- In the absence of urgent and concerted action, rapid growth and inefficient use of natural resources will continue to create **unsustainable pressures** on the environment.

Global environment – Sixth Global Environmental Outlook (GEO-6), 2019

- **Unsustainable production and consumption** patterns put at risk the healthy planet needed to attain sustainable development.
- The world is **not on track** to achieve the environmental dimension of the SDGs or other internationally agreed environmental goals by 2030; nor is it on track to deliver long-term sustainability by 2050.

- The **social and economic costs of inaction** often exceed the costs of action and are **inequitably distributed**, often being borne by the poorest and most vulnerable in society, including Indigenous and local communities, particularly in developing countries.
- **Transformative change** that will enable us to achieve the SDGs and other internationally agreed targets includes a tripling of the current decarbonization rate as we head towards 2050, a 50% increase in food production and the adoption of healthy and sustainable diets across all global regions.

Sustainable development – UN Global Sustainable Development Report, 2019

- The world is **not on track** for achieving most of the 169 targets that comprise the Goals.
- Adding to the concern is the fact that recent trends along several dimensions with cross-cutting impacts across the entire 2030 Agenda are not even moving in the right direction. Four in particular fall into that category: **rising inequalities, climate change, biodiversity loss and increasing amounts of waste** from human activity that are overwhelming capacities to process them.
- Recent assessments show that, under current trends, the world's social and natural biophysical systems **cannot support the aspirations for universal human well-being** embedded in the SDGs.

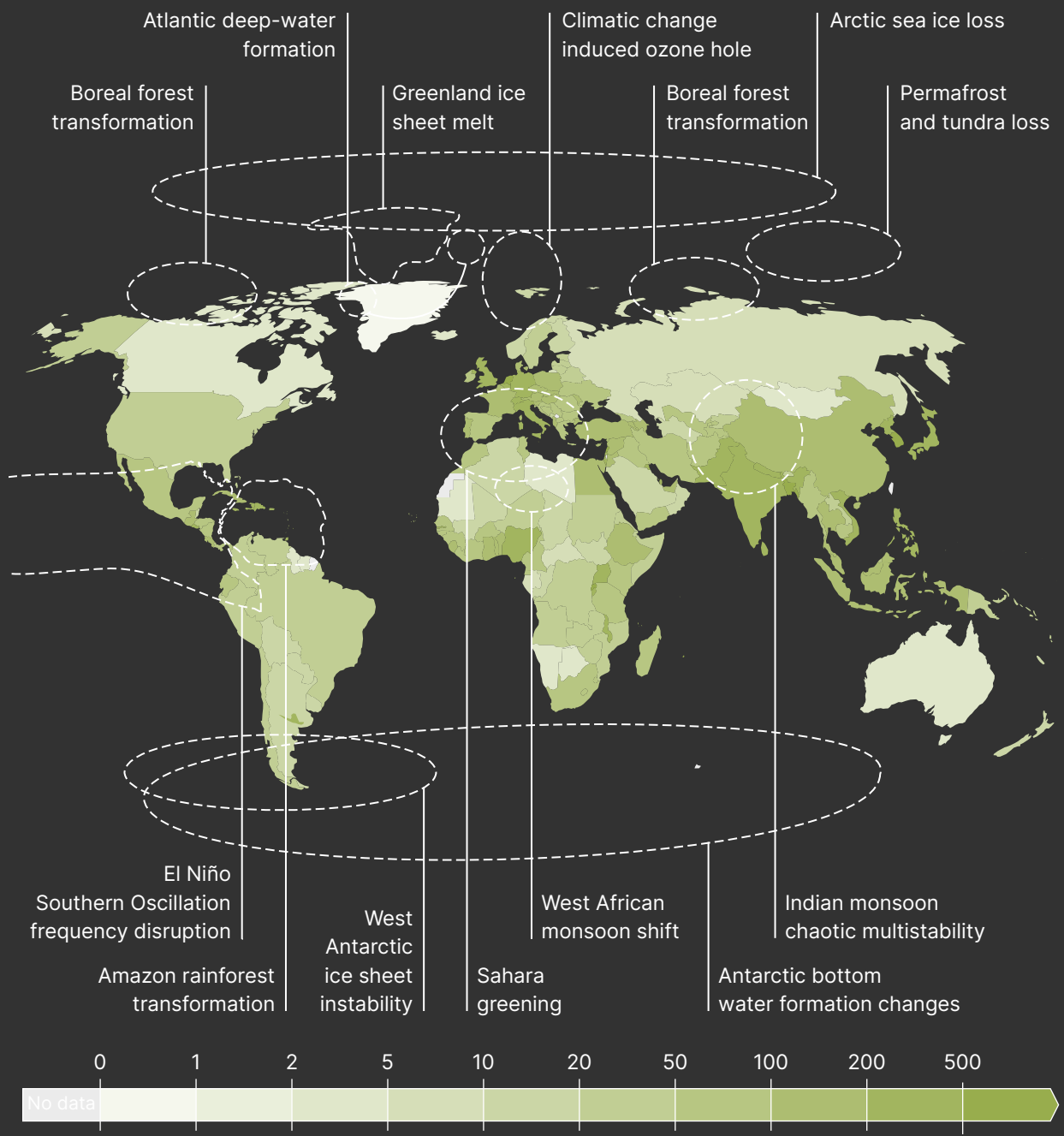
Synthesis report – UNEP Making Peace with Nature, 2021 (a synthesis of latest IPCC, IPBES and GEO assessments)

- Environmental changes are **undermining hard-won development gains** by causing economic costs and millions of premature deaths annually.
- The well-being of today's youth and future generations depends on an **urgent and clear break** with current trends of environmental decline.
- The **economic, financial and productive systems** can and should be transformed to lead and power the shift to sustainability. Society needs to include natural capital in decision-making, eliminate environmentally harmful subsidies and invest in the transition to a sustainable future.
- The **coming decade** is crucial.

Figure 2.5

Tipping elements in the Earth's climate system

The map shows potential tipping elements that could be triggered this century and would change within this millennium. Permafrost and tundra loss, climate change-induced ozone hole and changes in Antarctic bottom water formation are particularly uncertain as tipping elements. More recent research on tipping cascades include elements of coral reef destruction, thermohaline circulation slowdown, Jet stream stagnation, Sahel drying, Alpine glacier melt and East Antarctic Ice Sheet instability, and indicate the temperature at which elements risk tipping as well as linkages between them (Steffen et al., 2018).



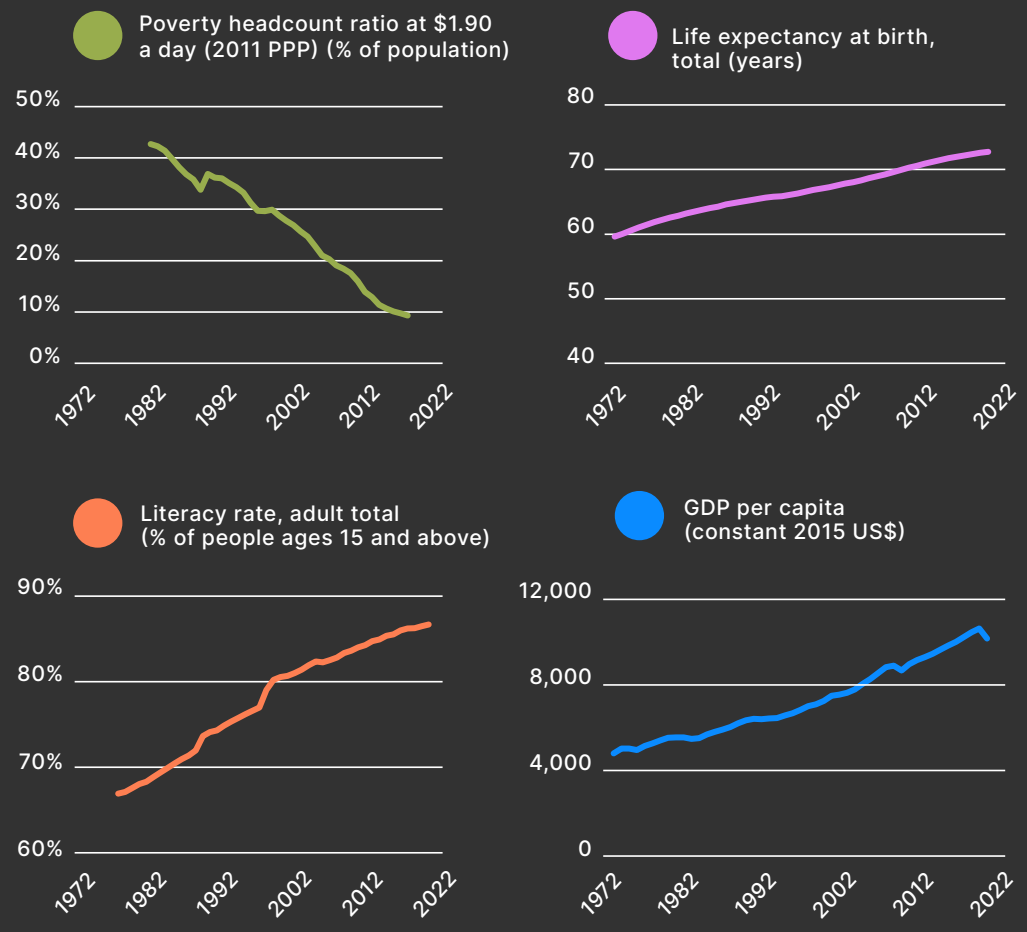
Source: Adapted from Steffen et al. (2018)

Today we also are confronted with tipping points in the Earth system we were unaware of in 1972 – some of which might be triggered in our lifetimes and are irreversible, including permafrost loss, ice sheet disintegration, and rainforest dieback (Lenton et al., 2008; Steffen et al., 2018; see Figure 2.5).

Given what we know about these pressures, we can also anticipate new and emerging environmental issues in the next 50 years that will require global environmental governance. These range from issues manifested locally, such as maladaptation to environmental change and environmental displacement, to issues interfering with our global commons, such as climate geoengineering, seabed mining and resource extraction, and resource extraction from space, to environmental risks of new technologies, such as synthetic biology, nanomaterials and artificial intelligence (Morin & Richard, 2021; Simon et al., 2021; UNEP, 2017a, 2019).

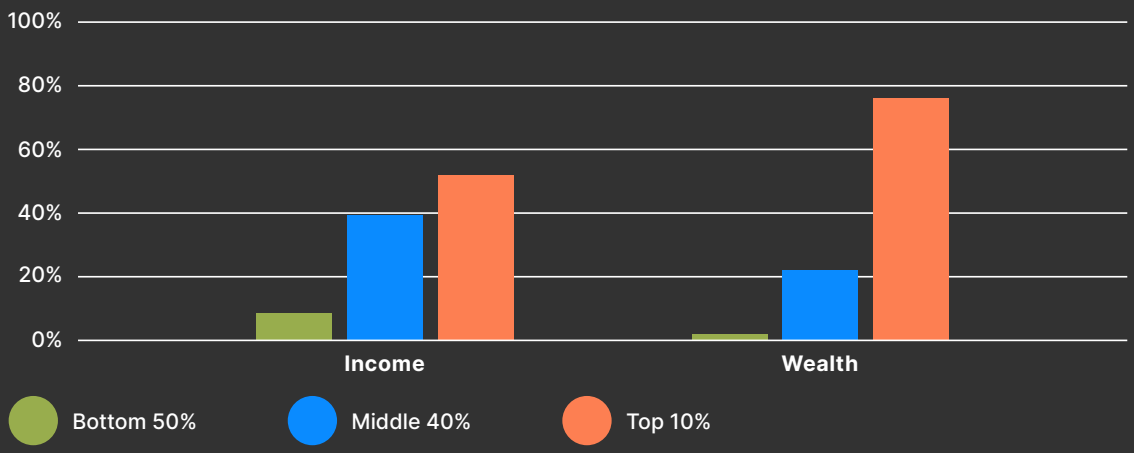
Photo: PhotoStock-Israel / Photodisc / GettyImages

Figure 2.6
Human development indicators, 1972–2022



Source: World Bank (https://databank.worldbank.org/source/world-development-indicators).

Figure 2.7
Global income and wealth inequality



Source: Adapted from Chancel et al. (2021).

2.2.2 The state of human development

Over the past 50 years, people and societies have improved social and economic well-being (Figure 2.6; UNDP, 2020). For example, for human health, gains have been made for maternal health, life expectancy, and combatting HIV/AIDS. Extreme poverty has more than halved and education is accessible to many more people.

Yet human development has been uneven. While global inequality between countries is declining, inequality within countries is increasing (Figure 2.7). The poorest half of the global population owns barely 2% of the total global wealth. In contrast, the richest 10% of the global population owns 76% of all wealth (Chancel et al., 2021). Compared to 1972, overdevelopment and affluence rather than underdevelopment and scarcity is a driver of unsustainable resource use (IRP, 2019).

The Covid-19 pandemic has triggered a spike in **inequality within countries across the world**. The wealth of the 10 richest men in the world doubled in 2020, while the incomes of 99% of humanity are worse because of Covid-19 (Ahmed et al., 2022).

The pandemic further laid bare inequality (see Guerrero et al., 2020; Rogers et al., 2020; The Lancet, 2020). Both wealthier individuals and wealthier countries had access to vaccines, healthcare and basic needs, and low-income countries and individuals did not.

As nations and some of their citizens have become richer, governments have become poorer. The gap between the net wealth of governments and of the private sector has increased over the past 40 years. The share of wealth held by public actors is close to zero or negative in rich countries, meaning that the totality of wealth is in private hands (Chancel et al., 2021).

The wealth of governments has important implications for state capacities to tackle inequality.

This trend has been magnified by the Covid-19 crisis, during which governments borrowed the equivalent of 10–20% of GDP, essentially from the private sector. The wealth of governments has important implications for state capacities to tackle inequality in the future, as well as the role of private stakeholders in addressing key challenges of the 21st century such as climate change (Chancel et al., 2021; see section 3.2 below).

Inequality connects with the planetary crisis both as a driver and impact. Between 1999 and 2018, extreme weather events caused about half a million deaths worldwide (Mohanty 2020). Growing climate and health stresses are raising the chances of such high-impact events occurring more frequently – and often overlapping. The domino effects of associated events can overwhelm the responsive capacities of communities, governments and multilateral organizations (BP Ghosh & Raha).

The gravest impacts have been borne by the poorest countries and most vulnerable communities. Climate disaster-related death tolls of potentially exposed populations during 2000–2017 indicate 16 deaths per million for high-income groups, compared to 60 per million for low-income groups. Climate-related disaster GDP losses by income groups, recorded from 1998 to 2017, also illustrate this stark disparity, ranging from more than 0.4% for high-income groups on a GDP base of USD 1.43 trillion, to nearly 1.8% for low-income groups on a GDP base of USD 21 billion (CRED & UNISDR, 2018).

As early as the mid-1990s, 90% of deaths caused by air pollution were in developing countries, mostly due to indoor air quality in rural areas. Soil degradation also impacts the poor, as nearly a third of the world's population depends on subsistence farming. Between 2000 and 2019, China and India accounted for about 70% of all disaster-affected people (Eckstein et al., 2021). Just one super-cyclone, *Amphan*, displaced about 2.5 million people each in India and Bangladesh in May 2020 (WMO, 2021) – while the region was already struggling with the Covid-19 pandemic.

Climate and other environmental risks disproportionately affect the poorest countries and the poorest people.

The degree of vulnerability of people to loss and damage from climate hazards and other environmental risks often depends on their livelihood, gender, age, ethnicity and race, but also government capacities. Climate and other environmental risks disproportionately affect the poorest countries and the poorest people, whether in low- or high-income countries, who are more exposed and more vulnerable to such impacts (BP Nazareth & Ghosh). In such economies, a large part of the population is engaged in biodiversity-related work that may be the most affected by climate change, notably, the agricultural, forestry, and fisheries sectors (UN DESA, 2016).

Inequality in incomes is also reflected in the unequal resource use and emissions. For instance, the richest 10% of the global population were responsible for emitting more than half of the total carbon emissions during 1990–2015 (BP Agarwal & Kalra; BP Dalhammar et al.; Kartha et al., 2020; BP Nazareth & Ghosh). New research on individuals' emissions shows that the difference in carbon footprint ranges from almost 55 metric tons of carbon dioxide (tCO_2) per year for the top 10% emitters in the US to less than 1 tCO_2 for the top 10% emitters in countries such as Uganda and Ethiopia, and it is less than 0.2 tCO_2 for the bottom 10% emitters in most sub-Saharan countries (Bruckner et al., 2022). The increase in global carbon emissions associated with lifting more than one billion people out of poverty, in line with targets under SDG1, would amount to only 1.6–2.1% or less (Bruckner et al., 2022).

2.2.3 Intertwined crises

Higher economic development in the past 50 years has meant larger ecological footprints, a pattern that has proven hard to break. Countries with a higher Human Development Index (HDI) typically have higher ecological

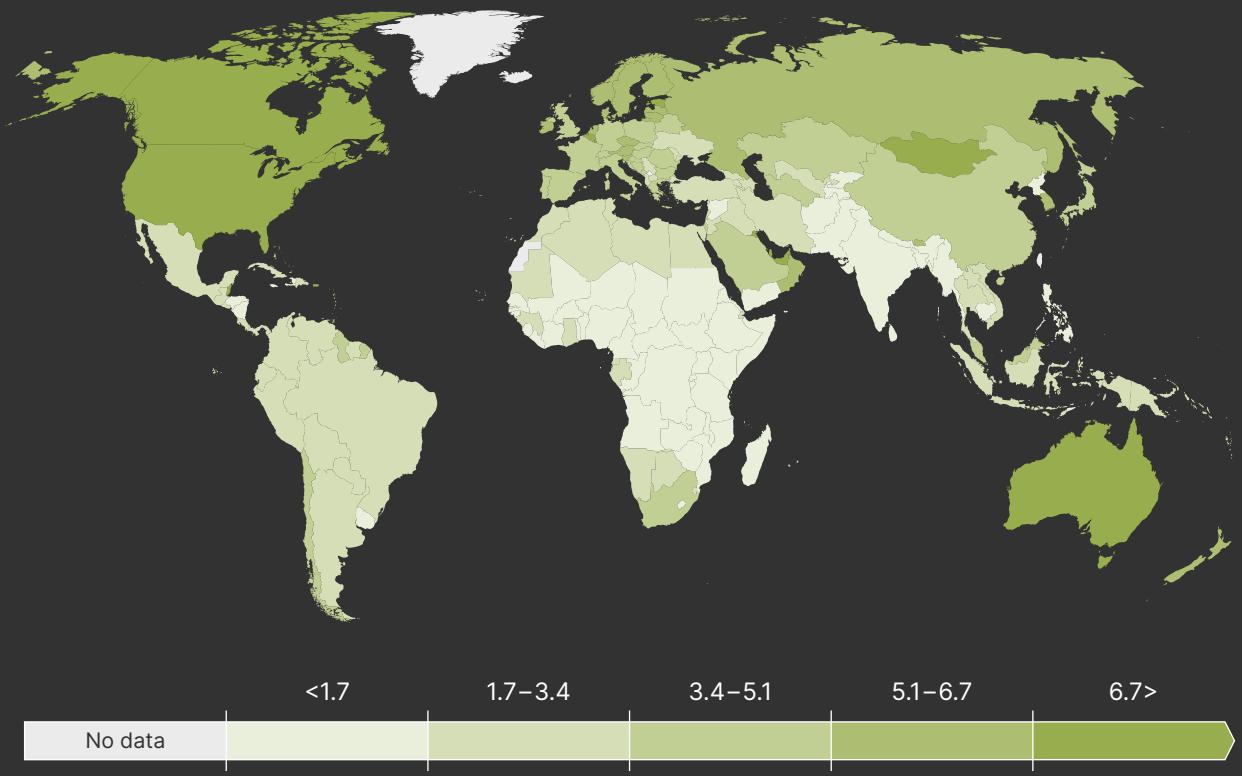
footprints (Figure 2.8) due to higher consumption of resources to sustain their lifestyles (Global Footprint Network, n.d.-b). If the global population were to emulate current lifestyles prevalent in the Global North, we would need three to five Earths to sustain such consumption habits, which we clearly do not have (BP Agrawal & Kalra; Global Footprint Network, n.d.-a).

Currently, no country is delivering what its citizens need without transgressing the biophysical planetary boundaries (O'Neill et al., 2018; see Figure 2.9). Staying within the planetary boundaries can still lead to negative repercussions at local and regional levels, e.g. water scarcity and air pollution.

High-income countries must drastically reduce their footprints, especially in light of their cumulative footprints over time (Hickel, 2020), to avoid closing development pathways for low-income countries. The choices available

Figure 2.8

Ecological footprint per person

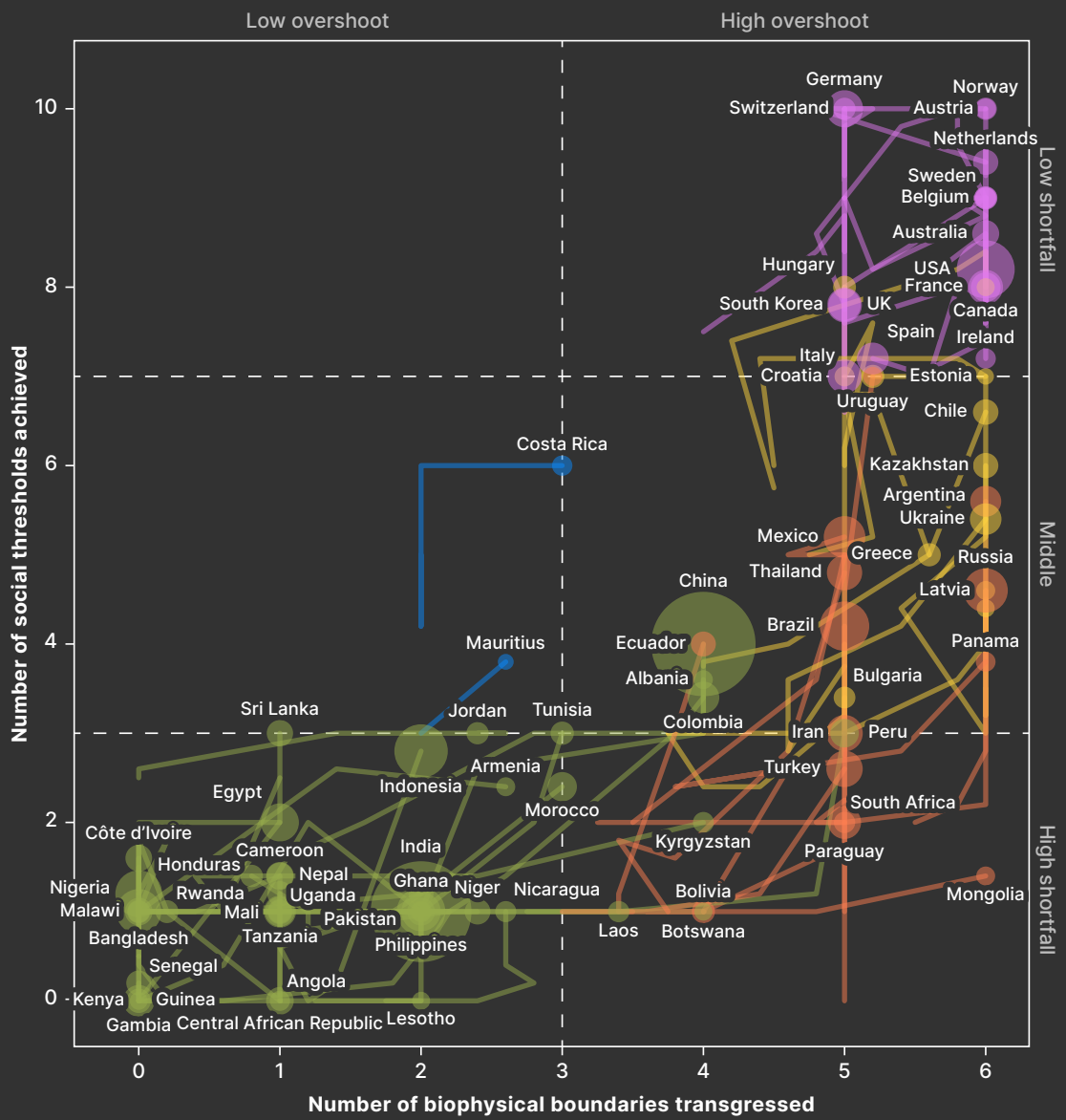


Ecological Footprint per person: A nation's total ecological footprint divided by its total population. An ecological footprint of 1.7 corresponds to the available biocapacity per person on our planet.

Source: Adapted from Global Footprint Network, York University, and Footprint Data Foundation (2021). Global Ecological Footprint data. Available at https://data.footprintnetwork.org (Global Footprint Network, n.d.-b).

to people to reduce their footprint are constrained by existing systems of production and distribution; they are 'locked in' to the infrastructure and systems around them (see Section 4.2). Structural changes to these systems are needed: material shifts in the access to planetary resources, technological shifts that offer alternative modes of production with lower resource footprints, and behavioural shifts in what people want and value.

Figure 2.9
Social achievements, biophysical transgressions: country performance 1992–2015



Source: Adapted from Fanning et al. (2022).

2.3 Future generations

Those of us who were the once-distant 'future generations' in 1972 now have children and perhaps even grandchildren. What was once the future material consequences of planetary pressures are becoming increasingly clear and closer – and in some cases, reality (World Weather Attribution, n.d.).

The 1972 Stockholm Declaration committed to safeguarding the planet's natural resources for future generations (Principle 2), establishing the principle of equity not just between people and nations but between generations. Fifty years later, we see **growing inequalities in life prospects between generations** – effectively a form of intergenerational discrimination.

A 'low-carbon life' can and should be a good life.

Scientific evidence shows that children and young generations already bear a disproportionate disease burden of climate change (Helldén et al., 2021; UNICEF, 2015; Watts et al., 2019). Extreme weather and climate change–induced disasters have direct effects on children, such as higher vulnerability to vector-borne diseases and greater dangers from undernutrition, and indirect effects, such as loss of education and risk of human trafficking. The fossil-fuel combustion that drives longer-term climate impacts makes children more vulnerable to respiratory diseases, and leads to heat stress that can even affect education and mental health of adolescents (Perera, 2017; Watts et al., 2019). Climate change can further exacerbate inequalities in life prospects for children born in wealthy versus poor families (UNICEF, 2015).

Scenarios for future climate change indicate what young and future generations face. A person born today may live in a '4° world', on average 4°C warmer than pre-industrial levels: 16% of species would be at risk of extinction, compared with 5% at 2°C warming (IPBES, 2019a, p. 37). A person born in 2020 may be up to seven times as much exposed to heat waves during their lifetime, compared with a person born in 1960 (Thiery et al., 2021). **At current rates, the available ecological space will be smaller in the future, which will decrease the carbon budget for all** – less forested area, for example, means less carbon dioxide sequestered, with further impacts on climate.

However, if governments implement the International Energy Agency (IEA) 'Net-Zero Emissions by 2050 Scenario', future generations would use far less carbon than someone born in the 1950s, for example, who on average has a lifetime carbon dioxide footprint of 350 tCO2 – of which 286 tCO2 has already been emitted. With the net-zero scenario, someone born in the 2020s would have a lifetime footprint of 34 tCO2 (IEA, 2022). Senior citizens, born in the 1950s and before, have driven up greenhouse gas emissions in the past decade, as wealthy societies have aged and changed their expenditure patterns (Zheng et al., 2022).

A 'low-carbon life' can and should be a good life. Without transforming our systems to reach that good life more quickly, we are rapidly limiting options for future generations.

3

The next 50 years: from urgency to agency

Highlights

- The world has already agreed on a common vision for sustainable development – Agenda 2030. Stockholm+50 can be the moment to make it come to fruition, by relating it to our everyday lives around the world and by considering more systematically the synergies and trade-offs between SDGs, while making the policy and planning to achieve them.

- Momentum for change has increased rapidly in many respects – public opinion appears to show that people recognize the urgency and indicate their willingness to change lifestyles; development and uptake of some technologies have been faster than anticipated, and better policy evidence shows the many wins and co-benefits from taking climate and sustainability action. Youth worldwide are both exercising and demanding more agency.

- Harnessing this momentum, we need to find ways to compress timescales for decision-making and roll-out of key investments and infrastructure without compromising values of democratic legitimacy and stakeholder consultation. Simultaneously, timescales must be extended in the preparation for decision-making to avoid 'lock-in' in unsustainable infrastructure, avoid intergenerational discrimination, and make bold long-term plans.

- We are better equipped than ever to make 2022 a new watershed moment for pursuit of our sustainable future on Earth. We are also as troubled as ever in our dealings with each other. We must move from acknowledging urgency to taking actions now that enable a better future for all.

There are broad vistas for the enhancement of environmental quality and the creation of a good life. What is needed is an enthusiastic but calm state of mind and intense but orderly work.

– 1972 Stockholm Declaration, Preamble

In many ways, we have grown used to hearing dire reports on the state of the planet and the urgency of action, and it can have a numbing effect. In this chapter, we turn our eyes forward.

The scientific evidence presented in the previous chapter is irrefutable, but the key issue at Stockholm+50 is how to move from urgency to agency. We look at how to build on momentum for change, in order to increase the pace of change. We also consider who has agency, so that actors and institutions fulfil their potential in both harnessing opportunity and taking responsibility.

3.1 Visions of a better future

What does a sustainable future look like? What should societies transform into? In both science and policy, actors increasingly use futures studies techniques – visioning, scenarios, modelling, foresight – to prepare for change and to shape change. A successful vision can capture the imagination of a broader community of stakeholders, and such visions have become important in sustainability science for developing transition pathways (UNEP, 2019; IPBES, 2019b).

The Stockholm+50 international meeting is nearly halfway into the decade of action for Agenda 2030, and it is timely to remind ourselves of the common vision already endorsed by all UN member states as part of the 2015 UN Resolution 'Transforming our world' (Articles 7 to 9 in the UN Resolution A/RES70/1; UNGA, 2015):

> *We envisage a world free of poverty, hunger, disease and want, where all life can thrive. We envisage a world free of fear and violence. A world with universal literacy. A world with equitable and universal access to quality education at all levels, to health care and social protection, where physical, mental and social well-being are assured. A world where we reaffirm our commitments regarding the human right to safe drinking water and sanitation and where there is improved hygiene; and where food is sufficient, safe, affordable and nutritious. A world where human habitats are safe, resilient and sustainable and where there is universal access to affordable, reliable and sustainable energy.*
>
> *We envisage a world of universal respect for human rights and human dignity, the rule of law, justice, equality and non-discrimination; of respect for race, ethnicity and cultural diversity; and of equal opportunity permitting the full realization of human potential and contributing to shared prosperity. A world which invests in its children and in which every child grows up free from violence and exploitation. A world in which every woman and girl enjoys full gender equality and all legal, social and economic barriers to their empowerment have been removed. A just, equitable, tolerant, open and socially inclusive world in which the needs of the most vulnerable are met.*

We envisage a world in which every country enjoys sustained, inclusive and sustainable economic growth and decent work for all. A world in which consumption and production patterns and use of all natural resources – from air to land, from rivers, lakes and aquifers to oceans and seas – are sustainable. One in which democracy, good governance and the rule of law, as well as an enabling environment at the national and international levels, are essential for sustainable development, including sustained and inclusive economic growth, social development, environmental protection and the eradication of poverty and hunger. One in which development and the application of technology are climate-sensitive, respect biodiversity and are resilient. One in which humanity lives in harmony with nature and in which wildlife and other living species are protected.

Stockholm+50 can be a moment to make this vision come alive. This means making it relatable to everyday lives (see BP Dalhammar et al.; BP Lindahl & Dalhammar; BP Mallya & Raha). More and more innovative efforts, such as initiatives drawing on the arts and humanities, show and imagine through storytelling what an everyday life would look like in 2030 or 2050 – such as museums of the future, climate fiction literature, art exhibitions and television series (Milkoreit, 2016; Oomen et al., 2021). Local stakeholders can 'co-create' exploratory scenarios to develop 'transformation pathways' (Bennett et al., 2016). 'Social labs' allow individuals to experiment with sustainable lifestyles (Sitra, 2021). These efforts are inspirational, but currently small-scale.

A just, equitable, tolerant, open and socially inclusive world in which the needs of the most vulnerable are met.

The SDGs vision can also come alive through better integration into national and local policy and planning, especially by considering trade-offs and synergies when pursuing the SDG vision in a systematic way. Achieving the vision as laid out above includes harnessing synergies, but also acknowledging critical trade-offs. Recent research has led to a number of methods, tools and frameworks for considering trade-offs and synergies (see e.g. Nilsson et al., 2016; Nilsson & Weitz, 2019; Pham-Truffert et al., 2020; Pradhan et al., 2017). There is great potential in more policy uptake of these tools and approaches, as an aid to planning for the future (Allen et al., 2021).

Finally, Stockholm+50 can be a moment for starting a conversation on how to imagine a science-based, participatory and compelling post-2030 vision and narrative on sustainable development, while not diverting attention from the current action gap and commitment to a Decade of Action.

3.2 Growing momentum for change

Looking ahead, evidence suggests that in some areas momentum is growing for actions that can ultimately lead to transformative changes for sustainable development. That evidence includes public opinion and financial commitments, as well as advances in new technologies. These are important improvements in the conditions for accelerating the pace of change, but such actions require effective and appropriate support.

Last year alone, three global surveys showed a growing concern for the environment, a demand for action and a willingness of people to change lifestyles – in particular in the views expressed by young people. Recent survey results of 910 young people show they experience increasing climate anxiety, as well as have an increasing will to act, according to the SEI-CEEW youth report (Aggarwal et al., 2022); 57% of survey respondents felt young people are inadequately represented in global climate governance, and expressed the desire to be included in governance fairly and equitably.

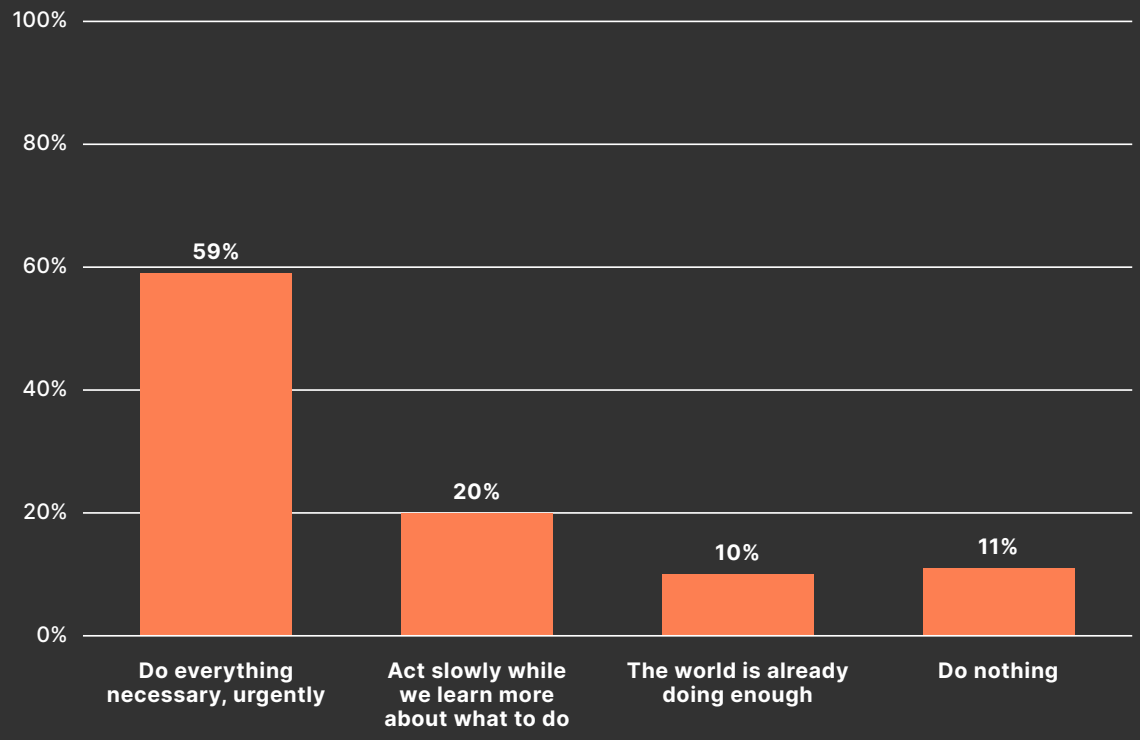
Other examples include the UNDP's People's Climate Vote, which had 1.2 million respondents in 50 countries; 64% said that climate change was an emergency, and of those, a majority of respondents called for an urgent response (UNDP & University of Oxford, 2021; Figure 3.1). A Pew Research Center survey of people in 17 high-income economies found that 80% of respondents were willing to make 'a lot' or 'some' changes about how they live and work to help reduce the effects of climate change (Pew Research Center, 2021). And a survey by the Global Commons Alliance showed that a majority of people in G20 countries are concerned about the global commons at large and willing to do more to protect and restore nature in the future (Global Commons Alliance, 2021; see also (Edelman, 2022).

Of course, public opinion and individual motivation to change lifestyles fluctuate. However, behavioural research has found that the principle of sustainability is only one driver of sustainable lifestyle action, alongside other motives (e.g. thrift, well-being, stimulation), that can be tapped into more systematically (Sitra, 2021).

We are doing more than anticipated, in accelerating the development and uptake of technology that will impact our carbon-based economies. Solar panels and batteries have become competitive much earlier than anticipated; uptake of these renewable energy technologies and others typically is not linear but takes an s-shaped curve. A number of key climate technologies are expected to reach mass market by 2030, a development strongly shaped by the Paris Agreement. The international agreement sets a clear and long-term goal for adopting low-carbon technologies (Systemiq, 2020).

A generation of potentially disruptive digital technologies has emerged, such as online platforms and mobile application that enable mass collaboration and the use of remote sensing and distributed ledgers to increase transparency

Figure 3.1
Perceived urgency of response to climate change



Source: Adapted from UNDP & University of Oxford (2021).

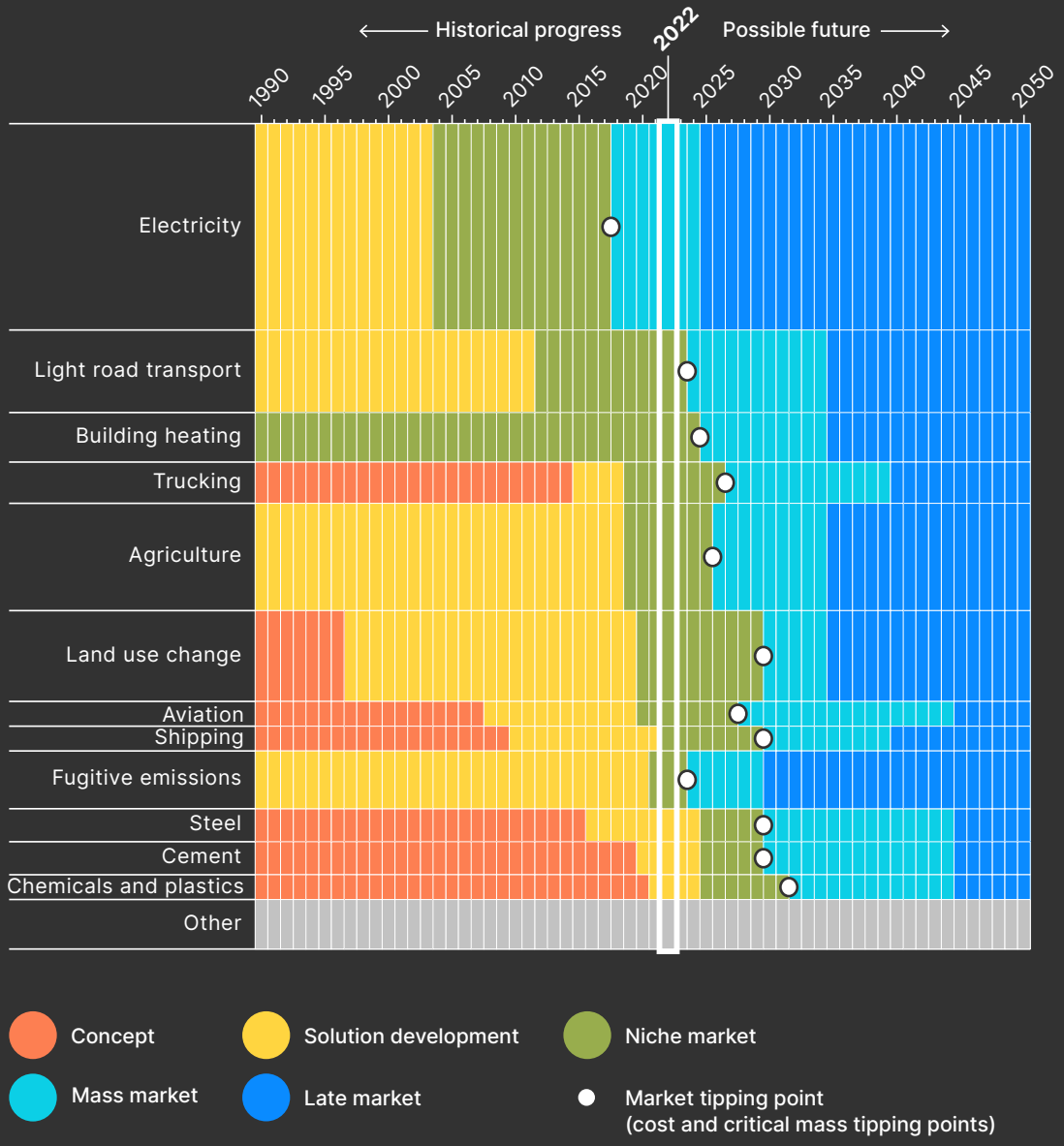
Growing concern for the environment, demand for action, willingness to change.

and accountability. If used and governed appropriately, they could unleash agency and resources for accelerating sustainable development, but also come with significant risks (Sustainability in the Digital Age, 2020).

However, technology's potential is not as clear in all sectors or for all environmental issues; these can also give rise to new environmental impacts to manage, such as e-waste and unsustainable extraction of new minerals, as well as 'rebound effects', where more efficient products lead to increasing volumes of consumption elsewhere and partly offset the benefit of the improvements (BP Dalhammar et al.). While we are doing more, technological advances have not led to structural changes. Technological innovation and deployment capacity, including the digital divide, is also unevenly spread across the globe.

However, the 'green race' that started with the Paris Agreement has captured political and policy attention (Figure 3.2). That could create positive feedback loops through complementary public, private and investor action (BP Dutt et al.; BP Ghosh et al.; see Chapter 4).

Figure 3.2
Maturity of low-carbon solutions by sector: progress since 1990, projected progress after 2022



The height of the bars is sized by each sector's emissions impact in 2019–2020. Market tipping point triggers an S-curve scale-up in share of new sales.

Source: Adapted from Systemiq (2020).

Better scientific evidence is available, on both costs of inaction and co-benefits of taking action. As shown above (Box 2.1), we have more scientific evidence and knowledge than ever, even though significant gaps persist in data and in scientific knowledge produced by and on the Global South. In particular, we have a better understanding of co-benefits and synergies from taking action – health, gender, fiscal, etc. – which will yield better and more cost-effective solutions and outcomes and is promising for implementation of the interlinked SDGs (see e.g. FAO, 2021; Global Commission on the Economy and Climate, 2014; WHO, 2021).

Agents of change should capitalize on these and other sources of momentum.

For example, the Global Methane Assessment found that currently available measures to reduce methane – some even at negative cost – could reduce human-caused methane emissions by up to 45% and thus avoid nearly 0.3C of global warming by 2040, while simultaneously preventing 255 000 premature deaths, 73 billion hours of lost labour from extreme heat and 26 million tonnes of crop losses globally (UNEP & CCAC, 2021). This means the evidence basis for designing smart solutions is better than ever before, and the challenge really lies in **bridging science, policy and practice to close the action gap** more quickly and decisively.

Agents of change – governments, international organizations, companies, civil society organizations – should capitalize on these and other sources of momentum. For example, show with concrete examples when ambitious environmental policy is responding to an articulated demand from the public; remove conservative bias when assessing speed of new technology uptake; and put the scientific evidence to direct use by embedding researchers more in governments, especially where there is low government capacity.

Agency of youth

A special momentum for change comes from youth. There are 1.2 billion young people (15- to 24-year-olds) today, representing 16% of the global population. The youth population globally is expected to peak at 1.3 billion in 2065, with the largest percentage increase in the least developed countries, at 62% by 2050 (UN DESA, 2019). This means that the largest increases will take place in parts of the world that are highly vulnerable to climate change.

As the consequences of the planetary crisis for their life prospects are becoming clearer (see section 2.4), youth are exercising agency today by mobilizing globally, making their voices heard, engaging in political processes, and taking legal action – despite rarely having influential formal roles. Many young climate activists today go beyond tackling climate change and the need to reduce emissions to also acknowledge and address climate justice and beyond: the wider systemic issues interlinked with climate change, including poverty, inequality, racism, sexism and marginalization and exclusion (Specia & Castle, 2021).

The companion report to this report, written by youth, for youth – *Charting a Youth Vision for a Just and Sustainable Future* – reinforces how essential it is that their concerns and recommendations are expressed, shared and considered, through innovation in decision-making processes and institutions (Aggarwal et al., 2022). In the survey of more than 900 young people conducted as part of the report, frustration is voiced: 65% think their government is doing too little on climate change. Another concern is that 53% of respondents feel anxious about climate change.

On the positive side, changing individual behaviour for sustainability is relatively less challenging for young people on account of limited lock-ins and increased awareness of the risk of the status quo to their future. Youth are keen to contribute to a better planet and share a responsibility by adopting various changes, including reducing waste and using recycled products, voicing their opinion and engaging with peers on environment-related matters, using public transport more frequently, changing dietary habits and others (Aggarwal et al., 2022).

Today's youth are thus exercising their agency, but within the constraints of current institutions that do not allow them to have voice. Youth are also now shaping their future agency as adults over the course of their lives: as citizens and voters; as workers and employees; as consumers; as entrepreneurs and investors; and as influencers in their social networks. Leaders today must recognize the voice of young people as powerful actors who can bolster inclusivity, solidarity and accountability (Aggarwal et al., 2022).

3.3 Accelerating the pace of change

In 2022, we have arguably arrived at a more broad-based shared understanding of the planetary crisis and acceptance of the need for change – at least in principle. The groundswell of climate action commitments from a broad range of actors is testament to this (Hale, 2016; Kuramochi et al., 2020).

Is change happening fast enough, and at the scale needed?

In the climate, biodiversity and SDG processes, the discourse from many actors is shifting from simply calling for action to calling for accelerated action, as well as protecting progress made and preventing backsliding on ambition as new societal priorities and crises inevitably occur (e.g. a global pandemic, debt crisis, energy price crisis, war). The overarching policy question becomes, 'Is change happening fast enough, and at the scale needed?' (Boehm et al., 2021).

This is a complex question. A wealth of scholarly research has sought to understand societal transformation (e.g. the abolition of slavery, the introduction of contraceptive pills, the internet), through socio-technical

Photo: Halfpoint / iStock / Getty Images Plus

transitions (e.g. Geels & Schot, 2007; Loorbach et al., 2017; Markard et al., 2020), transformational adaptation (O'Brien, 2012; Pelling, 2010; Scoones et al., 2015), social-ecological systems and resilience (Folke et al., 2010; Walker et al., 2004; Westley et al., 2011), and governance (Linnér & Wibeck, 2019; Patterson et al., 2017). Insights from this research have been picked up in policymaking, for example for stimulating dynamic effects in the energy sector (EEIST, 2021).

Markard et al. (2020) identified challenges in accelerating transformation, including policy implications for all levels – from individuals to governance to whole-system changes. These challenges are substantial, with few quick fixes. Fluctuating levels of public trust in institutions and society generally remain a major background challenge to accelerating transformation (Edelman, 2022). And transformation can be incomplete, surprising or beyond control.

More explicit timescales can lead to more practical and concrete ways of thinking about transformative change – for policymakers in particular. They must find ways to both compress and extend the timescales at which they operate, plan and make decisions. In Figure 3.3, we sketch out rough timescales that currently shape how we take action on sustainable development – or fail to take action, as the case may be.

A major challenge is **balancing short-term interest with long-term goals and trends** (Hovi et al., 2009). Both in politics and business, strong incentives lead leaders to focus on short-term gains, typically with a 1- to 5-year perspective. This is a problem for several reasons.

Policy decisions made today will impact global climate and ecosystems for the next 10 000 years.

First, **intergenerational equity and life prospects of future generations** are systematically put at risk (see above). A time perspective for 'future generations' implies anything from tomorrow to the infinite future, and standard timeframes need to be discussed to be useful in decision-making. With longer life expectancy (depending on the country and level of wealth) and an ageing society globally (UN DESA, 2019), prospects for adult and young generations today are also put at risk.

Second, decisions taken today can have long-term **lock-in effects**. Through big investments in infrastructure, societies can become locked into using that infrastructure, despite it being counterproductive to achieving policy goals, such as decarbonization. Life expectancy of infrastructure and implications for lock-in periods have been well assessed in the energy sector, for example for dams, coal-fired power plants or roads (Erickson et al., 2015); other sectors that need to adjust in order to achieve sustainability goals could do the same. While life expectancy of infrastructure is normally measured in decades (e.g. 50 years), policy decisions made today will also have profound impact on the global climate and ecosystems for the next 10 millennia, considering projected impacts of anthropogenic climate change (Clark et al., 2016).

Third, some decisions on policy measures and actions today may not 'pay off' until years or decades later, and may not therefore be prioritized by leaders

Figure 3.3

Timescales that influence the pace of change

Sources: see Appendix.

who wish to demonstrate results in the short term or during their tenure. Research on 'social tipping points' has investigated **timelags in achieving change**. Analysing decarbonization to achieve the Paris Agreement goals, Otto et al. (2020) identified small interventions with big effects, so-called tipping effects. Based on an expert survey, the researchers identified six 'social tipping interventions' and estimated the time needed to trigger the tipping of certain behaviours, ranging from a few hours to 40 years. Smith et al. (2020) pointed out in response that many tipping points are initiated by social movements rather than policy.

Leaders should work on multiple timescales simultaneously.

A number of things can be done to **extend the timescale in decision-making and planning**. Leaders can use their time in office by making themselves accountable to future outcomes, by seeking broader agreements with peers and stakeholders that can outlast their tenure. Including youth in decision-making and appointing ombudsmen for the future can ensure voices that represent long-term interests are heard (González-Ricoy & Gosseries, 2016). Discount rates could be reduced or dropped (Gollier & Hammitt, 2014). To avoid lock-in, policymakers planners and investors should anticipate policy change, expand the timeframe and system boundaries when assessing new investments and support 'deliberate decline' of unsustainable infrastructure (Erickson et al., 2015; Rosenbloom & Rinscheid, 2020).

Leaders should work on multiple timescales simultaneously. They can take immediate action for short-term results, seed longer-term change through early action, and encourage anticipatory action by target groups, by setting longer-term targets and direction in credible ways (Persson & Rockström, 2011). An example is the IEA's *Net Zero by 2050* roadmap, which sends the unambiguous message to immediately stop investing in new fossil fuel supplies.

A complementary approach is to think more systematically about **sequencing of policies**. For example, with decarbonization, the pattern most states follow starts with adopting green industrial policy, then moving to introducing carbon pricing schemes, and finally a stage of ratcheting up the policy mix (Meckling et al., 2017). This can serve to buy time, but mainly to gradually build up social acceptance for the next even more ambitious step.

The other side of the coin is that to respond to the scientific calls for urgency of action, **timescales simultaneously need to be compressed** for deciding and rolling out new policies, infrastructure, technologies and social innovations. Even when the actions that need to be taken are known and the targets and goals are identified, achieving change on a decadal timescale is challenging, given that robust and legitimate decision-making takes time.

By robust decision-making, we mean decisions that accommodate for deep uncertainty (Lempert et al., 2010) but also build in options for flexibility and avoidance of lock-in. By legitimate decisions, we mean decisions that are taken in line with both democratic legitimacy (i.e. meeting norms of legal certainty, absence of corruption, democratic accountability) and social

legitimacy (i.e. the public perceives decisions to be legitimate and has trust in the process).

The duration of a legislative process at the national level depends a lot on institutional and political context. Generally, it can take one to three years in preparation – designing a proposal, reviewing alternatives, and performing a regulatory impact assessment and stakeholder consultation (see Figure 3.3). A legislative proposal then needs to be approved in parliament, which takes additional time.

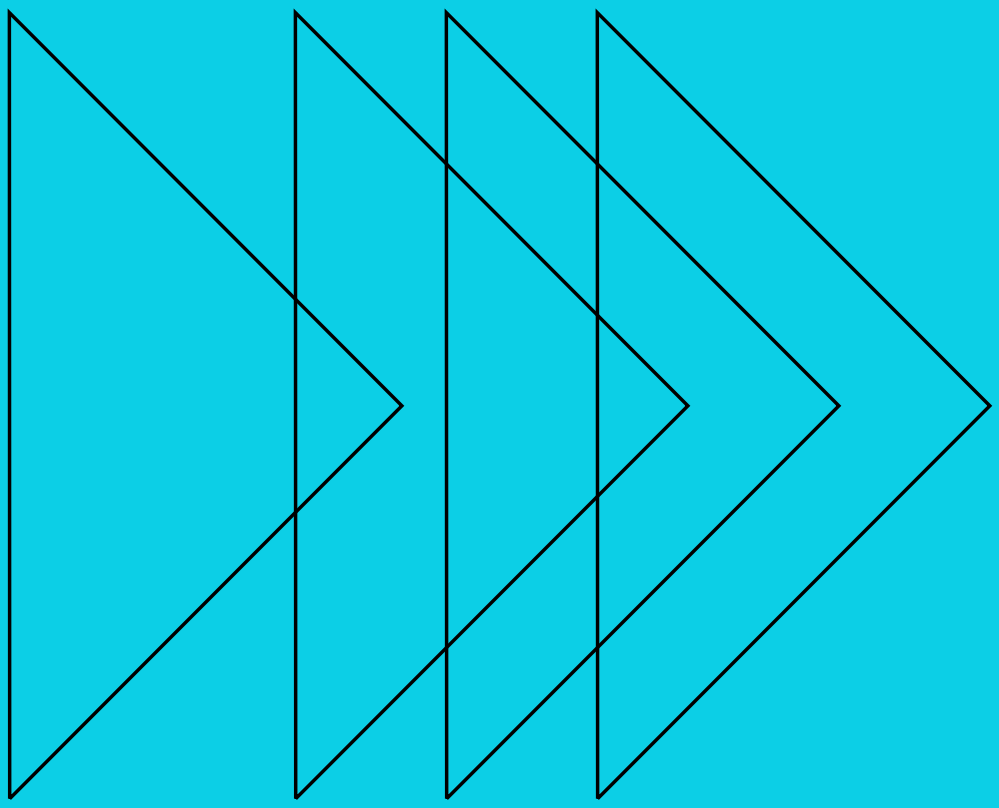
Similarly, for a business that wants to invest and establish a new production facility, the permitting process can take years. Environmental impact assessment and the permitting process for new installations can take years.

At the international level, the process of negotiating an environmental agreement and implementing it with demonstrable effect have, in the cases of climate change and stratospheric ozone, taken decades. For the Montreal Protocol, after scientific 'warnings' in 1974, the 'ozone hole' was first detected in the early 1980s; the convention was not adopted until 1987 and in effect until 1989 – and that is extremely fast (Velders et al., 2007).

We can start to accelerate change, at both international and national levels, with discussions at Stockholm+50. The trade-offs are not trivial between legitimate and fast decision-making, and between short-term gains and long-term goals. Targeted cultivation of ideas could assist – for example, digital tools for crowdsourcing and consulting, innovative public communication, and temporary extra resources for bureaucracies. While compressing timescales can seem daunting in times when public trust in institutions and social trust in general is low in many contexts (BP Dellmuth & Fornborg; Edelman, 2022), research shows that perceived fairness of a process can substitute for limited information on actual or potential outcomes of a decision (Bos, 2001; Lind et al., 1993).

Given the timescales for change, and their variability and differing contexts, we propose concrete actions under three shifts to be initiated now, for accelerating changes large and small in the long run, in the next chapter.

4



Keys to unlock a better future

Highlights

- Our relationship with nature needs to shift from appropriation and extraction towards protection and care. Human-nature connectedness should be strengthened in social norms and value systems, and in physical terms in how we live our everyday lives.
- Nature should be radically more integrated in cities and urban areas, through green architecture and housing policy, green infrastructure, and standards for access to nature in urban areas set by local government and community engagement.
- Improved animal welfare protection is needed not only for ethical reasons and connecting humans to nature, but to achieve multiple sustainable development goals. Transitioning out of intensive livestock industry and towards more plant-based diets is a critical means to this end and should be pursued in a just and sustainable way.
- A catalytic and long-term effect on repairing our relationship with nature can be achieved through increased nature-based education for children and youth, inspired by Indigenous communities' practices and supported through a global campaign.
- Enforcing norms on including Indigenous local knowledge in decision-making and assigning legal rights to nature can help directly limit unsustainable extraction of resources and deterioration of nature value, but can also lead to recognition of nature's intrinsic values and changed behaviour over time.
- Ensuring lasting prosperity for all and bringing emission and resource footprints within ecological limits requires a complete rethinking of our way of living, and a shift in social norms and values that drive human behaviour. It requires redefining prosperity at all levels in society and economy.
- Choosing a sustainable lifestyle must be the overwhelmingly easy choice for individuals and communities, through enabling infrastructures and supporting social norms, and the unsustainable must be the very difficult choice. This will

require major investments and bold decisions, as well as making unsustainable choices very difficult through regulation and fiscal policy.

- Purchasing functions to fulfil our material needs instead of products would be more resource-efficient. Supportive regulatory frameworks and changed social norms on ownership and reuse could have a transformative effect on scaling such business models and reducing material flows.

- The world economy is entangled through global supply chains; high interdependency governs how prosperity is created and shared along this chain, as well as how lasting that prosperity is in light of environmental and social impacts locally and globally. Existing governance initiatives provide a basis, but there is scope to increase environmental ambition and make frameworks more binding.

- National accounts are a highly influential arena in which to redefine prosperity. It is time to move beyond GDP as the primary metric and adopt indicators that help measure progress towards the vision of sustainable development, in a collective way to lower risks for first-movers.

- Common sustainability standards and principles for products and services (and eventually functions) should be applied to help to shape the upstream selection environment for innovation, which has a cumulative impact on technological development.

- The sustainability transition will need substantial investment. Today, we have the paradoxical situation of a massive amount of capital ready for sustainability investments, yet persistent funding gaps in low-income countries.

- Government funding and mission-driven public investment have unique roles in sustainability-oriented innovation systems. To bridge the technology gap between rich and poor countries, it is time for a shift from ‘technology transfer’ to a paradigm of ‘co-development of technology’.

- Private finance then has a critical role in bringing innovation to market. Private investors should engage more in active approaches to investing to support rapid action on climate change.

- To raise private finance to the needed scale for sustainability investments in the developing world, there is a need for public finance to de-risk and play a catalytic role.
- As important as de-risking sustainable investment may be, it is equally important to raise the perceived riskiness – and therefore the cost of capital – of unsustainable investment, for example through mandates for minimum allocation of lending portfolios.

The human environment will always change, development will continue. There will be growth. This cannot and should not be avoided. The decisive question is in which direction we will develop, by what means we will grow, which qualities we want to achieve, and what values we wish to guide our future.

– Prime Minister Olof Palme (Sweden), Statement in Plenary Meeting, 6 June 1972 (Swedish Delegation to the UN Conference on the Human Environment, 1972)

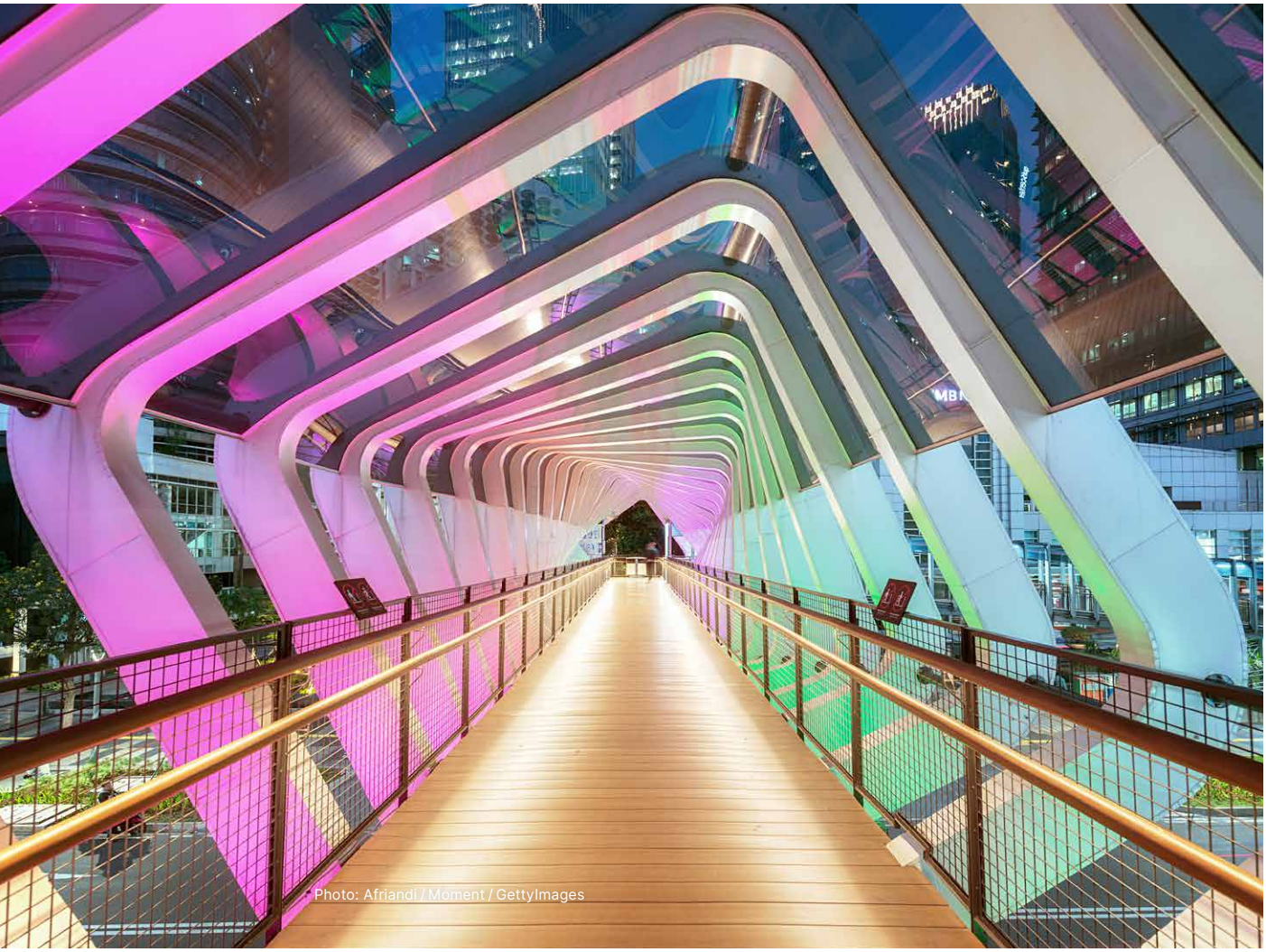


Photo: Afriandi / Moment / GettyImages

The pace of change needs to accelerate to unlock a better future. Not only should it be faster: it also should deliver just, socially and economically sustainable and democratically legitimate outcomes. A sustainable world should provide a good quality of life that is universally shared and can be maintained indefinitely into the future.

There is no reason such a world cannot exist (Millward-Hopkins et al., 2020; Vogel et al., 2021). But we are far from it at present, as Chapter 2 showed. To get there, we must navigate substantial systemic changes. We must determine what bold actions can be taken to trigger systemic and transformative change; immediate actions for the short term but also planting seeds for long-term change.

Bold actions can be taken to trigger systemic and transformative change.

We must recognize that societies are embedded within the biosphere, and that our global and national economies represent just a fraction of all social interactions (Figure 4.1). Economies cannot exist without societies, and all social and economic activities can be sustained only within a healthy and resilient biosphere (Folke et al., 2011b; Rockström et al., 2009).

One report cannot comprehensively present all the actions needed for transformative change. Such change is difficult to anticipate and govern. We focus here on three shifts and associated areas for action: **redefining the relationship between humans and nature, ensuring prosperity that lasts for all, and investing in a better future**. The rationale for choosing these is threefold:

- We propose actions under each shift that can be or need to be taken now, that are known to be important for sustainability in the longer term and that can promote systemic change.
- We focus on some key opportunities that are less evident in the current policy debate and that are not necessarily part of existing policy agendas within international processes (e.g. climate, biodiversity, chemicals) and sectoral domains (e.g. energy system, food system). In this way, we seek to complement the many emerging sectoral roadmaps for actions to 2030 or 2050.
- We focus on areas where we have contributions to make to the conversation at Stockholm+50.

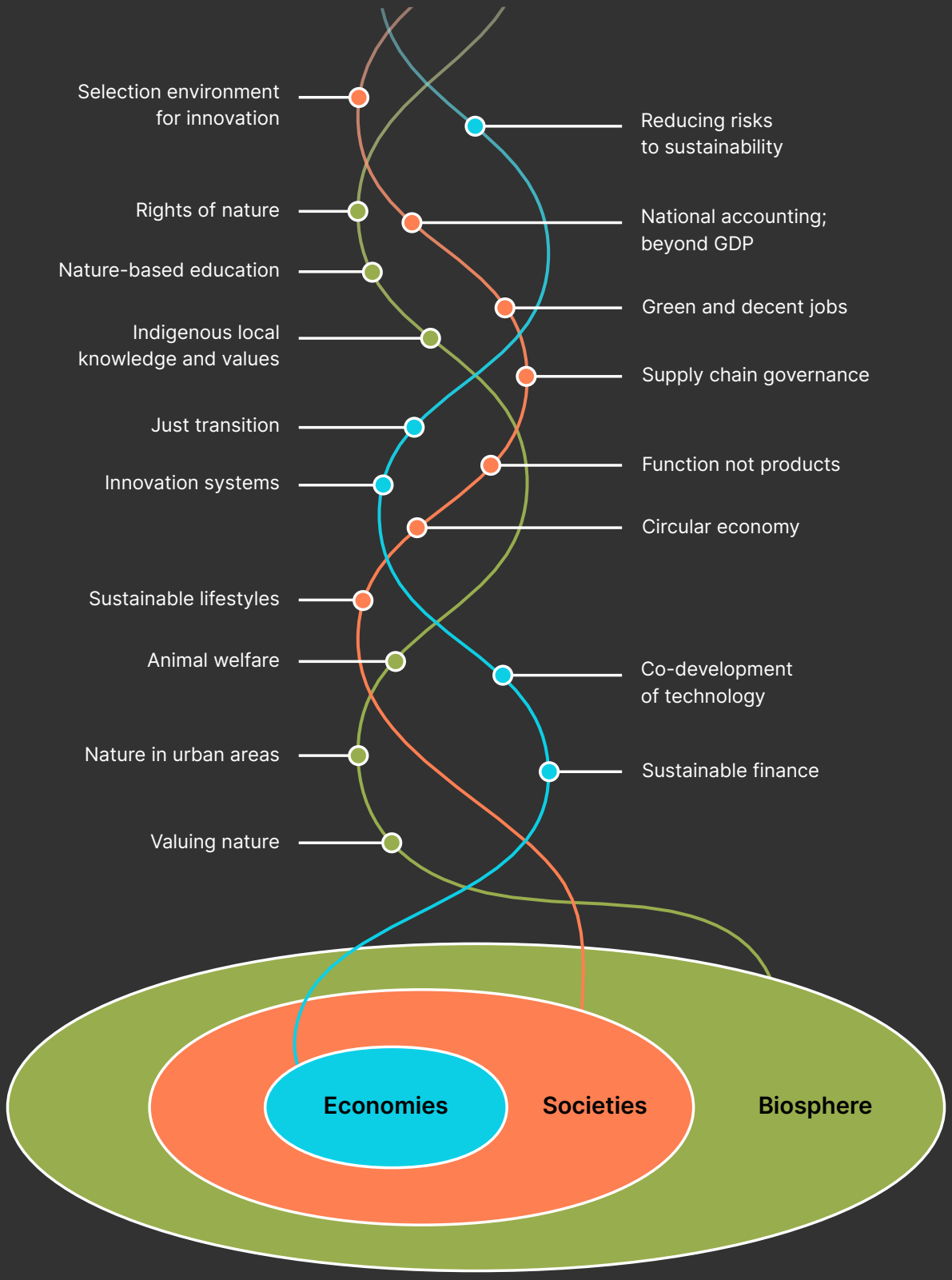
If achieved, these shifts and actions imply systemic change and hold large potential for improving sustainability. They contribute to transformative change, but they will not be sufficient. We present here a synthesis of research published in the peer-reviewed literature on these topics and new ideas, based on the background papers for this report.

Some of the key actions discussed here have been around as ideas for a long time, but they remain to be fully operationalized and implemented – a reflection of the action gap of the past, discussed above. In Chapter 5 we discuss key barriers that stand in the way of change.

Figure 4.1

Actions to unlock a sustainable future

- Redefine the relationship between humans and nature
- Ensure prosperity that lasts for all
- Invest in a better future



4.1 Redefine the relationship between humans and nature

The past 50 years – and even the past 5 years – have seen huge losses and degradation of nature[1] globally. As the latest IPBES report starkly puts it, 'nature across most of the globe has now been significantly altered by human drivers, with the great majority of indicators of ecosystems and biodiversity showing rapid decline' (IPBES, 2019a).

Humans have altered 75% of the planet's land surface, impacted 66% of the ocean area, and destroyed (directly or indirectly) 85% of wetlands. From 2010 to 2015 alone, 32 million hectares (ha) of forest were lost (Díaz et al., 2019; IPBES, 2019a). Society's disconnection from nature has been acknowledged as a root cause of the current ecological decline (Folke et al., 2011b). At the same time, half of the world's GDP is dependent on nature, and investment in ecosystem restoration can generate up to 30 times the return (UNEP, 2021b).

For many people today, especially in urban settings or in the wealthiest economies, the current relationship with nature is failing, with multiple negative repercussions for health, environment and overall sustainability (IPBES, 2019b; Pascual et al., 2017). Humans have always relied on nature in an instrumental sense, for survival and a good quality of life, whether through the consumption of natural resources, recreational use or cultural value we get from nature (Díaz et al., 2015), as well as in a relational sense, in how people derive meaning and purpose from being connected to nature (Chan et al., 2018; Mattijssen et al., 2020; Stålhammar & Thorén, 2019).

Humans have always relied on nature for survival and meaning.

From an ethical and philosophical standpoint, nature is also **intrinsically valuable**; ecosystems have value in themselves, independently of their usefulness to humans (Callicott, 1989). The current ecological decline is widely acknowledged to be linked to an imbalance in how many societies value nature. Societies' instrumental valuation often underpins policies and economic structures, which in turn shape behaviour and social norms at the individual level (Folke et al., 2011a; Pascual et al., 2017; Richardson et al., 2020).

The **commodification of nature** by states and markets demonstrates how an instrumental value of nature can become institutionalized. More than 550 programmes around the world now pay for ecosystems services, covering the domains of forest, water, biodiversity and land-use carbon;

1 Following the definition used by the 2019 IPBES report's summary for policymakers, the word nature as used here 'refers to the natural world with an emphasis on biodiversity' (IPBES, 2019a, p. 51). Within the context of science, it includes categories such as biodiversity, ecosystems (both structure and functioning), evolution, the biosphere, humankind's shared evolutionary heritage, and biocultural diversity. Within the context of other knowledge systems, it includes categories such as Mother Earth and systems of life, and it is often viewed as including humans, not as a separate entity.

together, these account for annual payments of over USD 36 billion (Salzman et al., 2018). The state also commodifies nature by creating property regimes, physical infrastructure and scientific knowledge that frames the environment as consumable products (Parenti, 2015).

Underpinning these programmes is a strong presumption that monetary valuation can and should be used to calculate the contributions of nature to human welfare (e.g., Dasgupta, 2021), which formalizes a particular notion of 'value' that is not universally held (Farber et al., 2002; Gibbs, 2010). This arguably leads to a transactional framing of nature in policy evaluation that is reflected in increasing commodification (Gómez-Baggethun et al., 2010).

Although there is debate on the role of nature commodification in conservation efforts, the metaphor of nature as a stock that provides a flow of services has become the dominant way of viewing ecosystems (Norgaard, 2010). Approaches to conservation that are based on payment for ecosystem services are often misaligned with the perspectives of Indigenous communities and fail to incorporate Indigenous knowledge and practice (Smith et al., 2019).

Most of the biodiversity on Earth is located in the territories of Indigenous peoples – around half a billion people who collectively manage about a quarter of the world's land (Garnett et al., 2018). **Indigenous land management practices have often been shown to result in higher native and rare species richness** (Arcese et al., 2014; Peres, 1994; Redford & Stearman, 1993) and less deforestation and land degradation than non-Indigenous practices (Ceddia et al., 2015; Nolte et al., 2013).

Despite this, governmental and non-governmental initiatives tend to overlook the diverse views and needs of Indigenous populations (Brondizio & Tourneau, 2016) and the enormous potential of Indigenous-led governance for scaling up socially just conservation efforts (Artelle et al., 2019). Indigenous local knowledge about the landscape is holistic and accumulated over centuries, making it essential for promoting sustainable environmental management and strengthening human/nature connectedness (Burgos-Ayala et al., 2020).

Indigenous knowledge is essential for sustainability and human-nature connectedness.

Another important locus for reshaping the relationship between people and nature is urban areas. Human well-being diminishes as we become physically distanced from natural spaces needed for health and well-being, inspiration, relaxation or sense of belonging (IPBES, 2019a; Riechers et al., 2021a). A recent study of more than 1000 cities in 31 European countries found that up to 43 000 premature deaths could be prevented each year if these cities were to achieve the World Health Organization recommendations regarding residential proximity to green space – nearly a third of the European population lives below that recommendation (Barboza et al., 2021).

As urbanization continues globally, the majority of humans will have less direct contact with 'natural ecosystems' and the perception of

Photo: Federico Rostagno / iStock / Getty Images Plus / GettyImages

connectedness to nature. Today, more than half the world's population lives in cities; current trajectories for population demographics imply that billions more people will live in cities by 2100. The way in which urban areas are planned and designed will have immense consequences for biodiversity, green space access and human health in cities (Garrard et al., 2018; UN DESA, 2016).

Urban planning will also impact resilience to climate risks: Nearly all of the 10 cities projected to become megacities between 2018 and 2030 are located in developing countries; 60% of cities with 500 000 or more inhabitants face high risk to exposure to natural disasters including cyclones, floods and droughts, according to UN DESA. Nature-based solutions could help cities to adapt to climate change, while delivering benefits to health and biodiversity (BP Barquet & Green).

Repairing the relationship between people and nature will require redressing a core imbalance in how individuals and societies value nature, so that more emphasis is placed on the intrinsic and relational value of nature than is currently the case (Diver et al., 2019a). It would be transformative (Díaz et al., 2019; Riechers et al., 2021c), requiring deep changes across societies, economies and communities. One pathway to this rectified relationship could be measuring human-nature connectedness.

This concept has been highlighted as a potentially powerful approach to finding interventions that address sustainability challenges (Ives et al., 2018; Riechers, Loos, et al., 2021). Strengthening the connection could simultaneously benefit human well-being (Nisbet et al., 2008; Shanahan et al., 2016). People with higher levels of connectedness make choices and engage in behaviours that are more 'pro-environment'. These include using public

transportation, mindful use of energy, recycling, environmentally friendly shopping behaviour and acceptance of climate change and energy policies (BP Giusti et al.).

Several studies suggest human-nature connectedness can be increased through carefully designed interventions to prompt engagement with nature (Richardson et al., 2020). Given this evidence, **increasing such connectedness has been proposed as an important 'leverage point' for deep transformative change towards a sustainable future** (Riechers et al., 2021b). One proposed set of 'Nature Connectedness Pathways' includes experiencing nature through the senses, being emotionally connected to nature, appreciating the beauty of nature, recognising how nature brings meaning to one's life, and actively caring for nature (Richardson et al., 2020; Riechers et al., 2021c).

These principles can be adopted in urban design, education and elsewhere, to encourage a cultural reset on how we see nature – and how we then 'use' or interact with nature (BP Agrawal & Kalra, BP Giusti et al.). While this framework may seem to be more appropriate for high-income settings, the applications could be useful in low-income settings, as well as the basis for designing liveable urban spaces where residents have equitable access to ecosystems, no matter their level of wealth.

Areas for action

Drawing on the concept of Nature Connectedness Pathways, we identify four areas for action that can help to connect individuals, communities and societies to the natural spaces around them and repair the broken relationship between humans and nature. They address our connection to nature in how we live, how we produce food, how and what we learn, and knowledge and rights that inform our choices.

1. Integrate nature in cities and urban areas
2. Protect animal welfare by mainstreaming it in sustainable development governance
3. Expand and invest in nature-based education
4. Recognize Indigenous local knowledge and the Rights of Nature

Integrate nature in cities and urban areas

Nature can contribute to thriving cities: urban ecosystems bring social, cultural and community benefits and well-being (Pineda-Pinto et al., 2022). **'Green' architecture, infrastructure and access to nature in towns and cities can help repair our relationship with nature and mitigate the 'extinction of experience'** (Shanahan et al., 2016; Soga et al., 2015). **Local and national governments can provide policies to encourage more of all three, as a way of both seeding transformative change through shaping values and providing immediate climate, biodiversity and health benefits.**

‘Systemic solutions to the urban environment that are inspired by nature, use nature, strengthen and/or are supported by nature’ are considered nature-based solutions (Frantzeskaki et al., 2019); these are increasingly promoted to address societal challenges of climate change, natural disasters, human health and well-being, and economic and social development (Cohen-Shacham et al., 2016; BP Barquet & Green). As such, nature-based solutions are increasingly framed in terms of multi-functional climate adaptation. The recent Covid-19-related lockdowns spurred research into the mental and physical health benefits of urban green space (BP Barquet & Green).

Urban planning should bring opportunities to connect with and care for nature into the everyday environment.

Greening architecture and housing policy: *Biophilic design* is an example of a nature-based solution that connects people and nature within built environments and communities, requiring sustained engagement with green spaces and promoting attachment and responsibility for local ecosystems and people (Beatley, 2011; Heerwagen et al., 2013). Using Biophilic design principles at a building, neighbourhood and city scale may encourage connection to nature, improve our health and well-being, and make action feel more meaningful (Andreucci et al., 2021).

Biophilic design principles in architecture and interior design include efforts to bring the outside indoors: green or living walls and skylights; mimicking natural patterns and forms; and planting abundant greenery, e.g. rooftop gardens and atriums (Heerwagen et al., 2013). Housing policy should stipulate that all new developments include spaces for an active relationship with nature; urban planning should bring opportunities to connect with and care for nature into the everyday environment through the creation of spaces for these activities (Richardson, 2020).

Biophilic design is increasingly used in urban development around the world as an approach to make cities more liveable, by reducing heat island effects and air pollution and providing residents with access to green space. The city of Singapore is a pioneer in biophilic urbanism, with extensive use of green walls, rooftop gardens and green walkways connecting parkland throughout the city (Newman, 2014).

Greening urban infrastructure: *Biomimicry* as a practice learns from and mimics the strategies found in nature. For example, water treatment and sewerage that mimics wetlands and stream or river flows have been adopted in South African settlements (Hermanus & Campbell, 2017), with implications for use in higher income neighbourhoods as well. Harvesting nutrients from human waste – a practice used in smallholder farming in Uganda (Andersson, 2015), Burkina Faso (Dickin et al., 2018) and Pakistan (Nawab et al., 2006) also could be the future for both rural and urban communities globally. Research is now under way in Brazil (Chrispim et al., 2017), Bolivia (Liera et al., 2022), Ethiopia (Tucho & Okoth, 2020), Haiti (Moya et al., 2019), South Africa (Mkhize et al., 2017), and the Netherlands (Stehouwer et al., 2022), among other places, to develop ways to scale up such initiatives for application in cities.

Access to nature in urban areas: A range of nature accessibility standards can be set, to ensure natural sites and areas are within easy reach of people's homes. For example, in the UK, the Accessible Natural Greenspace Standard imposes a hierarchy of accessibility to natural spaces (e.g. 2 ha within 300 metres, 20 ha within 2 kilometres). As well as improving physical access to natural areas, the standard aims to enhance 'naturalness' and biodiversity of these spaces, for example through the creation of meadows and wildflower planting, and to improve nature connectivity by encouraging communities to use their natural spaces for social, educational and cultural events (English Nature, 2003).

Spending time in urban green spaces can mitigate the stressful impacts of city living, even for residents of informal settlements (Cinderby et al., 2021). However, guaranteeing accessibility to nature in urban areas is often not straightforward. First, city and community planning processes often fail to prioritize space for nature that would allow for everyday nature experiences. Using land for community gardening or public parks has less economic value in our current economic and societal systems than for a shopping centre or high-end residential development (de Sousa Silva et al., 2018; Kronenberg et al., 2020).

Photo: Andy Andrews / The Image Bank / GettyImages

Second, where governance is weak, property rights and valuation of nature is even trickier, heightening inequality (Mahendra et al., 2021). Where city development plans are absent or not enforced, private actors tend to drive development, leaving poorer parts of the population disconnected from key services – including green space (Mahendra et al., 2021).

As a way forward, proactive and meaningful community engagement is essential to ensure local buy-in and agency in urban planning. Adopting a social equity lens early on and iteratively throughout the planning of a policy or project can ensure that equity outcomes are well integrated and budgeted for (Mahendra et al., 2021).

Involving a broad range of stakeholders in urban planning processes, including community-based civil society organizations, can help to ensure that grassroots support for mutually agreed city plans survives beyond electoral terms (Mahendra et al., 2021). In the informal settlement of Mukuru, Nairobi, a civil society organization managed to create space for residents to participate in a planning process for their neighbourhood, including environment and natural resources. They engaged directly with residents, rather than local elites, and made strategic use of political opportunities, including an upcoming national election, to put pressure on the local government (Horn, 2021).

Recommendations for integrating nature in cities and urban areas:

- **Local governments and architects should apply biophilic design principles in new and retrofitted urban architecture and housing policy, to enable human-nature connectedness as well as provide direct climate, biodiversity and health benefits.**
- **Local planners should green urban infrastructure such as water treatment, for example by learning from biomimicry and smallholder practices.**
- **Access to nature in urban areas should be promoted through local or national accessibility standards and higher economic valuation of green space. Especially where reformed valuation is not possible or governance is weak, community engagement should be supported as a way of ensuring local agency, long-term perspectives and accountability in urban planning.**

Protect animal welfare through governance for sustainable development

Protection of animal welfare will help build human-nature connectedness. It can also directly or indirectly benefit many other societal goals, such as disease prevention, healthier diets, reduced water and land pressures, and reduced greenhouse gas emissions.

Consensus has grown over the years in scientific and philosophical communities that non-human animals feel and experience more than humans give them credit (Dawkins, 2008; Webb et al., 2019), and that **animal welfare matters morally** (Peggs, 2018; Regan, 1987; Singer, 1995). In many countries,

this understanding has received some policy and legislative recognition, for instance through anti-cruelty laws and animal welfare acts (Shaffner, 2010).

The importance of respectful treatment of other sentient beings is recognized across many cultures and religions and in ethical guidance for scientific practice (UNGA 2020). Indeed, the 1987 Brundtland Report recognized that 'sustainable development does not only involve a moral obligation to future generations but also to other living beings' (Brundtland & Brundtland Commission, 1987). This year, UNEA-5 adopted a historic resolution to produce a first report on the animal welfare-environment-sustainable development nexus.

Sustainable development involves a moral obligation to other living beings.

Many of the ways in which we currently interact with animals **limit our ability to achieve sustainable development goals** (BP Verkuijl et al.). For example, while the origins of the Covid-19 pandemic remain uncertain, the virus highlights the potential roles that habitat destruction, industrial livestock farming, and the wildlife trade play in infectious disease emergence (Roe et al., 2020; Wiebers & Feigin, 2020), as well as the suffering that these practices cause to billions of individual animals – wild and domesticated (BP Verkuijl et al.). While generalizing across all geographies and all cases is not possible, industrialized livestock production as a system is most associated with greater disease burdens – both through the over-consumption of meat and arising human non-communicable diseases, and through the use of antibiotics and more closely housed animals, which can drive disease among livestock, as well as emergence of zoonoses and antimicrobial resistance. Industrialized systems also are geographically biased towards consumption in wealthier regions, and often based in less wealthy ones, contributing to greater per capita environmental pressures, and further exacerbating inequalities.

The way we interact with animals also impacts the environment. For example, on top of its detrimental impacts on animal welfare, industrial animal agriculture consumes much more land and water than plant-based alternatives, making it a leading driver of deforestation in some regions (Pendrill et al., 2019). It also produces much more waste pollution, and greenhouse gas emissions than plant-based alternatives (Poore & Nemecek, 2018). According to one standard estimate, this industry is responsible for approximately 14.5% of global greenhouse gas emissions (FAO, 2013).

This industry has attracted attention for its impacts on human health, as breeding grounds for antibiotic resistance as well as human disease, after outbreaks of West Nile Virus, Crutzfeld-Jakob and more.

This intersection of food safety, zoonotic disease and antibiotic resistance is the focus of the One Health framework, developed by the One Health Initiative for improving public health (www.onehealthinitiative.com; Lebov et al., 2017). Conventional applications of the One Health framework focus on intensive practices of the livestock industry, but only seek to improve biosecurity and pathogen monitoring (BP Verkuijl et al.).

Animal health should be regarded as a worthwhile end in itself under One Health (Kamenshchikova et al., 2021). If we are serious about improving conditions for animals at scale, we need to pursue a global transition away from industrial animal husbandry and toward humane, healthful and sustainable alternatives to this food system (Coghlan et al., 2021; Sebo, 2022).

Economic tools could be used to incentivize activities that support animal welfare, and disincentivize activities that conflict with it (BP Verkuijl et al.). Governments can phase down subsidies for practices that impose significant costs on humans, animals and the environment. For instance, animal products including poultry, pork, mutton and beef are among the top 10 food products that benefit the most from government support, which often goes to large companies that practice intensive farming methods (FAO et al., 2021). More broadly, subsidies for agriculture are a key underlying driver of global forest loss (Kissinger, 2015). By phasing down subsidies for harmful practices, governments can further reveal the true cost of these practices.

Governments can then increase subsidies for humane, healthy and sustainable alternatives. For instance, on the supply side, governments can subsidize plant-based food production, and consider investing in research and development of plant-based or cell-based meat, dairy or eggs, as economies such as Canada, China, Denmark, the EU, the Netherlands, Singapore and the UK have started to do (UKRI, n.d.; Verkuijl & Green, 2021). On the demand side, governments can subsidize purchase of plant-based foods for low-income individuals or otherwise introduce policies to ensure access to healthy and sustainable meals (BP Verkuijl et al.).

Transitions should not exacerbate existing inequalities or create new ones.

Governments can furthermore require corporations to disclose welfare, health or environmental risks associated with their practices to investors (BP Verkuijl et al.). For example, the FAIRR Initiative is currently working with investors to assess food companies according to risk factors such as greenhouse gas emissions, deforestation and biodiversity, water use and scarcity, waste and pollution, antibiotics, animal welfare, working conditions, and food safety (https://www.fairr.org). Improved information and transparency in product labelling can help consumers and investors to make informed choices, but they should not hold sole responsibility for making the right choices (Akenji et al., 2021; Ran et al., 2022).

In regions with high levels of animal protein production and consumption, the benefits of a just transition may be considerable. According to one study, a global shift towards plant-based diets could avoid 8.1 million human deaths, reduce food-related emissions by 70%, and save USD 1.6 trillion in health and climate change costs by 2050 (Springmann et al., 2020). In Latin America, a shift to higher-value fruit and vegetable production would result in 19 million jobs gained, compared to 4 million lost (Sagat et al., 2020).

However, not all stakeholders will be affected equally. Lessons from transitions in other sectors – specifically energy, and fossil fuel producing communities –

point to the importance of ensuring meaningful, inclusive, participation of stakeholders who stand to be affected by a transition (SEI et al., 2019). Affected stakeholders may include, for instance, workers, consumers, companies, communities, and regions (BP Verkuijl et al.).

It is important that transitions do not exacerbate existing inequalities or create new ones, for instance by amplifying food or income insecurity for marginalized communities (BP Verkuijl et al.). Governments can support transitions in many ways, including compensation for lost incomes and jobs, investments in regional economies and communities, investments in social safety nets, and funding for education and retraining that prepare people for work in humane, healthful, sustainable sectors (BP Verkuijl et al.).

Recommendations to mainstream animal welfare in sustainable development governance:

- **Governments should elevate the importance of animal welfare for sustainable development, and sustainable development for animal welfare, in international instruments.**

- **Support policies that benefit humans and non-human animals alike, particularly policies that use informational, financial and regulatory measures to benefit animals more and harm them less. Animal welfare impact assessments can play a valuable role here. Governments could phase down public subsidies for animal products and harmful agriculture, and increase support for plant-based food production, in a way that avoids regressive effects on low-income households. Governments should require or encourage voluntary action on disclosure of animal welfare, health and environmental risks by food companies to investors.**

- **Researchers, experts and policymakers should expand the interpretation of the One Health framework to recognize animal health and welfare as an end in itself, and not just instrumental to human health outcomes.**

Expand and invest in nature-based education

Education policy and school curricula can explicitly draw on nature connectedness pathways thinking, through which education authorities and teachers could contribute to a long-term, catalytic effect on repairing our relationship with nature (Richardson et al., 2020).

Since its inception in 1977, a key goal of environmental education has been 'to search for a new ethic based on respect for nature' (UNESCO, 1978, p. 28). However, classic environmental education favours curricula abundant in ecological knowledge but ignores practical skills and social circumstances; this is inadequate for building a deep relationship with nature (Hungerford et al., 1980).

Examples of nature-based learning are many (see e.g. Box 4.2 on forest schools). The most effective programs in environmental education are

characterized by occurring over an extended period of time, learning about existing, local, and immediate environmental issues, practicing directly deployable action skills, experiencing and taking ownership of environmental problems, and participating together with role models and mentors (Chawla & Cushing, 2007; BP Giusti et al.). These pedagogical principles are at the core of Indigenous concepts of education, where ecology, community and spiritual life are seamlessly integrated (Cajete, 1994).

Weave Indigenous principles of environmental education into mainstream educational systems.

For North American Indigenous people, for example, education in nature is life; everything from navigation to application of medicinal properties of plants and animals, to traditional techniques of agriculture is based on an intimate understanding of the natural world (Cajete, 1994). Similarly, in India the Indigenous Gurukula system of education emphasized a holistic and immersive approach to education and involved teaching in natural settings (Joshi & Gupta, 2017). And for more than 500 years, the Bishnoi religious community in India have demonstrated an overlap of religious, personal and ecological attitudes and are known to protect trees and animals, even at great personal cost (Jain, 2016).

The idea that we are a part of the natural community is at the core of Indigenous world views and is an idea that could be mainstreamed in modern pedagogy (Cajete, 1994). Where possible and appropriate, Indigenous communities could be engaged in the co-development of nature-based curricula. It is also critical that Indigenous communities have access to education that acknowledges their worldviews, ancestry, and culture, including language.

As well as weaving Indigenous principles of environmental education into modern educational systems, there is also a need to broaden curricula to reflect the diversity of locally driven approaches to sustainability in the Global South. Across Africa, Latin America and Asia there are countless examples of grassroots movements working to protect their local environments, but these cases are often neglected in sustainability education (Nagendra, 2018). For example, across India, agro-ecological initiatives such as the Deccan Development Society in Medak district (Natarajan, 2005) and the Foundation for Ecological Security in Anand (Nagendra & Ghate, 2019) work with farmers to restore forests and common land, and to promote organic methods of farming and soil-friendly crops (Kothari, 2014). Such examples should could be used by international organizations such as UNEP and UNESCO to develop more globally inclusive educational materials and (Nagendra, 2018).

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Box 4.2 The growth of forest schools

Nature was humanity's first classroom. Denmark's first formal forest school was started in the early 1950s by a woman named Ella Flautau. Ella's children and her neighbours' children began gathering daily in a nearby forest, leading the parents to form a group. Eventually, they established an initiative for 'walking kindergartens', based on the Waldorf-Steiner approach to education, where learning is child-led and play-based, with adults as facilitators, not teachers (The Forest School Foundation, 2020).

Similar forest schools, known as Naturbørnehavens, continued to pop up throughout Denmark during the 1950s and the trend later spread to the rest of Scandinavia. Today, preschool education conducted outdoors is a widely accepted practice in the region. Inspired by the Scandinavian model, the forest school movement emerged in the UK in the 1990s and has grown globally since then, with *bush kindys* in Australia, *Waldkindergarten* in Germany and or *Mori-no-ie* in Japan.

The core elements of a forest kindergarten include all-weather nature immersion time every day; child-led learning; inquiry-based teaching style; child-inspired, child-directed documentation of emergent curriculum; place-based education; and small class sizes (Natural Start Alliance).

Recommendations for expanding and investing in nature-based education:

- **Education authorities and Indigenous communities should collaborate on weaving in Indigenous principles of environmental education into modern educational systems.**
- **To build a deep relationship with nature, education authorities and teachers should not just focus on ecological knowledge but also include practical skills, learning about local environmental issues and taking ownership, through hands-on engagement in community projects.**
- **UN organizations, such as UNESCO and UNEP, should start a global campaign to promote development of more diverse educational materials, drawing more on cases from the Global South.**

Recognize Indigenous local knowledge and the Rights of Nature

Greater recognition of Indigenous local knowledge can redefine our relationship with nature, through more effective nature conservation, and more just environmental governance. Assigning legal rights to nature can be a way of limiting extraction of resources but can also lead to recognition of nature's intrinsic values and changed behaviour over time.

Indigenous knowledge is inextricably linked to Indigenous self-determination, rights and responsibilities, which includes respect for the obligations of all beings of creation, not only human (Latulippe & Klenk, 2020). Acknowledging Indigenous knowledge and values can lead to more effective, locally owned and equitable conservation and development outcomes (Berkes, 2017; Berkes et al., 2000). However, Indigenous knowledge is more than data; it is embodied practice embedded within a worldview and inseparable from the socio-cultural, political, legal and other place-based relations and obligations that give rise to holistic knowledge systems (Latulippe & Klenk, 2020; Parsons et al., 2017; Rosengren, 2018).

Despite recognition in international agreements of the importance of traditional or Indigenous knowledge for conserving biological and cultural diversity, few national policies explicitly include it (Brondizio & Tourneau, 2016). At the subnational level, tools such as environmental risk assessment protocols often do not account for this type of embodied knowledge, which means that Indigenous concerns are excluded from decisions on the use of ecosystems within their ancestral territories (Arsenault et al., 2019).

A typical example is the development of energy projects, which often encroach on Indigenous peoples' rights and territories, in both developed and developing countries; flawed consultation processes with Indigenous communities are common (BP Muñoz Cabré & Vega Araújo). In Sápmi in Scandinavia, for example, Indigenous communities are seeking the application of justice principles to both mining and renewable energy wind farms, on issues such as the legitimate representation of communities during consultation processes, territorial fragmentation, and impacts including changes in reindeer behaviour

around mines and windfarms (Kløcker Larsen et al., 2022; BP Muñoz Cabré & Vega Araújo), with knock-on ecological impacts.

One mechanism for achieving Indigenous self-determination could be through the legal concept of Rights of Nature, which is closely aligned with Indigenous world views (O'Donnell et al., 2020). Rights of Nature is a legal instrument that enables nature, such as ecosystems or species, to have inherent rights and legally be entitled to the same protection as individuals and corporations (Lavides, 2018). It follows the rationale used to establish human rights: since human rights are based on the philosophical belief that rights are derived from humanity's own existence, then logically, so do inherent rights of the natural world (Darpö, 2021).

Based on the idea of environmental personhood, the recognition of the Rights of Nature concept can be seen as a radical approach to redefining humans' relationship with nature, underpinning a growing global movement focused on implementing the concept through legal processes. Legal tools are devised depending on whose interests are protected, and adopting Rights of Nature is a stepwise progression (Jain, 2021).

The Human Right to a clean, healthy and sustainable environment, recognized by the UN Human Rights Council in 2021, is based on an anthropocentric view of nature, where the primary concern is maximizing natural resources and protecting humans from environmental pollution (Jain, 2021). Rights of Nature can be viewed as the final step in this progression, where the focus shifts from the interests of humans to the interests of nature, of which humans are a part (Jain, 2021). Pursuing an integrated approach that incorporates rights-based strategies for human beings and the environment could be transformative (Earth Law Center et al., 2020).

The focus shifts from the interests of humans to the interests of nature, of which humans are a part.

Although the Rights of Nature are not yet recognized everywhere, several ecosystems around the world have been declared living entities by local or federal courts, with many of them also granted personhood. New Zealand recognized the Whanganui River and Te Urewera National Park as a 'legal person' with accompanying rights and obligations (Magallanes, 2015). The Ecuadorian constitution also granted rights to nature, due in part to beliefs held by Indigenous peoples regarding the way that human beings should interact with nature (see Box 4.3). Similarly, the Rights of Nature are enshrined in the Bolivian constitution.

Box 4.3 The right of a river to run its course

In 2008, Ecuadorians amended their constitution, recognizing Pacha Mama (Mother Earth) as a legal entity in Chapter 7, Rights of Nature (Republic of Ecuador, Constitution, 2008). The idea of *el buen vivir*, or good living, was the basis for part of the amendment, which states that people have the right to benefit from environmental services and resources. The understanding of nature itself as an independent entity or 'subject' is central to the Indigenous worldview of the Andean region.

In 2011, the first case was tried in which the Rights of Nature concept was applied: the right of a river to its natural course. A lawsuit was filed in the province of Loja on behalf of the Vilcabamba River, the course of which had been redirected under a state-led project to widen a road. Although one possible argument was that the river served as a vital natural resource for the local population for a healthy environment, because of the recent constitutional reform, it was possible to claim that the river itself has the right to its own natural course.

One of the main arguments in the judgement from the Penal Tribunal of Loja's Provincial Court, dated 30 March 2011, is the recognition of the Constitutional Rights of Nature:

> *Our constitution of the republic, without precedent in the history of humanity, recognizes nature as a subject of rights. Article 71 affirms that nature, or Pacha Mama, where life is reproduced or occurs, has the right to integral respect for its existence and for the maintenance and regeneration of its lifecycles, structure, functions and evolutionary processes* (Republic of Ecuador, 2008).

The court ruled in favour of the river. The state was directed to repair the damage that had been done during the initial stages of road construction, but the company involved in the road construction did not comply with the court's ruling. The claimants could not afford to bring the case to court a second time.

Proponents of environmental constitutionalism argue that Rights of Nature should be included in international law or national constitutions, to ensure long-lasting value to the protection and conservation of nature (Darpö, 2021). However, several barriers have prevented the Rights of Nature movement from gaining broader traction.

As illustrated in the Ecuadorian case (Box 4.3), bringing cases to court is expensive and often beyond the capacity of local communities or non-governmental organizations typically advocating on behalf of nature. Also, merely observing that nature has rights will not provide the effective force of law; enforcement must be included. Although the Rights of Nature movement appears to be gathering momentum, and may hold potential for protecting Indigenous-held ecosystems, ensuring broader recognition of Indigenous knowledge in legal and policy frameworks will maintain Indigenous communities' long-term connection to their landscapes (Diver et al., 2019b; Tănăsescu, 2020).

We see evidence of acknowledgement of Indigenous ownership and historical rights in New Zealand, Canada, and Australia, for example, and in international agreements on Indigenous rights (UN Declaration on the Rights of Indigenous Peoples, 2007); in many places, this has yet to be translated to legal status, in part because of lack of accountability (see Chapter 5).

Recommendations for recognizing Indigenous local knowledge and the Rights of Nature:

- **National policies related to nature conservation should more strongly include the role of traditional and Indigenous knowledge, in line with international agreements.**
- **National legislative and judicial bodies should consider whether establishing Rights of Nature will help protect nature in specific contexts, based on comprehensive consultation with stakeholders and analysis of what capacities and resources would be needed for effective enforcement.**
- **The Human Right to a clean, safe and sustainable environment should incorporate a Rights of Nature rationale, whereby human responsibility and interests for the protection of Nature as a legal entity with personhood, are clearly articulated.**

Photo: UN Photo / Manuel Elías

Taken together, the actions we propose here have the potential to fundamentally redefine our relationship with nature by shifting how people and societies value the natural world: from valuing nature as a set of extractable resources to recognizing the intrinsic value of the more-than-human world (O'Connor & Kenter, 2019). Achieving this shift will require us to overcome the undeniable tension at play between human-centred models of ecosystem valuation – which only consider ecosystem functions as useful for meeting human needs or desires – and the role of intrinsic and relational values of nature (O'Connor & Kenter, 2019).

In the next section we explore the economic and policy implications of these shifts for achieving a level of human prosperity that is aligned with the strong sustainability model. Some of the tools we suggest below rely on these inherently damaging systems and ways of thinking that are antithetical to the¥long-term goal of redefining our relationship with nature. We acknowledge this¥as a stepping stone to the future we want to achieve.

4.2 Ensure prosperity that lasts for all

As shown in Chapter 2, **the world is far from ensuring prosperity that lasts and even farther from prosperity that lasts for all**. Climate, biodiversity and the natural world are under severe pressure; extreme inequalities continue in who exerts the pressure on our planet's systems as well as who suffers the impacts (Chancel et al., 2021; UNEP, 2021d).

One major source of pressure is our material resource use, which also reflects the inequality in growing prosperity. The annual global extraction of materials has tripled since 1970; the rate of extraction has accelerated since 2000. The consumption of these materials is unevenly distributed: high-income countries have per capita material footprint consumption levels that are 60% higher than upper-middle income countries and more than 13 times the level of the low-income countries. Under a historical trends scenario, global resource use could more than double from 2015 to 2060 levels (IRP, 2019).

The way we use resources now requires systemic change.

If material resources are a proxy for prosperity, inequality and the pressure on both planet and people, then the way we use them now indicates the urgency for systemic change. **The extent of the transition required to ensure lasting prosperity and to bring lifestyle footprints within ecological limits will require a complete rethinking of our way of living, including a shift in social norms and values that drive human behaviour (UNEP, 2017b).**

Instead of a narrow focus on economic growth, a future of 'lasting prosperity for all' should be seen as **human, environmental and societal well-being**, maintained for the long-term. This definition of prosperity could be

consistently applied at all levels: international, national, subnational, business, societal and individual (BP Jain & Chhabra). It requires addressing the vast inequalities – between individuals and between countries – that characterize the world today.

While the world is far from being able to supply lasting prosperity for all at present (O'Neill et al., 2018), societies and the economies embedded within them can provide material comfort within planetary boundaries – a safe and just space for humanity (Raworth, 2017).

It is physically possible to meet our material needs with very low inputs of energy and materials, in such a way as to provide more than enough and consistently for all (Millward-Hopkins et al., 2020). The key is to reduce the 'material intensity' of meeting our needs, particularly those that are not inherently material-intensive (Jackson & Marks, 1999). **Yet many social, cultural and physical environments today do not support low-impact means of satisfying human needs**.

The world as a whole appears to have a greater focus on wealth, status and image.

The world as a whole appears to have a greater focus on wealth, status and image than on the transcendent 'larger-than-self aims' of caring for the environment, for example, or each other (BP Agrawal & Kala; Kasser et al., 2020; BP Mallya & Raha]. As higher-income populations continue to increase their consumption and resource footprint, they also raise the benchmarks for aspirational lifestyles in less wealthy countries. Globalization and enhanced interconnectedness through access to internet and social media platforms has heightened the risks of emulation of prolific and resource-intensive lifestyles at global scale (BP Agrawal & Kala).

Promising examples exist of individuals and communities adopting lower-carbon lifestyles, for a multitude of reasons, not only because of concern about climate change (Howell, 2013; Sitra, 2021). Efforts around the world are under way to implement zero-carbon communities, such as the Beddington Zero Energy Development (BedZED: Chance, 2009) and the Zero Carbon Communities initiative in Australia (Beyond Zero Emissions, n.d.).

The promise of 'zero-carbon' has not been fully realized (Berry et al., 2014), and standards are still lacking (Kennedy & Sgouridis, 2011). Moreover, people who live in low-carbon housing – that is, housing constructed or refurbished using low-carbon solutions across the full life-cycle (UNEP, 2021a, p. 16) – are still embedded within a society offering mostly high carbon–emitting activities. Thus, residents of low-carbon housing may not be living truly low-carbon lifestyles (Walker et al., 2015). Local and individual efforts require larger scale support and transformation.

Substantial barriers remain to redefining prosperity (BP Jain & Chhabra), **and even more so, to enabling more equitable prosperity** (BP Nazareth & Ghosh). These range from barriers at the international level, for example with economic size acting as a source of power, to the business level, where companies seek to broaden their markets and remain profitable, to the individual level, where

material wealth is often associated with success. As for national-level metrics, geopolitics and power relations between nations are strongly influenced – if not wholly determined – by economic size, while governments rely on monetized economic output for revenue. At the individual level, many individuals throughout the world associate material wealth with success, a belief that is strongly reinforced by social norms (and leads to a disconnect with nature, as noted above; section 4.1). Businesses seek to broaden their markets and must remain profitable.

Another challenge is that people's material needs are rooted in biology, but are not absolute, and can change, in both more and less sustainable directions. For example, for most of human history, 6 square metres of living space per person in a dwelling was typical and considered sufficient (Brown, 1987). In high-income countries today, that would be considered extraordinarily small.

The implication is that while a certain amount of living space will suffice, sufficiency is a flexible notion – with rising income, households tend to spend some of it on expanding their living space (Kemp-Benedict, 2013). And as living

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space expands, **people readjust their criteria of sufficiency** (Foye, 2017, p. 431; BP Lindahl & Dalhammar). The adjustment can go in the opposite direction as well (Cohen, 2021), although it pushes against norms. Some individuals feel intense personal satisfaction with a smaller space – yet distress from social disapproval, as illustrated by the experience with 'micro-flats' in some countries (Lau & Wei, 2018; Preece et al., 2021; Vachon, 2018).

Meanwhile, it is much easier for people with property to adopt low-carbon housing options or invest in climate adaptation measures (BP Barquet & Green). And the distribution of property within countries has been strongly shaped by historical inequalities (Aladangady & Forde, 2021). **Addressing material footprints and other markers of prosperity raises pressing questions of inequality and historical responsibility.**

Between countries, the goal of achieving lasting prosperity for all is built into international agreements. Principle 3 of the Rio Declaration (UNGA, 1992) ensures a right to development that meets the needs of both present and future generations, in an equitable way. Principle 7 asks member states to 'conserve, protect and restore the health and integrity of the Earth's ecosystem', while noting that states have common but differentiated responsibilities.

States should 'conserve, protect and restore the health and integrity of the Earth's ecosystem', with common but differentiated responsibilities.

These principles are part of international law, and agreeing to them was a significant achievement for international environmental and development cooperation. In practice, however, the results have been disappointing (BP Mallya & Raha). Climate negotiations are the most prominent arena for the principle of common but differentiated responsibilities, and high-income countries – which have the greatest historical responsibility for greenhouse gas emissions and experience the least impacts – have yet to take responsibility, even the step of providing financial investments to support the poor and marginalized communities and countries that bear the brunt of climate impacts (Althor et al., 2016; David-Chavez & Gavin, 2018; UNFCCC, 2021a, 2021b; BP Nazareth & Ghosh).

While we do not have principles for common but differentiated responsibility at the level of individuals, the extreme inequalities in climate footprints are becoming increasingly clear (see Chapter 2; BP Agrawal and Kalra; BP Dalhammar et al.; BP Nazareth & Ghosh). The Paris Agreement targets appear to be out of reach unless we tackle the emissions of the rich (Newell et al., 2022).

From the dominant narratives of consumption driven by rising affluence, consumerism, product marketing and access to credit (Ahlström et al., 2020), the world must move to a sustainable future where sustainability and consuming less is considered aspirational (BP Agrawal & Kala). Such transitions require transformation of systems, including social norms and values (UNEP, 2017b).

Areas for action

Ensuring prosperity that lasts for all requires changing metrics and realigning powerful norms, incentives and drivers at all levels of society. It also requires recognising common but differentiated responsibilities for high-income countries and individuals. While individuals, communities and others can take actions, transformative and systemic change depends on providing enabling infrastructures, supportive legal frameworks and new social norms. We highlight here five interlinked areas of action, which start at the level of individual and community lifestyles, move to business models and supply chains, and to the national level for statistics and support for innovation, influenced by all of these levels.

1 **Make a sustainable lifestyle the easy choice**
2 **Purchase function, not product**
3 **Make supply chains better for both humans and the environment**
4 **Align national statistics with sustainability goals**
5 **Change the selection environment for innovation**

Make a sustainable lifestyle the easy choice

Making sustainable lifestyles the overwhelmingly easy choice for individuals and communities is necessary for ensuring lasting prosperity and substantially reducing footprints of high-income people and nations. This requires innovative and bold policies that actively create enabling infrastructures, reconfigure systems and amplify social norms around sufficiency, as well as new global governance initiatives to address equity in these transitions.

The impact on the planet from individual lifestyles and overconsumption, and in particular the richest individuals, is highly inequitable (Chapter 2). New research directly connects global targets to individual footprints; for example a '1.5°C lifestyle' in keeping with the Paris Agreement targets on climate-changing emissions would mean average per capita footprints of 2.5 tCO2 by 2030 and 0.7 tCO2 by 2050, compared with today's per capita footprints of high-income countries, which are often over 10 tCO2 (Akenji et al., 2021). Per capita footprints can also be measured for land, water, nitrogen and chemicals (see e.g. https://www.prince-project.se/), also showing a clear pattern of inequality across high- and low-income countries.

In some contexts, individual changes in lifestyles can lead to substantial reductions in carbon footprints, by approximately 25% in Europe (Moran et al., 2020). Reducing footprints to the level indicated as necessary by scientific evidence inevitably entails changes in lifestyles, together with supporting infrastructure; dedicated policies must be part of the mix. Other motivations and values than sustainability can drive more sustainable lifestyle choices (e.g. thrift, well-being, small pleasures of life) and synergies between individual or policy goals are possible (Sitra, 2021).

The policy toolbox for sustainable lifestyles is growing fast (see BP Agrawal & Kalra; BP Dalhammar et al.; BP Lindahl & Dalhammar; BP Olsson & Dawkins). Current policy measures can be broadly grouped into measures for individuals, markets and societies:

- nudging individuals into sustainable actions (e.g. 'ecolabelling', reinforcing norms through 'good examples', modifying physical environments);
- enabling markets to make sustainable choices available, convenient and affordable (e.g. market incentives to subsidize or tax behaviours and products, regulations that remove products through standards and bans);
- and redefining social norms to make sustainability aspirational (e.g. promoting new social identities such as minimalism or vegetarianism, leveraging collective action to shift social norms; BP Agrawal & Kalra).

The latter type of measure – redefining social norms – shows that lifestyles are not just individual pursuits but collective practices, such as the Raahgiri Day in New Delhi to motivate people away from use of personal cars. Another typology is provided by Akenji et al. (2021), who proposed a hierarchy of options: starting with efficiency improvements, moving to modal shifts towards more sustainable options, to absolute reductions in high-impact consumption.

A strongly emerging common theme in the background papers to this report and the scientific research on which they draw is that we are now at a point where efficiency-oriented options and nudging measures are insufficient. To achieve the scale of behaviour change needed, more systemic and transformative measures are needed, more oriented toward the enabling infrastructure for lifestyle choices and the broader social norms underpinning our behaviour and toward absolute reductions in high-impact consumption. Absolute decoupling has not taken place due to so-called rebound effects, problem shifting and limited potential of recycling (BP Dalhammar et al.).

Efficiency-oriented options and nudging measures are insufficient.

Moving forward, the sustainable choice needs to be not just the default choice, but the easy choice for an individual to make (Akenji et al., 2021). The substantial structural changes in economies and societies required is highly likely to threaten powerful established interests that have both the motivation and the means to resist them (Geels, 2014). At the same time, substantial and uncertain change is threatening for people in more precarious situations. While much of the literature on 'everyday resistance' in the context of sustainability focuses on small-scale sustainability initiatives (Leach & Scoones, 2015; Sovacool & Brisbois, 2019), it can go the other direction as well (Sovacool et al., 2022).

There is no easy way to address the powerful structures that drive societies along unsustainable paths. However, there are some broad strategies that can help. One is to go beyond merely encouraging sustainable activities

at the margin, e.g., through nudges (Thaler & Sunstein, 2009). Nudges can indeed be effective and appear to be a useful policy tool. However, they influence modest choices within specific contexts (Lehner et al., 2016). They are about small changes within existing systems of production and provision, whereas this report focuses on substantial systemic change. More alarmingly, because they demand little of people, acceptance of nudges can crowd out acceptance of more challenging options with greater potential impact (Hagmann et al., 2019).

Rather than a default, where a sustainable and unsustainable option sit side by side and the purchaser is gently encouraged to choose the sustainable one, choosing unsustainable options should be very difficult. Substantial systemic change requires actively *promoting* sustainable options and actively *demoting* unsustainable ones (Box 4.4).

Photo: Donyanedomam / iStock Editorial / Getty Images Plus

Box 4.4 Enabling infrastructure: why fossil-fuelled private cars are still the easy choice

To take an influential example, use of fossil-fuelled private cars is supported as the default option because of a wide range of supporting infrastructure and institutions (BP Olsson & Dawkins). The enabling infrastructure and institutions include fuelling stations, trained mechanics, regulations, manufacturers, suppliers, dealerships, marketing messages and so on that are geared towards the petrol-powered car. Fossil fuel extraction remains actively promoted and often subsidized (SEI et al., 2021).

In comparison, finding alternatives is more challenging, at least at present, due to fewer charging points for electric vehicles, limited public transportation services, fewer specialized service stations and less-readily available parts, among other conditions. All of these exist within an emerging regulatory environment that contributes to uncertainty.

Transitioning to low-carbon transportation requires system reconfiguration (Geels, 2018). The clues to a future system configuration lie in innovations that currently live in 'niches'. Some might replace existing mobility components, such as electric motors replacing internal combustion engines. Intermediate technologies might lead to a blended approach, such as biofuels and hybrid electric vehicles. Yet other innovations may change opportunities, such as smart cards to improve public transport or facilitate trips that use multiple modes.

Finally, innovations lying outside of transport *per se*, such as working from home, changing ownership patterns, or living in more compact cities, would likely drive broader changes in institutions and infrastructure that would impact upon car ownership and use. These influences offer opportunities for policy. Experiments with shared cars are one example of changes to ownership patterns, an example of 'purchase function, not product' discussed below. Some countries are introducing bans and moratoria on fossil fuel exploration and extraction (SEI et al., 2021, Chapter 6), which could arguably accelerate a transition away from fossil-fuel use, including for transport. Other policies include expansion of charging infrastructure, incentives for purchasing electric vehicles or retiring fossil-fuelled vehicles, and disincentives or outright bans (Plötz et al., 2019) for fossil-fuelled vehicles.

Cultural and institutional adoption of these practices can be one action toward a sustainable future, in both low- and high-income settings, and would satisfy some material desires while potentially smoothing out inequalities of access – but they are not the main endpoint. Given the intertwined nature of social, economic and ecological systems – and problems – more needs to be done. Densification of urban housing and infrastructure, walkable cities and so forth, all contribute to fewer vehicles on the road and facilitate closer interactions with natural settings.

Examples of making unsustainable choices difficult, costly or even impossible, in the context of decarbonization include the banning of short haul flights, stopping airport expansion and freezing road building projects. Clearly, there are risks and barriers with such measures. They can be seen as violating individual rights and they can pose risks to local cultures and economies dependent on the product or infrastructure that is demoted or banned (BP Agrawal & Kalra). For this reason, trust-building and inclusive and just processes are important to ensure acceptance.

Policies previously seen as radical or unthinkable become seen as acceptable, sensible or even popular.

At the same time as more transformative policies are needed, we may be approaching a tipping point in public acceptance for sustainable consumption policy, at least in some places. Signs are emerging of more radical policies in some places, such as end dates for selling fossil-fuelled cars, cities banning diesel vehicles, cities curbing tourism levels, and organizations reducing working time for their employees (BP Dalhammar et al.). This suggests that the so-called Overton window may be shifting; i.e. policies previously seen as radical or unthinkable become seen as acceptable, sensible or even popular.

New ideas and concepts in research can be more socialised and tested in policy experiments, such as operationalising 'sustainability corridors', notions of 'sufficiency', and mapping out 'provisioning systems' (BP Dalhammar et al.; BP Olsson & Dawkins). The focus on individual consumption when discussing lifestyles could be broadened to also consider other roles of an individual, such as member of organizations, employee, and influencer in their social network (Nielsen et al., 2021).

In view of the grave footprint inequalities and principles of equity, high-income countries and individuals must take the lead on these types of transformative shifts. To ensure a truly global response, however, global governance is needed. A first step could be a collective global exercise to co-develop pathways for sustainable lifestyles and parameters that can measure it, led by a UN global commission (BP Agrawal & Kalra). Another idea is to develop a Global Budget of Resources and set up a Conference of Parties on Utilization of Resources under the UN (BP Mallya & Raha). High-income countries should support the enabling infrastructure for sustainable lifestyles that also meet development aspirations in low-income countries through increased investment support (see section 4.3).

Recommendations to make a sustainable lifestyle the easy choice:

- **Transformative change requires a long-term vision, but it can be enabled through near-term actions: local and national governments should identify the barriers in infrastructure that prevent individuals from shifting to more sustainable lifestyles and begin to remove them, combined with more effective and ambitious mixes of policies that edit choices, in order to accelerate change.**

- **The use of local policy labs and learn-by-doing experiments for sustainable lifestyles should be scaled up, where the individual is an active co-creator and network influencer.**

- **A regular UN forum on sustainable lifestyles should be established, to enable international peer learning and elevate action on SDG12. A collective global exercise to co-develop pathways for sustainable lifestyles and parameters that can measure it should be convened.**

Purchase function, not product

Purchasing functions to fulfil our material needs instead of products would be more resource-efficient; this should be a key element of the reset needed for everything from individual lifestyle choices to business models, to ensure lasting prosperity. Supportive regulatory frameworks and changed social norms on ownership and reuse could have a transformative effect on scaling such business models and reducing material flows.

Function – rather than product – is a core idea of circular economy. This switch could help plug the 'circularity gap': less than 9% of total material input to the global economy is estimated to consist of 'cycled' materials – not recycled, per se, but reused, repaired and otherwise cycled back into the economy (Circle Economy, 2021).

Material throughput can be substantially lower if households, businesses and government agencies switch from purchasing products to acquiring functions of products – instead of buying a lamp, purchasing lighting. This practice is also referred to as 'Product-Service Systems', which can be product-oriented (i.e. a product with additional services such as maintenance), use-oriented (e.g. leasing or renting), or result-oriented (no predetermined product is involved; Bocken et al., 2016; Tukker, 2015).

Such contracts to purchase functions can have substantial environmental and economic benefits (Lindahl et al., 2014), in part because the service-oriented contracts include reuse, repair and remanufacture of equipment, which creates environmentally positive incentives. A faulty machine – say, a water pump – can be removed and fixed by a service provider that would also be responsible for all the materials in that product, as part of a service – providing water.

Function-oriented contracts could resolve some of the trickier problems for a sustainable economy.

In this framing of 'function-oriented contracts', 'consumers' become 'users': their use of the service is not the end of the line for the product (BP Lindahl & Dahlhammar). Such contracts are available to some extent already in the mobility and consumables sectors through equipment rental, carsharing pools, launderettes and online streaming services, as well as public services such as lending libraries. If they became the norm rather than the exception, function-oriented contracts could resolve some of the trickier problems for a sustainable economy.

One problem is 'expenditure mistakes' – buying a product that the purchaser soon decides is not what they want. By purchasing for function, the user can simply end a contract or ask a provider to find a new way to provide their function. The user avoids needless costs. The material goods are taken away by the provider and readied for use by someone else. This innovation lowers the stakes for making poor expenditure choices – and enables a higher standard of living that contributes to better quality of life (Brown, 1994).

A second problem is obsolescence. Style and performance improvements can make a perfectly functional piece of equipment undesirable, as illustrated by the short turnover time for mobile phones in most high-income countries. The owner of that equipment may buy a replacement before the end of its useful life. However, under a function-oriented contract, the equipment might be replaced by the service provider and remanufactured to capture recent improvements (BP Lindahl & Dahlhammar).

The goal, at the design stage, would be to facilitate remanufacturing: make products that are easy to disassemble, reuse or repair. This practice would require both cultural and regulatory shifts, but would reduce the volume of solid waste and life-cycle emissions. One dimension of the cultural shift needed to make reuse more acceptable and popular is the language we use. Words like 'old', 'waste' and 'second-hand products' are generally seen as less attractive than 'new', 'resources' and 'products'. It could have a transformative effect to develop more neutral language (see Figure 4.2). Powerful social norms that privilege ownership over rental and borrowing, and new things as more desirable, need to be disrupted. Behavioural barriers must also be overcome; people want to have easy accessibility and control over the things they use (Tukker, 2015).

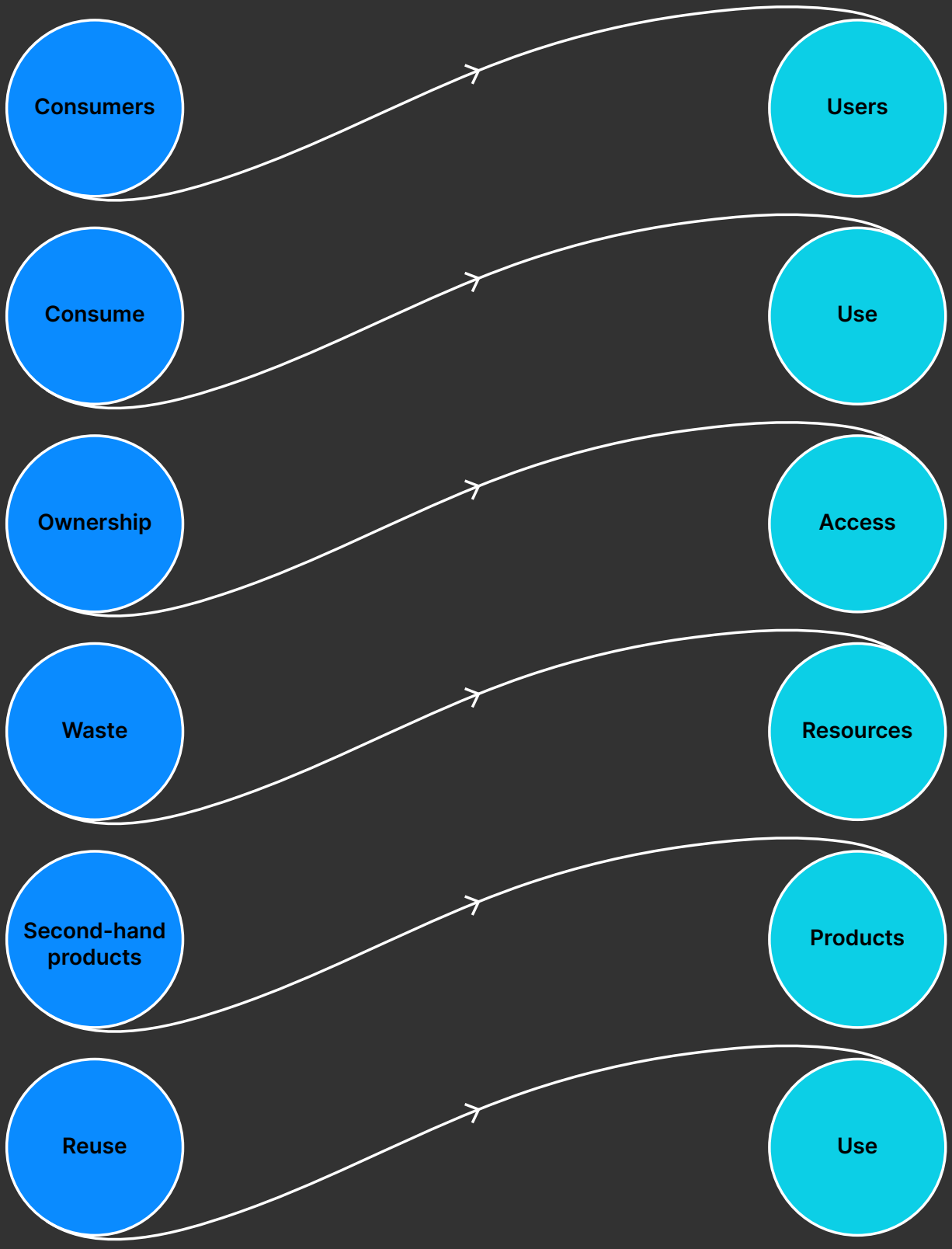
Following function over product could transform global value chains to benefit today's low-income countries.

Regulatory shifts are needed to remove barriers for more reuse or repair, whether by users or function providers. Examples include waste and producer responsibility legislation that promotes recycling over reuse; chemical legislation that blocks repair and remanufacture if a remanufactured product does not comply with rules on dangerous or toxic substances; and intellectual property rights that prevent repair in order to preserve competitive advantage.

Following function over product could transform global value chains, including supply chains, in ways that would benefit today's low-income countries. The current pattern follows raw materials produced in low-income countries, used to create finished products in high-income countries, which then become waste that is sent back to low-income countries. This flow could be replaced by value chains dominated by remanufacturing and reuse, locally and abroad (BP Lindahl & Dahlhammar). In that case, remanufacturing would increase working knowledge of the products within low-income countries, and the value added to the remanufactured products would provide income and employment.

Figure 4.2

A more neutral language around consumption



While intuitive in principle, 'product-service systems' do not by default lead to lower resource throughput and absolute decoupling; a number of conditions must apply (Kjaer et al., 2019). Relying on circular economy approaches alone carries the risk of rebound effects, where saved resources lead to more resources used; hence, measures are needed that are oriented towards sufficiency and lifestyles more broadly (see above).

Recommendations to shift to purchasing functions, not products:

- **Businesses should shift to offering functions rather than products as much as possible.**
- **Government should adapt legal frameworks to remove bias against business models that switch from selling products to functions.**
- **Governments should help create and expand markets for use- and result-oriented product service systems through public procurement.**
- **Government and businesses should pioneer more neutral language around consumption and reuse, to enable new social norms to develop around the status of ownership and new products.**

Make supply chains better for both humans and the environment

The world economy is entangled through global supply chains, and since the 1972 Stockholm Conference, they have increasingly driven the world economy. High interdependency governs how prosperity is created and shared along this chain, as well as how lasting that prosperity is in light of environmental and social impacts locally and globally. Transparency and sharing verifiable information are crucial (Dasgupta, 2021) to ensuring decent new jobs and skills, co-creation and sharing of prosperity and benefits, social safety and security, and care for the vulnerable. **Existing governance initiatives provide a basis, but there is scope to increase environmental ambition and make frameworks more binding.**

A key issue for businesses and governments when contributing to prosperity and equity, as opposed to the company bottom line only, is how to demand, incentivize and support sustainability along the supply chain. This responsibility becomes extra important when raw materials are supplied from developing regions, which may lack strong enforcement of local legislation on environment, human rights and decent work. The uneven distribution of power, capacity and agency throughout supply chains calls on those in power to create the capacity needed for transformation.

Between 1995 and 2007, pure domestic production as a share of global GDP declined from around 85% to below 80%. Meanwhile the contribution of global value chains to global GDP rose as a share of the total (World Bank Group et al., 2017, p. 43). These patterns sharply reversed during the 2007–2008 financial crisis, and only partly recovered thereafter. Nevertheless, the overall trend has been towards an expansion of global value chains in the global economy.

To date, supply chain governance has mostly been voluntary (BP Engström) and targeted at mapping and analysing sustainability impacts along the supply/value chain (see e.g. UNEP, 2021c). One influential set of guiding principles is the 'Ten Principles of the United Nations Global Compact' (see Table 4.1; UNGC, 2022). Organized under the four categories of human rights, labour, environment and anti-corruption, they explicitly entwine human and environmental development and, if followed, would support both green and decent jobs (see Box 4.5). As the European Commission's recent Trade Policy Review points out: 'The green transition needs to go together with social equity. A serious decent work deficit persists in global supply chains in many parts of the world, from serious violations of freedom of association to poor working conditions' (EC, 2021, p. 2).

Table 4.1. The Ten Principles of the UN Global Compact are related to 'corporate sustainability' and applicable to supply chain governance (UNGC, 2022).

Human Rights
Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and
Principle 2: make sure that they are not complicit in human rights abuses.
Labour
Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
Principle 4: the elimination of all forms of forced and compulsory labour;
Principle 5: the effective abolition of child labour; and
Principle 6: the elimination of discrimination in respect of employment and occupation.
Environment
Principle 7: Businesses should support a precautionary approach to environmental challenges;
Principle 8: undertake initiatives to promote greater environmental responsibility; and
Principle 9: encourage the development and diffusion of environmentally friendly technologies.
Anti-Corruption
Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

BOX 4.5 Green jobs and decent work: maximizing synergies

In the context of the climate transition (SDG13), the potential of new, green jobs has come to the fore, as a co-benefit or even a primary reason to make large public investments in renewable energy, low-carbon mobility, energy efficiency and climate resilience. The International Labour Organization (ILO) has estimated that 24 million new jobs will result from the climate transition and shifting to a circular economy, and that 1.2 billion current jobs (e.g. in agriculture) depend on a healthy environment (ILO, 2018; see also BP Muñoz-Cabré & Vega-Araújo). Equally, a transition to a 'bioeconomy' can facilitate new small-scale entrepreneurship (Kuckertz et al., 2020).

At the same time, the decent work agenda (SDG8) was deeply affected by the Covid-19 pandemic, with failing or absent social safety nets and increasing unemployment, including among 2 billion people worldwide in informal employment and especially among youth (UN, 2021). Education and skills development (SDG4) were similarly disrupted with potentially long-term effects.

The interlinkages between these agendas and possible synergies should be more systematically explored. Evidence, good examples and needs on the following questions should be synthesized (see BP Engström):

- Are public job creation programmes targeting climate goals and maximizing SDG synergies?
- How can new green job creation programmes target marginalized workers, the informal sector and unemployed youth? Are new green jobs promoting occupational health and safety and decent work?
- How are just transitions designed for workers and communities in fossil fuel industries and other industries that need low-carbon transition?
- How will climate and environmental change impact labour productivity and worker safety?
- Are education curricula equipping young people with the right skills to prepare for a sustainability transition?
- How will the 'future of work' agenda (e.g. automation, artificial intelligence, gig workers, remote workers) affect green job opportunities?
- How can workers and employees help drive the sustainability transition, at workplaces and through trade unions?

The economic recovery after the pandemic and the need to accelerate towards Agenda 2030 together make Stockholm+50 a timely moment to make a step change on greening jobs, with a particular focus on youth and developing economies. Building on the Global Deal and existing initiatives on green jobs (e.g. Green Growth Knowledge Platform, ILO Green Jobs Programme), a new initiative to co-develop knowledge, good practice guidelines and pilot programmes should invite governments, business, trade unions and youth groups.

The Ten Principles are a widely referenced benchmark. Nevertheless, they could be improved. Notably, there is no recommendation to *discourage* unsustainable practices under the 'environment' category. In contrast to human rights, labour and anti-corruption, where the principles urge businesses to explicitly avoid bad actions, the environmental principles only recommend encouraging good actions. This is unlikely to drive change at the needed scale – as noted earlier, a sustainability transition requires actively *promoting* sustainable options and actively *demoting* unsustainable ones.

Furthermore, as voluntary principles, adoption of the Ten Principles or any other guidelines depends on whether companies believe they can help alleviate reputational risk, or whether their clients or investors require a high standard of social and environmental due diligence (Smit et al., 2020, p. 16).

A recent study carried out for the European Commission found that a majority of survey respondents, including business representatives, supported mandatory due diligence requirements. Mandatory requirements assist business in many ways, including coherence and legal certainty. The existence of a common and non-negotiable standard helps responsible businesses to also be competitive, and gives them leverage in discussions with supply-chain partners and investors (Smit et al., 2020, p. 17).

One important finding from the study is that industry organizations – that is, groups that represent many businesses – were less supportive of a mandatory standard than were individual business respondents. The gap is striking, and concerning, because industry organizations represent businesses to policymakers.

Mandatory due diligence laws have been in place in the US and individual European countries for conflict minerals. More recently, the EU introduced a requirement for all member countries. Other requirements are in place for timber, and others are being proposed for human rights and environmental issues (BP Engström). To promote intended outcomes, due diligence must cover the full range of environmental and social impacts, as well as raise ambition; to be effective, transparency and traceability are a prerequisite (e.g. Trase, n.d.).

Due diligence must cover the full range of environmental and social impacts, as well as raise ambition.

A key barrier to mandatory national regulations is that they must not violate World Trade Organization rules. In response, a variety of voluntary, mandatory and hybrid regulatory systems is emerging, mainly driven by initiatives in high-income countries, with decidedly mixed results for lower-income countries (Partzsch, 2020). Another key challenge for many multinational corporations is to ensure compliance with standards beyond the first-tier suppliers, in the wider supply network (Villena & Gioia, 2020). This is why global approaches are useful, to set more general formal or informal standards. Other key tools to promote global supply chains that are better for humans and the environment include regulations for corporate sustainability governance and reporting, public procurement,

disclosure of financial risks, and tools for better traceability, such as digital passports (BP Engström).

Recommendations to make supply chains better for both humans and the environment:

- **The UN Global Compact and its members should consider increasing the level of ambition of the environment-related Ten Principles, to more actively demote unsustainable options and practices.**
- **National governments and international organizations should consider more binding due diligence requirements and greater harmonization.**
- **Relevant international organizations, supported by member states, business, trade unions and youth organizations, should consider co-developing more knowledge and best practices for maximizing synergies between green jobs, decent work and youth employment.**

Align national statistics with sustainability goals

National accounts are a highly influential arena in which to redefine prosperity. It is time to move beyond GDP as the primary metric and adopt indicators that help measure progress towards the vision of sustainable development, in a collective way to lower risks for first-movers.

National metrics and statistics inform policymaking and policy analysis. They are far from the only inputs to decision-making, but the choice of core statistical indicators is an influential signal of what matters to policy, and efforts to improve key indicators can direct policy interventions in particular directions. National statistics can thus act as policy levers, so they must be chosen well. The shortcomings of GDP have been well known for a long time (Raworth, 2017; BP Jain & Chhabra).

New metrics can be developed and can become hugely influential on policy.

The perverse nature of current statistics is well-illustrated by their neglect of the caring economy – the unpaid work that underpins the functioning of our societies, countries, cities, and families and thus creates a public good. As the Covid-19 pandemic has made clear, this is essential work (Guerrero et al., 2020; The Lancet, 2020). National economic accounts – the source of data for calculating GDP – almost exclusively record transactions where money changes hands. There are a few exceptions, and what is included and what remains excluded is highly revealing of policy preferences. For example, the implicit rental value of owned homes may be counted as earned income (Mazzucato, 2018, p. 93), while intangible assets, such as intellectual property, have begun to be accounted for as well (Haskel & Westlake, 2018). In contrast, unpaid caring work remains outside the accounts.

As a prominent example of an alternative metric, the Human Development Index (HDI), introduced in UNDP's first Human Development Report (HDR) in 1990 (UNDP, 1990), illustrates how indicators can shape policy. The authors' goal was explicitly pragmatic. Noting that the statistics available in 1990 were highly constrained and that too many statistics could be bewildering, the authors of the HDI focused on three key areas of human development – longevity, knowledge and decent living standards – and chose three broad indicators – life expectancy at birth, literacy and GDP per capita. Since that time, subsequent HDRs have addressed a range of issues, continually expanding the scope of inquiry and the structure of the HDI (UNDP, 2019). This example shows that new metrics can be developed and can become hugely influential on policy.

In a sustainable world, and in contrast to current practice, the high-level indicators that guide policy and that are used to compare countries should also include essential but currently unrecorded or undervalued life-supporting activities (Eisler, 2007, Chapter 10). There are many ideas, such as the measure of Inclusive Wealth that aggregates all capital assets and is regularly tracked by UNEP (UNEP, 2018).

A wide range of alternatives to GDP are now being implemented within countries to guide policy (BP Jain & Chhabra). In Australia, Measuring Australia's Progress (MAP) was targeted to the general public through a dashboard. In Germany, a set of nine so-called W3 indicators were introduced to complement GDP. They cover three dimensions: ecology, economy, and well-being. In Bhutan, the Gross National Happiness Index is used as an input to policymaking, and was used as a basis for a sustainability

Photo: Hugh Sitton / Stone / GettyImages

scenario (Kamei et al., 2021). Environmental accounts were introduced as a set of satellite accounts to the UN System of National Accounts (SNA) in 1993 (UNSD, 2007). They provide an internationally recognized and standardized way to incorporate environmental resource use and emissions.

To the extent that they are taken seriously in policy formation, alternatives to GDP and other key statistical indicators can help drive policies toward human well-being and environmental sustainability (BPJain & Chhabra). However, there are significant barriers to reorienting societies from measuring 'growth', via GDP, to 'prosperity', via alternative metrics. A nation's influence in international affairs is seen as dependent on economic heft. Government revenues depend on GDP, in that either taxes can be raised or the number of taxed transactions.

Recommendations to align national statistics with sustainability goals:

- **Global leaders must collectively recognize the need to redefine prosperity through alternative indicators, to generate buy-in and not deter 'first movers'.**
- **Governments should mainstream the narrative of redefined prosperity within countries through consultative approaches, including with subnational government.**
- **National statistics offices should more widely adopt consumption-based accounting and life-cycle accounting, and national governments should set goals and strategies for reducing footprints, with support for low-capacity institutions from relevant UN bodies.**

Change the selection environment for innovation

Common sustainability standards and principles for products and services (and eventually functions) should be applied to help to shape the upstream selection environment for innovation, which has a cumulative impact on technological development.

If the recommendations above were positively encouraged through policy initiatives – to make a sustainable lifestyle the easy choice, purchase a function rather than a product, make supply chains better for both humans and nature, and align national statistics with sustainability goals – then inventors, innovators and entrepreneurs would take them into account when carrying out research, development and design. Such considerations at these stages are crucial because early decisions constrain later decisions. The activity in a product's lifecycle with the greatest impact on products' environmental impact is design (BP Lindahl & Dahlhammar).

Design activities, in turn, are guided by institutions, norms, standards, and principles that live outside of any one firm and that inform firms' and individual inventors' activities. These shape the 'selection environment' for innovation, which in turn influences what potential innovations are further developed. Those become the starting point for subsequent innovation, so the selection environment acts in a cumulative fashion (Dosi & Nelson, 2018). To take

one example, opposition to GMOs in food strongly impacted the selection environment and subsequent development of biotechnology-based sectors (Saviotti, 2005, pp. 18–19).

Formal criteria, when widely adopted and, as necessary, enforced through regulation, offer one route to shaping the selection environment for innovation. For example, firms seeking financing may choose to align their product with the Green Bond Principles (ICMA, 2021; Maltais & Nykvist, 2020, pp. 10–11).

A further and potentially influential example is the emerging standard for a circular economy. The ISO is drafting such a standard, ISO 59004 (BP Lindahl et al.), which defines a circular economy as 'an economic system that uses a systemic approach to maintain a circular flow of resources, by regenerating, retaining or adding to their value, while contributing to sustainable development' (BP Lindahl & Dahlhammar). It lays out a number of definitions and principles, including that organizations 'regenerate, retain, or add value' effectively; inclusively collaborate with stakeholders along value chains and across value networks, and share the value created; sustainably manage and regenerate stocks and flows; and track those stocks and flows in a transparent manner to enable accountability. Adopting these principles at the level of research, development, and design would shape the form of new products and the ways in which they are provided to users.

A potentially influential example is the emerging standard for a circular economy.

Principles can also be developed for nature-based solutions, despite the complexities that arise from relying on living components that are embedded within dynamic social contexts. The challenges are significant: little data are available for life cycle costs of nature-based solutions, and it is not always clear whether adaptation interventions are indeed targeting those that need them the most (Bisaro & Hinkel, 2016; Lehmann et al., 2018). However, some degree of standardization of cost estimation and analysis of benefits would greatly assist cities, coastal communities, and others to incorporate nature-based solutions into their standard decision-making (BP Barquet & Green). More generally, well-designed stakeholder-informed approaches can systematically identify ecosystem service trade-offs, synergies and 'hotspots' associated with green infrastructure (BP Barquet & Green; Cousins, 2021; Meerow & Newell, 2017).

At a high level, official taxonomies of sustainable activities – that is, classification systems that provide common definitions of what constitutes a sustainable activity – can address concerns with greenwashing and facilitate the linking of international capital with a credible pipeline of projects (BP Dutt et al.). Regulation based on such a taxonomy would boost investor confidence in investment opportunities in developing countries. Because of the broad scope and therefore potentially strong influence of taxonomies of sustainable activities, it is crucial that they be developed through a transparent and inclusive process.

While the EU taxonomy was the first major taxonomic framework to be implemented, taxonomies are at various stages of development in developing countries such as China, Malaysia, South Africa, and India. Given the socio-economic contexts of developing countries, these could consider weaving in relevant socio-economic criteria besides environmental standards in taxonomy development, in order to facilitate a just transition to a low-carbon economy (BP Dutt et al).

This short list of examples shows how common standards and principles can help to shape the selection environment for innovation, which has a cumulative impact on technological development. Any definitions, rules and principles must respect the very real and non-negotiable biophysical limits of the planet. As Raworth's 'doughnut' metaphor highlights, the goal for a sustainable future is to provide a good quality of life for all in a manner consistent with ecological limits (Raworth, 2017). Crucially, that implies that the twin crises of overdevelopment and underdevelopment (see Chapter 2) are closely interlinked. Both goals must be pursued with equal vigour, and neither should be subordinated to the other.

Recommendations to change the selection environment for innovation:

- **Businesses should adopt voluntary sustainability standards and principles so that they become market-leading and influence innovation and product development.**
- **Governments should develop binding standards and classification schemes when voluntary standards are not aligning with sustainability goals or they are not sufficiently influential.**
- **International organizations should seek to harmonize standards, with special concern to entry requirements for low- and middle-income countries, so that they can access new markets for sustainable products and align their innovation systems to ambitious selection environments.**
- **Publicly funded innovation should demand adherence to standards.**

Prosperity that lasts, for all, can be promoted through a number of actions that together make a sustainable lifestyle an easy choice, refocus from products to functions, make supply chains work better for people and planet, align national statistics with sustainability, and change the selection environment for innovation so that it positively drives all these changes. Beyond these, creating an enabling infrastructure and making new innovations will require substantial investment.

4.3 Invest in a better future

All the actions identified above – to redefine our relationship with nature and to ensure lasting prosperity for all – and additional actions to transition our energy, food and transport systems will need investment.

The way we live now relies on globally distributed networks of production, trade and waste. The day-to-day transactions within those networks rely on and are shaped by the existing set of long-lived infrastructure, machinery and buildings (Fisch-Romito et al., 2021). Private expectations of profit and public planning determines investment in new long-lived goods, and therefore the shape of future day-to-day transactions.

Any future sustainable world – with multiple economies and cultures, supporting all individuals equitably – will have its own complex networks of production and trade. Because of a tight relationship between energy consumption and complexity, in a sustainable world those networks may be simpler than ones that dominate today (Tainter, 2011). Nevertheless, they will still be substantial and have an impact on people and the planet. The long-lived goods supporting those networks will also differ from those of today, which means that the pathway to that future sustainable world depends crucially on investment decisions made today (BP Dutt et al.; Lecocq & Shalizi, 2014).

The real challenge is to redirect financial flows, moving the global economy and society to a sustainable path.

The sustainable finance discourse today has to a large extent focused on new, green investment opportunities. However, as in any technological transition (Perez, 2010), some existing capital goods – for fossil-fuel extraction (Lazarus & van Asselt, 2018) as well as power plants (Chignell & Gross, 2013) and chemical plants (Jang et al., 2012); energy-intensive industries (Bataille et al., 2018); and housing stock, vehicle fleets, and road networks (Lecocq & Shalizi, 2014) – will have to be either substantially modified or abandoned entirely.

A sustainability transition requires investment in new and greener capital goods, while simultaneously shifting capital away from unsustainable systems. Abandoning existing capital goods before the end of their productive lifetime heightens risks for investors exposed to these assets during the transition (Cahen-Fourot et al., 2021). In recent years, certain carbon-emitting sectors have declined, such as coal-fired power plants and coal mining, and to a lesser extent petroleum-related activity, perhaps more for economic reasons and to avoid local health impacts than a commitment to sustainability goals. In any case, the real challenge is to redirect financial flows to promote alternate technologies or business models, eventually moving the global economy and society to a sustainable path.

In some cases, the ‘new’ capital will be productive only with other kinds of investment. For example, replacing a fossil-fuel refinery with a biofuel refinery

(Demirbas, 2010) requires both that sustainable biomass feedstock is available and that demand is sufficient (Haveren et al., 2008). A new pool of labour skills must be available to build and operate new capital equipment. Also necessary is the will to abandon the old before the end of its useful life, while at the same time ensuring a just transition to support communities dependent on the older assets for their livelihoods. More investment capital alone will not deliver a societal transformation towards sustainable development.

Transition risks exist in low-income countries as well as high-income countries (Espagne et al., 2021). Nevertheless, the bulk of anticipated new investment in long-lived capital stocks will be in low-income countries, and there is a one-time opportunity to make those new investments green (Lecocq & Shalizi, 2014). This means that low-emission investments in emerging markets are key to a low-carbon transition (BP Dutt et al.). In some cases, low-income countries can 'leapfrog' beyond high-emitting technologies into fossil-fuel-free, low-emitting, and low-impact technologies as their economies grow (Bond et al., 2021; Goldemberg et al., 1987).

A massive amount of capital is ready for sustainability investments, yet funding gaps persist.

Today, we have the paradoxical situation of a massive amount of capital ready for sustainability investments, yet persistent funding gaps in low-income countries. The SDG funding gap globally has been estimated at USD 2.5 trillion, before the Covid-19 pandemic (OECD, 2020a), and the climate finance goal of mobilising USD 100 billion per year by 2020 was not delivered on by Annex I countries. At the same time, UNCTAD estimates that the value of sustainability-themed investment products in global capital markets amounted to USD 3.2 trillion in 2020, up more than 80% from 2019 (UNCTAD, 2021). These products include sustainable funds, green bonds, social bonds and mixed-sustainability bonds. Most of these are registered in high-income countries and targeted at assets in developed markets.

The entry of mainstream financial actors with such products into the sustainability arena is a clear transition in the making. These flows are driven partly by the potential returns and partly by a growing trend in financial institutions to follow net-zero or similar standards. However, the dominant factor shaping the direction of global and national financial flows will remain the perceived profitability of any transaction.

Areas for action

Investing in a better future is necessary both for ensuring prosperity for all and redefining our relationship with nature. Action is needed not just to mobilize capital for sustainability, but to ensure sufficient levels, supporting allocation to places and sectors in need, and transitioning out of unsustainable practices and retiring inappropriate capital goods.

Public and private investment must act together. During the Covid-19 pandemic, governments showed their fiscal potential to act at a large scale

to achieve necessary ends, and some public asset-holding entities such as sovereign wealth funds have the potential to actively promote sustainable development. However, the scope for public spending is limited in relation to the investment gap, and the most important challenge is to see how the flow of finance in the private market of savers, investors and intermediaries can be shaped to meet sustainability ends.

We identify four key areas of action for both public and private actors in the financial system starting with investment in innovation, to deployment, to steering the allocation according to sustainability goals.

1 **Recognize and enhance public funding of innovation and co-development of technology**
2 **Incentivize active engagement in private finance**
3 **Raise adequate private finance**
4 **Reduce risks to sustainability, enhance risks of unsustainability**

Recognize and enhance public funding of innovation and co-development of technology

Government funding and mission-driven public investment have unique roles in sustainability-oriented innovation systems. To bridge the technology gap between rich and poor countries, it is time for a shift from 'technology transfer' to a paradigm of 'co-development of technology'.

For nearly all of the innovative technologies we enjoy today, and for 'green' technologies specifically (Semieniuk & Mazzucato, 2019), states have played an essential role (Fligstein, 2008; Mazzucato, 2015). Historically, governments in high-income countries and, more recently, middle-income countries, have been able to undertake patient, committed and mission-driven investment in early stages of development, when costs and failure rates are higher than industries are generally willing to bear.

A classic example is all of the technology that came from the 'space race' that began in the 1960s, but others include investments in telephony, computers and the internet; energy infrastructure including batteries; and other technologies integral to many of our lives today. International public capital, drawn from multilateral development finance institutions, has also supported early-stage investments.

The state usually takes a critical role in the stage of research and development, but it continues to be important through product development and entry into the market (see Figure 4.3).

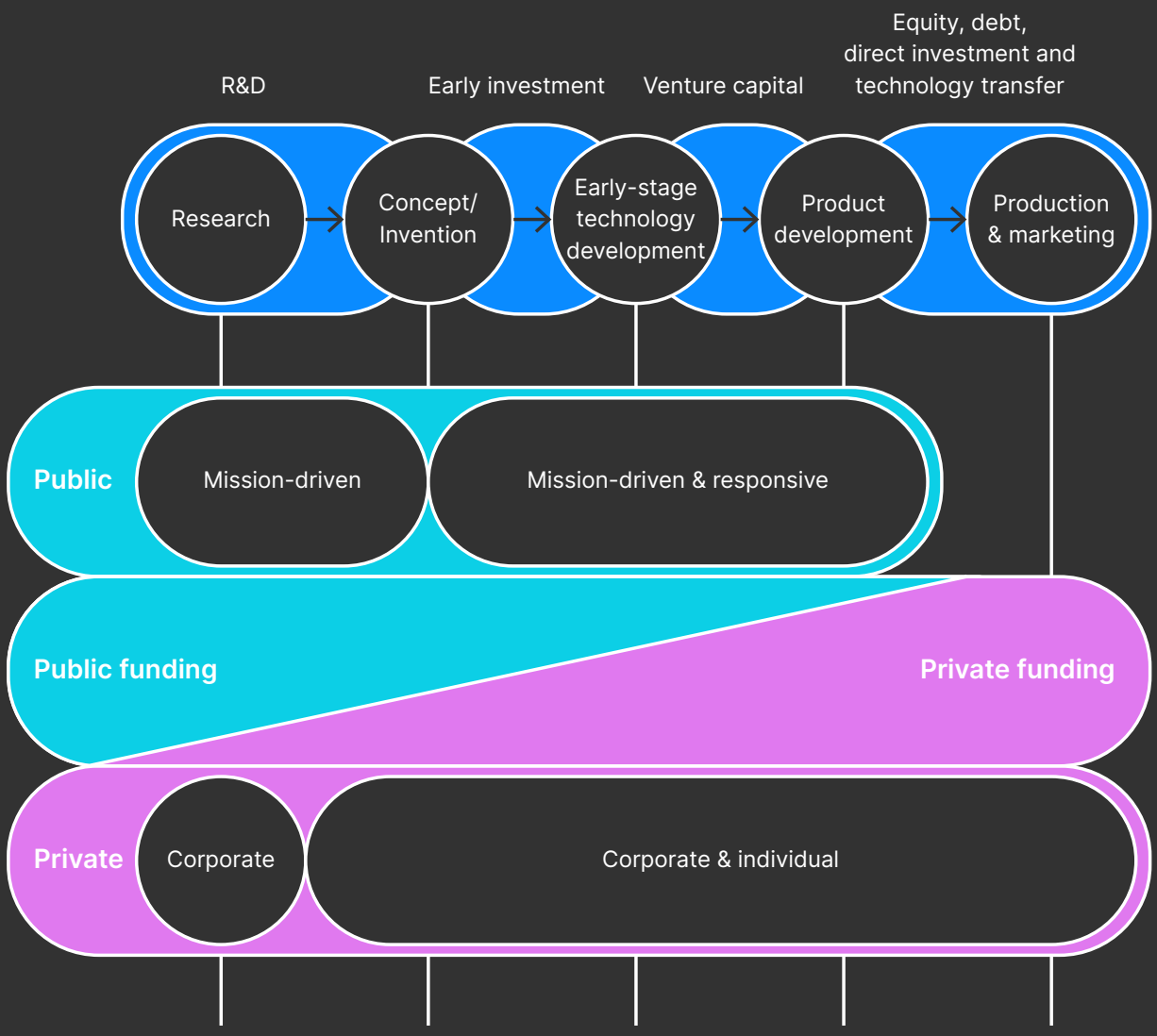
Today recognition is growing of how effective government can be with an innovation-focussed industrial strategy. A sustainability transition appears likely to be possible only with a specifically green industrial strategy that helps

resolve coordination problems, helps 'sunrise industries' to emerge, and 'sunset industries' to retire (Hallegatte et al., 2013; Rodrik, 2014).

Industrial strategies are again being promoted by many countries, e.g. India (Ganesan et al., 2014), Germany (Financial Times Editorial Board, 2019), the UK (Thomas & Pickard, 2020), and the US (Politi & Williams, 2021). Arguably, this policy shift in high-income countries came from careful study of the experiences of emerging economies. In a provocative and influential paper, Chang (2003) pointed out that today's high-income countries had achieved

Figure 4.3

Stages of development and deployment of novel technologies



Source: adapted from Semieniuk & Mazzucato (2019).

their current status with ample doses of government intervention, as did the rapidly growing Asian economies of the 1990s. Current advice for developing countries leans towards a strategic and globally oriented industrial policy, featuring facilitation and coordination, rather than direction, of private sector activity (Lall & Teubal, 1998; Schrank & Kurtz, 2005). In keeping with this trend, the World Bank has noted the importance of innovation policy for developing countries in recent publications (Cirera et al., 2020; Cirera & Maloney, 2017).

More broadly, mission-driven public investment can contribute to sustainability-oriented innovation systems (Altenburg & Pegels, 2012). For example, governments and international financial institutions can create enabling conditions for smallholder innovation in sustainable agricultural intensification (Hounkonnou et al., 2012) and staple crop value chains (AfDB, 2018).

These efforts are promising for both high-income and low-income countries. However, the structure of innovation systems will be quite different when it comes to addressing 'underdevelopment' versus 'overdevelopment' (Oyelaran-Oyeyinka, 2006). Financial systems in low-income countries lack capacity to catalyse investment flows in financially underserved sectors and to innovative and novel technologies. As illustrated in Figure 4.3, that requires patient capital, typically drawn from public sources, to underwrite a portion of the investment risks (BP Dutt et al.).

For long-term sustainability, technologies must be co-developed.

The common element in green innovation strategies of low-income and high-income countries is the long-term goal of sustainability. That common interest means that technologies must be co-developed. In contrast, the dominant paradigm today is 'technology transfer', where technologies are developed – and the intellectual property rights formalized – in high-income countries, and subsequently sold to developing countries (BP Ghosh et al.).

Established in the 1972 Stockholm Declaration (Principle 20), the dominant approach has not been successful, because the lack of technology cooperation has resulted in uncertainties and technological lock-ins (Ghosh et al., 2019; see also Box 2.1). A review of technology transfer initiatives in the energy and agriculture sectors showed that few go beyond knowledge exchange and preliminary R&D activities, to actual transfer (BP Ghosh et al.).

Key modalities for co-development include co-ownership of intellectual property rights, pooling resources through innovative financial incentives, arrangements for risk and liability management, and multi-stakeholder partnerships for governance and transparency (BP Ghosh et al.). Co-development should be preceded by inclusive consultation on governance arrangements, not just for terms of co-development but also for deployment. Co-development is particularly crucial when the technology has the potential to cause harm on other countries, as with geoengineering (Biermann, Oomen, et al., 2022; BP Ghosh et al.).

Within the private sector, co-development is nothing new. Foreign direct investment enters countries in a variety of forms (Nakandala et al., 2016), while technology aoption follows multiple routes (Stock & Tatikonda, 2000), and some of them are highly collaborative. But co-development has not featured in international funding for development. A notable and very recent exception is the African Development Bank's Alliance for Green Infrastructure in Africa (AfDB, 2022).

Recommendations to enhance governments' role in innovation:

- **Increase public research and development funding to missions co-defined with stakeholders (industry, civil society, local communities affected, academia) to achieve sustainability goals.**
- **Target international finance to low- and middle-income countries to develop and implement green industrial strategies, as well as their co-defined and nationally owned missions and innovation systems, especially countries faced with a phase-down of fossil fuel production.**
- **Replace ineffective technology transfer mechanisms with a new paradigm of 'technology co-development'.**

Incentivize active engagement in private finance

Private finance has a critical role in bringing innovation to market. Private investors should engage more actively to ensure sustainable finance becomes the norm.

Private investors usually enter rather late in the innovation process, though some investors such as venture capitalists invest at earlier stages. These investors broadly invest through equity (ownership of a company's shares), or debt (see Figure 4.3 above).

Crucially, most investment in physical infrastructure for 'clean', 'green' or sustainable technology is debt financed (BP Dutt et al.]. For example, solar and wind projects in India receive three-quarters of their financing in the form of debt, and one-quarter from equity (Dutt et al., 2020).

At a global scale, private investors are increasingly interested in monitoring the environmental, social and governance (ESG) performance of their investments (Amel-Zadeh & Serafeim, 2018; EF, 2020). But most investors will only tolerate very small reductions in returns compared to the broader market.

For example, venture capitalists who wish to invest in sustainable businesses look for start-ups with a solid business model that can deliver good performance on the 'triple bottom-line' of people, planet and profit (Bocken, 2015). Governments can contribute significantly to the viability of new ventures through for example regulations, subsidies, procurement and support for research and development (Bocken, 2015, p. Table 3; Moore & Wüstenhagen, 2004).

Green bond issuances are typically associated with mature and commercially viable technology investments, offering returns only very slightly below those of the broader market (Kölbel et al., 2020, p. 562; Maltais & Nykvist, 2020). For bonds, the counterpart of slightly lower returns for investors is lower cost of capital for issuers, which is an incentive to enter the market; while the difference in cost of capital is very modest, it more than compensates for the cost of certification (Maltais & Nykvist, 2020, p. 10). The evidence thus suggests that however positive the trend of increasing certification may be, green bonds are not a promising funding source for novel or complex investments with high perceived risk.

Whether for equities or bonds, investors may be more passive or active in relation to the targets of their investment (Amel-Zadeh & Serafeim, 2018, p. 94). The most direct passive approach is to apply a screen to investments based on ESG criteria. Any investments that do not pass through the screen are excluded from the investor or fund manager's portfolio. Various metrics and principles for innovation in Section 4.2 are relevant criteria for an ESG screen as well. They link investor preferences to technological development.

Active investor engagement is much more likely to be impactful.

Active investor engagement is much more likely to be impactful than passive investment (Kölbel et al., 2020). Higher shares of ESG assets in any single passive investor's portfolio – even a sizeable institutional investor – will have at most a marginal impact on the economy as a whole (Heinkel et al., 2001; Kölbel et al., 2020; Maltais et al., 2021) and current ESG metrics lack both transparency and standardization (EF, 2020; Widyawati, 2020).

Active investors engage with the firms in which they invest, either directly or through shareholder initiatives. They therefore have much more power to *transform* sectors or industries that would be excluded by an ESG screen. Rapid action on climate change, for example, will require active engagement with high-emitting sectors such as steel, cement, or oil and gas (Maltais et al., 2021).

Such activities, driven by private actors, should be encouraged but also monitored and incentivized in order to ensure movement towards sustainability.

Recommendations to incentivize active engagement in private finance:

- **Financial actors and investors should engage more in active approaches to investing to support rapid action on climate change, especially with high-emitting sectors.**
- **Governments should provide enabling conditions for viability of sustainable investment at early stages of commercialization or start-up.**

Raise adequate private finance

To raise private finance to the needed scale for sustainability investments in the developing world, public finance needs to 'de-risk' and play a catalytic role.

Four critical dimensions – scale, regulation, balance and risk – must change for emerging markets to access investments for sustainable infrastructure. Far more capital is needed than has been negotiated: for example, the USD 100 billion pledged for the Paris Agreement must be a floor rather than a ceiling, when trillions of dollars are needed by countries that have yet to build the infrastructure and energy systems to meet the developmental aspirations of their people (BP Ghosh & Raha).

At COP 26, the Glasgow Financial Alliance for Net Zero (2021) announced that financial actors with USD 130 trillion under management are committing to align their portfolios and operations with net-zero climate targets. That exceeded the estimated amount required to achieve net zero over the next 30 years. The announcement highlighted the vast capacity of private-sector finance to address the climate challenge and, by extension, a sustainability transition.

The gap between private and state investment capacity is longstanding.

In contrast, government commitments fell short (Angele et al., 2021). Moreover, even large emerging economies face challenges mobilizing domestic resources. For example, achieving India's stated 2070 net-zero target would entail an investment of USD 10.1 trillion in 2020 prices (Singh & Sidhu, 2021). While a large part of the investment requirement could be mobilized through conventional sources, a significant investment gap of USD 3.5 trillion would remain (BP Dutt et al.).

The level of commitment from the private sector at COP 26 was new, but the gap between private and state investment capacity is longstanding. The relative decline of the public sector emerged from a decades-long intellectual and political trend to reduce the scope of state intervention in the economy (Burgin, 2012; Lobao et al., 2018; Stahl, 2021).

With the rapid expansion of renewable energy and the idea of 'a just energy transition', a third player is entering the field when it comes to cost- and benefit-sharing of investments – local communities (see Box 4.6). There are important lessons from these cases for other sustainability transitions that require capital investment for the distribution of returns and ownership arrangements.

Box 4.6 **Sharing costs and benefits in just energy transitions**
(BP Muñoz-Cabré and Vega-Araújo)

Annual investment in renewables is estimated to be about USD 1.6 trillion by 2030, under the IEA Net-Zero scenario (IEA, 2021). All those capital investments, many enabled with public resources, are likely to generate significant returns and other economic and social benefits.

Renewable energy projects have the potential to **create large benefits for local communities**. Community benefit packages appear to be key for public acceptability. The further expansion of benefit-sharing schemes means larger amounts of funds going to often relatively dispersed and lightly populated rural zones. This highlights the importance for communities of developing community action plans, where key priorities for investment are identified, are updated on a regular basis, and are aligned with sustainable practices.

Benefit sharing can occur through *returns boosting the local tax revenues* and being used for local government services, *mandated social investments* by the owner in local communities, or crediting local residential electricity customers where the projects are based, or *community ownership*, which brings more capital into local economies and can strengthen communities in terms of empowerment, skills development and local regeneration. While the latter are found in wealthier nations, documented evidence of their use in developing countries is limited.

The role of government is key in ensuring that local communities can reap the benefits of the energy transition, including by establishing appropriate institutional and regulatory frameworks, and policies to promote community benefits. An example can be found in Scotland, where the government has issued good practice guidelines for community benefits, encourages online registration of the agreements reached and offers free advice and support at any stage of the negotiation with developers.

Costs include losses from transitioning away from legacy projects. In the US alone, customers will likely pay USD 20–25 billion yearly for utilities' 'stranded assets' that will need to retire early to maintain the US nationally determined contribution (NDCs) target (Varadarajan et al., 2021). Developing countries have on average newer coal power plant fleets, and will take the brunt of the loss in a transition.

On the other hand, the energy transition is expected to create many additional jobs, and thus livelihoods, beyond the locations where projects are located. And other benefits related to digitization could be realized: some energy transition technologies involve vast quantities of data (from smart homes to electric vehicles and beyond) that can have high value.

For low-income countries, a key goal is to increase the amount of domestic credit to businesses. Using data from the World Bank World Development Indicators, domestic credit to the private sector is less than half of GDP for lower middle income and low-income countries, compared to well over 100% for upper middle and high-income countries – the lower the national income level, the greater the disadvantage when it comes to mobilizing much needed domestic credit for investment (BP Dutt et al.).

The lack of credit can hamper even highly promising investments. Utility-scale renewables in China and India are well-established and known to be financially viable. Yet mobilizing finance at sufficient scale to meet sustainable development trajectories from existing sources remains a challenge (BP Dutt et al.; Singh et al., 2020).

Multilateralism will have a critical role to play in scaling up private investment flows towards pertinent technologies in developing countries. To facilitate international private finance at scale, financial regulation in developing countries needs to be mappable to international standards. In the absence of international harmonization of such standards, these could hinder rather than accelerate capital flows.

Therefore, central banks and financial supervisors in developing country jurisdictions must engage with their counterparts on multilateral fora during the development of regulation to ensure international harmonization. Emerging

Photo: jia yu / Moment / GettyImages

multilateral platforms and processes should not only bolster the capacity of catalytic finance interventions but also create enabling environments that maximize the effectiveness of financial and fiscal interventions that aim to direct capital towards sustainability (BP Dutt et al.).

In order to be effective, emerging sustainable finance fora must learn from the experience of mainstream multilateral finance processes that have been criticized for under-representation of developing country interests. Given that developing countries will be the major destinations of sustainable investments, in order to be truly effective, sustainable finance platforms must include developing countries as equal partners in shaping the global sustainable finance architecture.

Recommendations to raise private finance to the needed scale:

- **Multilateral climate finance institutions should substantially enhance grant finance, to support capitalization of catalytic instruments that help make available domestic credit to sustainable investments in developing countries.**
- **Governments should coordinate to harmonize financial regulation frameworks (e.g. taxonomies, disclosure standards) in developing countries with international frameworks. to remove barriers to mobilizing and accessing finance internationally.**

Reduce risks to sustainability, enhance risks of unsustainability

As important as de-risking sustainable investment may be, it is equally important to raise the perceived riskiness – and therefore the cost of capital – of unsustainable investment, for example through mandates for minimum allocation of lending portfolios.

One key to increasing the scale of private finance for a sustainability transition is to alter the perceived riskiness of investments. This includes both reducing the perceived risk of sustainable investments and raising the perceived risk of unsustainable investments, for example through allocation mandates on lending portfolios.

While risk profiles are relatively low for well-established technologies, including low-carbon alternatives such as utility-scale solar and wind power production, they are high for technologies with a shorter track record (BP Dutt et al.). Private investors will avoid risky projects, unless the prospects for profit are high enough to justify the extraordinary risk.

The transition from novel and high-risk technologies to potentially profitable technologies – between early-stage technology and product development in Figure 4.3 – results in high potential combined with lack of investor experience. That can lead to overinvestment and a financial bubble (Perez, 2002).

Arguably, this is the phase for some renewable energy technologies (BP Muñoz Cabré & Vega Araújo), triggering some concern that a ‘green bubble’ might

be emerging (Jones, 2021). The prospect of a bubble is not, in itself, a barrier to transformation, but bursting bubbles often lead investors to be excessively cautious. Governments can take measures to ensure that investment continues to flow to viable projects if a green bubble were to emerge and burst.

Investors can view projects as risky for reasons other than uncertainty over new technologies. For example, nature-based solutions are highly tailored to particular environments and are expected to yield benefits only over long timescales. Moreover, as they typically involve multiple actors and beneficiaries, they may require novel and complex governance structures, which can increase the perceived riskiness of the projects (BP Barquet & Green; McQuaid, 2019).

Investors also consider the policy environment in their assessment of risk. If they question the stability or degree of enforcement of the incentives for green investment (or disincentives for non-green investment), then they may be hesitant to invest. Doubts may arise if there are economic actors who feel they may be harmed by a policy and who are powerful enough to successfully lobby to block action or to direct policy in ways that benefit themselves (Altenburg & Pegels, 2012, p. 13; Geels, 2014; Lockwood, 2015).

The inevitable complexity of the real-world environment in which policy plays out can impede effective implementation (see Box 4.7).

BOX 4.7 Carbon leakage and other problems (BP Olsson & Dawkins)

Cross-border 'carbon leakage' can be illustrated within the EU. Industrial emitters within the EU, who sell their products on global markets, can lose market share to non-EU companies not subject to the EU Emissions Trading System, resulting in negligible net emission reductions and reduced competitiveness of EU firms.

The initial EU policy response was to distribute carbon dioxide allowances for free to firms at risk of carbon leakage, which did little for the climate. In future, carbon leakage is set to be addressed via a carbon border adjustment mechanism; that is, a carbon dioxide-based tariff on imported goods. In the process, the initial policy recommendation – to internalize the cost of environmental harm through trade in emissions permits – ran into real-world implementation challenges that undermine confidence in the effectiveness of policy.

However, this solution to an EU policy challenge is highly contentious as a unilateral measure. Carbon leakage would not be an issue if consumption lifestyle emissions were taxed or mitigated within the EU. Instead, the focus is on production emissions – for example, from China – for making goods that Europeans want. As the EU exempts private jets or private yachts from emissions controls, the policy's concerns over carbon leakage are a stark contrast with uncompromised lifestyles (see Section 4.1).

Many low-income countries cannot de-risk financially underserved sectors and technologies. To overcome this barrier, risks can be pooled across countries and then de-risked through a common fund. Proposals such as those for a Global Clean Investment Risk Mitigation Mechanism (GCI-RMM) could address this gap. The GCI-RMM is envisioned to operate on the principle of risk pooling across projects and across countries. Its design could achieve further reductions in the cost of de-risking (Ghosh & Harihar, 2021).

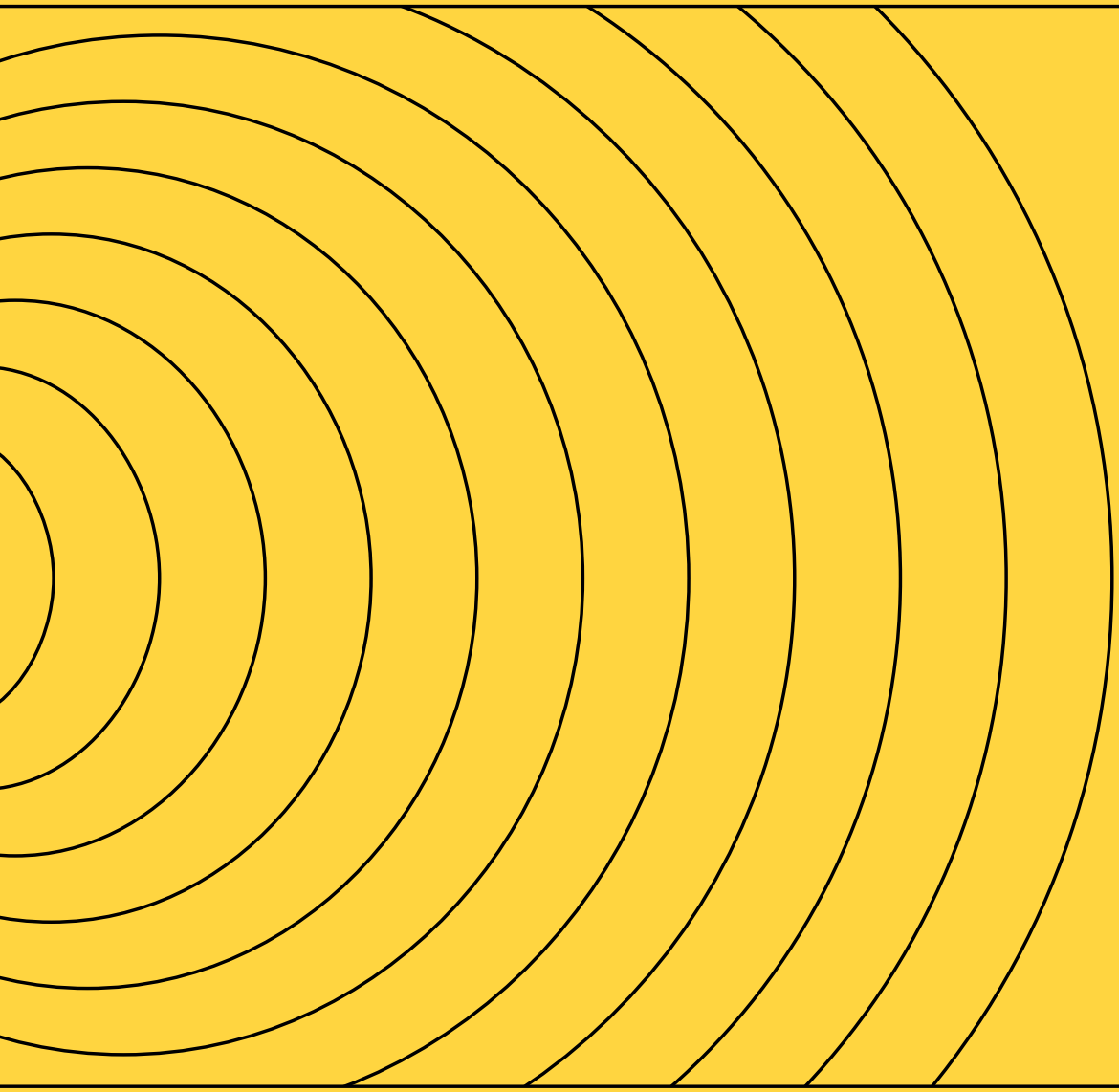
As important as de-risking sustainable investment may be, of equal importance is raising the perceived riskiness of unsustainable investment, including capital costs. As noted earlier, private-sector financial institutions are looking to systematically invest in low-carbon investment opportunities. While such an organic shift in capital allocation priorities is welcome, regulators can accelerate the shift towards sustainability. Mandates for a minimum allocation of lending portfolios of banks and non-bank financial institutions to SDG-compliant activities, as well as for institutional investors such as pension, insurance, and mutual funds to invest a minimum portion of their portfolios in sustainable assets could be considered by financial regulators (BP Dutt et al.).

Recommendations to reduce risks to sustainability and enhance risks of unsustainability:

- **Governments should reduce investor risk by providing a stable policy environment with long-term goals set in key areas of sustainability. International agreements are an effective way of setting shared long-term, binding goals.**
- **Governments and international financial institutions should consider joint de-risking initiatives to meet the sustainability investment needs in low-income countries and emerging markets, where domestic credit to the private sector is insufficient.**
- **Educate investors on novel and emerging sustainability technologies and solutions, to enable accurate assessments of risk.**
- **Regulators should consider mandates for minimum allocation of lending portfolios to sustainable assets, in order to enhance the perceived risk of unsustainable investment portfolios.**

By taking actions in these areas and embarking on the three overarching shifts, societies can actively design better futures. Many of these actions will not deliver immediate benefits for the planet, people or their prosperity – other measures are needed for that. We believe, however, that they have systemic importance by unlocking progress across sectors and that, if seeded now, they will have transformative effect.

5



Improving conditions for change

Highlights

- The institutions and governance system built for the challenges of the past might very well have created some of the challenges of the present. The structural barriers of policy incoherence, weak multilateralism and lack of accountability must be decisively tackled to enable effective action on redefining humans' relationship with nature, ensuring lasting prosperity for all, and investing in a better future.
- With more actors and stakeholders participating in global governance today, many more routes are available to taking action. However, conflicts of interest and uneven power relationships must also be recognized.
- Governments and international organizations must make their policy mixes coherent and consistent towards sustainability goals, in order to increase incentives for action, by adopting new practices and tools for more integrated and systemic policymaking.
- The gap in trust and solidarity between countries acts as a barrier to new agreements, to raising ambition and to accelerated national implementation. Opportunities exist to renew multilateralism, to more effectively tackle environment and development crises and to rebuild solidarity: developing multilateral responses to chronic risks, replacing technology transfer with a new paradigm of 'co-development of technology', and setting norms for the global financial system.
- Countries, companies and citizens have to be held accountable for their actions and their inaction. We need new imaginative mechanisms for nurturing constructive accountability, which incentivizes and leads to bold action and change, rather than threatens and leads to pre-emptive action and reduced ambition.

To achieve this environmental goal will demand the acceptance of responsibility by citizens and communities and by enterprises and institutions at every level, all sharing equitably in common efforts.

– 1972 Stockholm Declaration, Preamble

A range of actions can be taken immediately to redefine humans' relationship with nature, ensure lasting prosperity for all, and invest in a better future, as discussed above. However, these actions and other large-scale shifts have been and will continue to be hindered from reaching their full effect **unless structural barriers in our institutional and governance systems are tackled**.

Above all, we must ask ourselves: Do we have the rules, norms and institutional structures fit for purpose for the 21st century, to ensure progress in human development for all, equity in access to resources, sustainability for nature now and for future generations, and justice for the most vulnerable? **The institutions that were meant to solve the challenges of the past might very well have created the challenges of the present.** The structures that intermediated finance, technology and power after the Second World War, and particularly after the end of the Cold War, may no longer suffice to respond to the needs of hundreds of millions still without the basics – sufficient income, food, healthcare, water or energy.

Moreover, the aspirations of an emerging global middle class will have to be met with systems of production and consumption vastly different from what the world has known so far, even as we struggle to reduce inequality and various forms of discrimination, including gender disparities. **Beyond the rhetoric, countries, companies and citizens have to be held accountable for their actions and inactions; governments must make their policy mixes coherent and consistent towards sustainability goals; and multilateral institutions have to be reformed to renew trust in global cooperation and ensure resources are provided to those who lack access to financial markets, banks and other 'big finance' entities.**

At the global level, relatively centralized and single multilateral institutions have morphed to a state of polycentric governance.

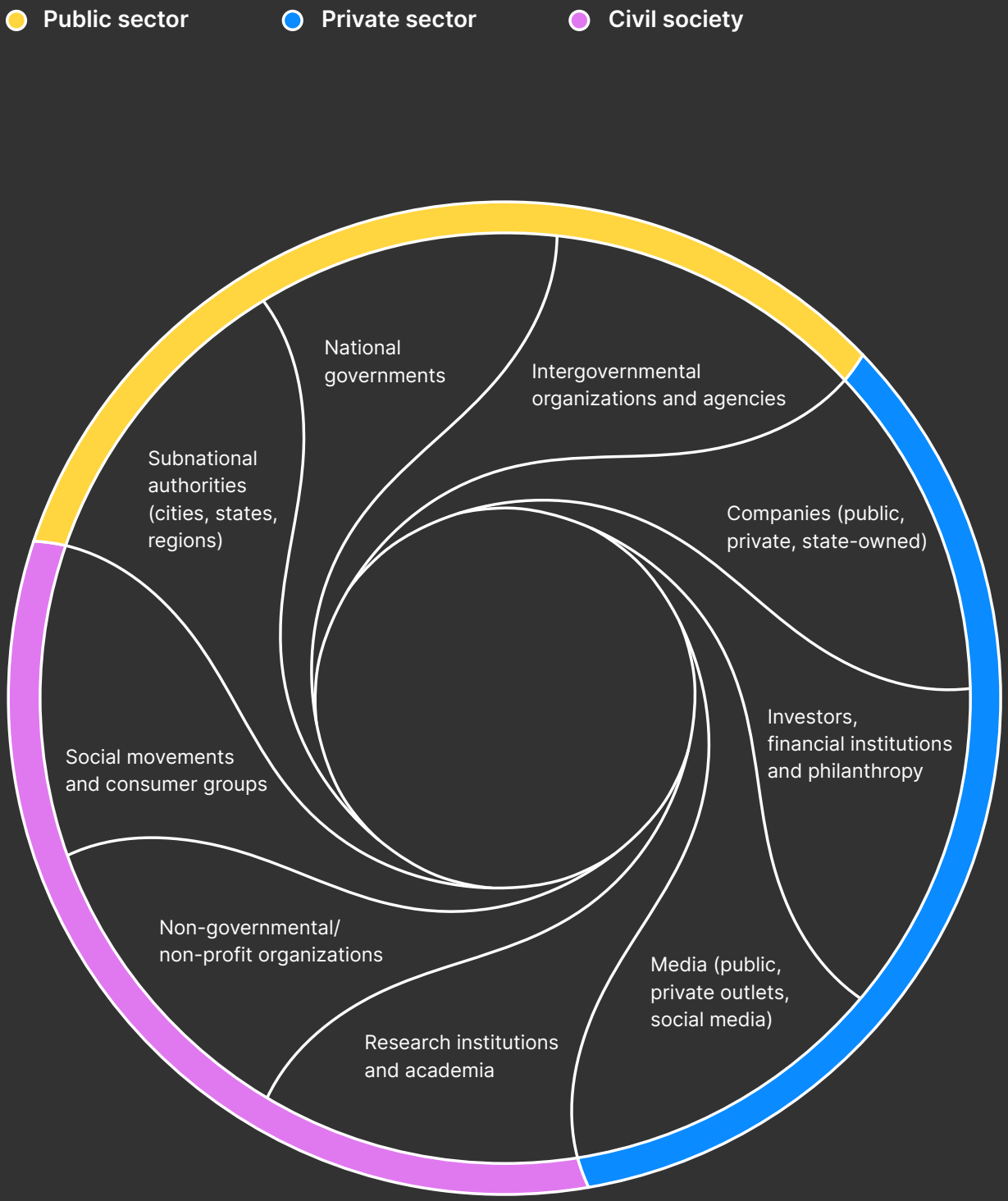
Considering these structural barriers today requires understanding that the institutional context has changed since the 1972 Stockholm Conference. At all levels of society, a broad shift has taken place, from 'government' to 'governance' (Rosenau, 1992). A growing range of actors – companies, financial institutions, civil society organizations – now participate in governance.

This shift is clear at the global level, where relatively centralized and single multilateral institutions have morphed to a state of polycentric governance (Ostrom, 2009, 2012) and regime complexity (Abbott, 2012; Biermann & Kim, 2020; Bulkeley et al., 2014; Keohane & Victor, 2011), in which multiple stakeholders take part. Global climate governance is most indicative of this shift, with an abundance of partnerships and initiatives (see Figure 5.1), as well as other governance domains, such as biodiversity, chemicals, ocean and the SDGs domain at large.

Today, **a complex network of actors and institutions interact with different sources of agency and legitimacy**, including voting power, legislative power, financial resources, business influence, innovation capacity, consumer

Figure 5.1

Actors in environmental global governance



Source: adapted from Future of Climate Cooperation (2021).

pressure and discursive power. On the positive side, this means many more opportunities and routes are available to accelerate global action than through multilateral institutions and agreements alone.

However, the shift from multilateralism to 'multistakeholderism' in global governance (Gleckman, 2018) means that there can be deep incoherence between conflicting interests, as well as unevenness of power and influence between corporate-commercial actors and local-civic voices (see e.g. (Canfield et al., 2021; Gleckman, 2018; Manahan & Kumar, 2021; Sapinski, 2015). Amid these parallel and connected shifts, **states have continued to be, and must be, central actors that shoulder unique responsibilities and powers to shape voluntary action,** at the national and global levels (Betsill et al., 2020; Giessen et al., 2016; Mazzucato, 2015).

In the same way, for transboundary environmental issues, **multilateral environmental agreements (MEAs) continue to be the core means to regulate and set norms for conduct**. Despite the high number of MEAs, their effectiveness in closing the action gap has been limited (Box 2.1).

In stark contrast to the evolving nature of environmental risks, environmental treaties are often segregated by topic, sector and geographic divisions that create fragmented and diffused governance structures – leading to overlapping and conflicting negotiations (Azizi et al., 2019). Inadequate coherence and coordination for a functional division of tasks may result in a lack of transparency and accountability across institutions.

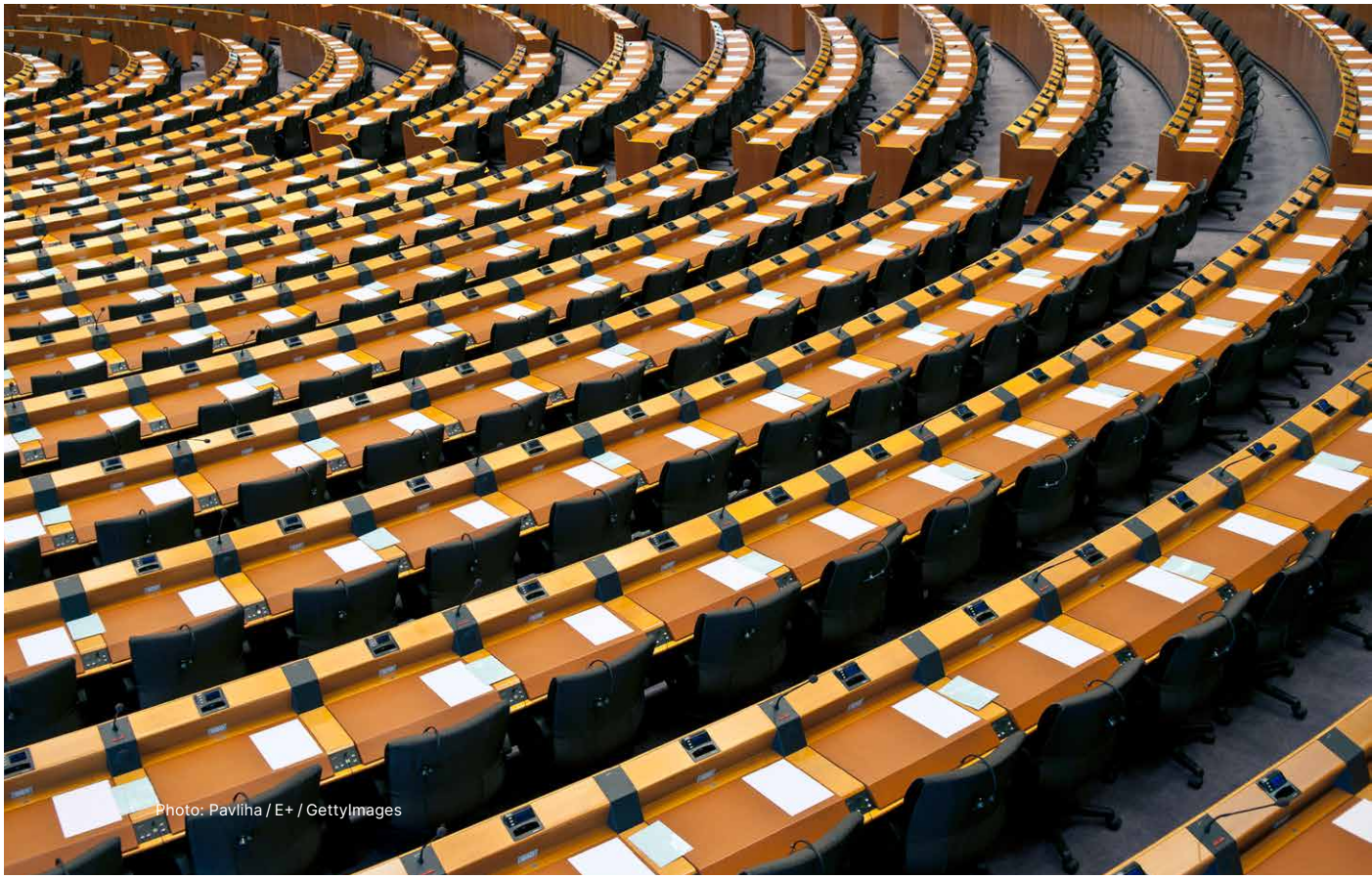


Photo: Pavliha / E+ / GettyImages

5.1 Policy coherence: ensure stronger and more consistent incentives for action

No action for sustainability, however well intended, will succeed if it is undermined by unresolved goal conflicts and policy incoherence. Many new approaches for more integrated and systemic policymaking are ready for use, to tackle policy incoherence at international and national levels and thereby ensure strong and consistent incentives for target groups to take accelerated action.

Why have we not seen more action in all the areas discussed in Chapter 4, given that we know the need and that many of the proposed actions can lead to multiple benefits? The simplest explanation is that incentives to act have not been strong enough. Without strong incentives, individuals are not making more sustainable consumption choices, companies are not adopting more sustainable business models, and governments are not investing more in the sustainability transition.

Incentives to act have not been strong enough.

Weak incentives, in turn, can be explained in two ways: insufficient ambition and incoherent or conflicting incentives. For example, **incentives from a given policy instrument may not be strong and compelling enough to transform behaviour.** For example, a recent review of 37 studies on the effects of carbon taxes and emission trading schemes found that these instruments had only reduced emissions by 0–2% per year (Green, 2021), compared with the 6–7% reduction target required as per UNEP (UNEP, 2020). The scope of and price level resulting from these instruments in terms of resetting incentives were not sufficient to trigger deeper change. In other words, the policy instruments were not sufficiently ambitious – which is particularly problematic in the case of high-income countries, given the principle of common but differentiated responsibilities and capacities.

The corollary to insufficient ambition is that target groups may be faced with **incoherent and conflicting incentives from the totality of the policy mix**. In other words, taken all together, our economic growth policies, trade and industrial policies, environmental policies, etc., conflict with each other or exist in a vacuum, without dovetailing together. Chapter 4 identified several examples, e.g. agricultural subsidies that particularly benefit animal food products over plant-based foods (BP Verkuijl et al.) and legal frameworks that disincentivize remanufacturing products and using waste as a resource (BP Lindahl & Dalhammar).

Other examples of instances where environmental goals and policies co-exist with environmentally harmful subsidies include those for fisheries, pesticides and fertilizers, and fossil fuels – where reduced costs for an industry undercut goals of marine protection, ecosystem and species preservation, and land

use conservation. A recent assessment showed that environmentally harmful subsidies amount to at least USD 1.8 trillion a year, or about 2% of global GDP (Koplow & Steenblik, 2022b). That total is almost three times the level of global climate finance in 2019–2020 (Climate Policy Initiative, 2021) and 18 times the Paris Agreement goal to mobilize USD 100 billion per year by 2020 for climate action in countries that need support.

Another example is the failure to use economic stimulus spending as a means to achieve sustainability objectives. The Oxford Economic Recovery Observatory estimates that, by early April 2022, only 31% of global Covid-19 recovery spending can be considered 'green' (Oxford University Economic Recovery Project, 2022). Looking at government spending related to the energy sector during the Covid-19 pandemic, support that promotes fossil fuels has so far well exceeded that for renewable and other energy sources in major economies (Figure 5.2).

What can be done to tackle this structural barrier, by national governments and international organizations alike?

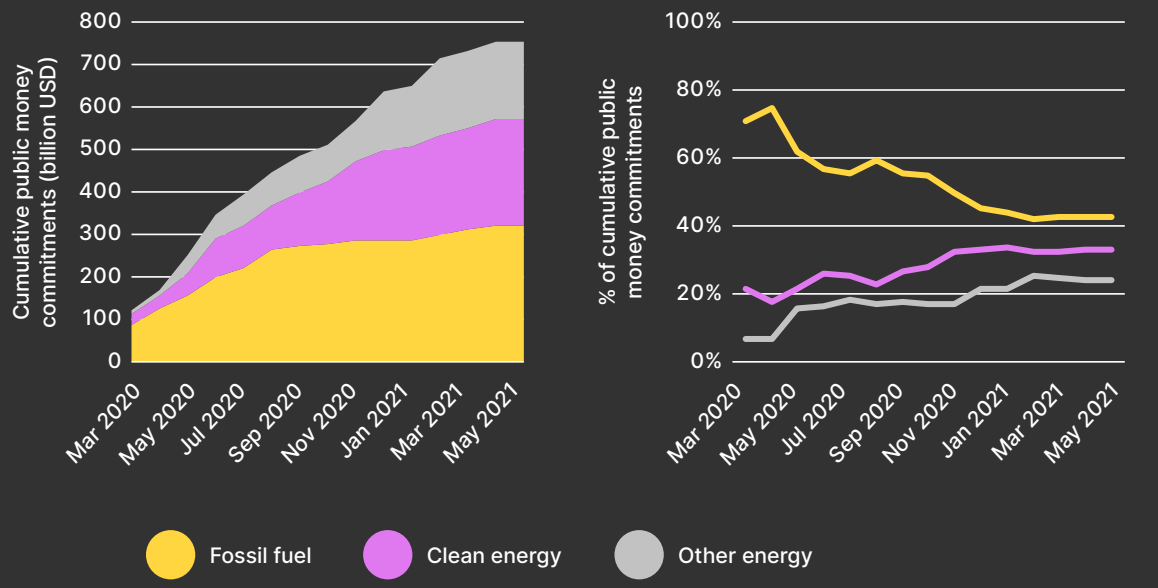
Most research on policy coherence and integrated policymaking finds that a critical factor is political will (Nilsson & Persson, 2017; Persson & Runhaar, 2018). Policy design derives from the political priorities that leaders set. For example, low unemployment as a key political goal may lead governments to support environmentally harmful industries in the short term to avoid job loss, unless environmental goals are similarly prioritized and smart synergies actively pursued. Similarly, a transformation towards sustainability involves not just governments promoting sustainable choices and investments, but also demoting unsustainable choices and investments (see Section 4.2 and 4.3) – decisions that can be politically challenging.

An important step forward would be to recognize that what is technically referred to as 'policy coherence' (for example, under SDG target 17.14) is often more appropriately referred to as 'political incoherence'. **It stems from perceived goal conflicts and cannot be easily 'managed' away, but needs to be resolved at a political level** (Brand et al., 2021).

Goal conflicts can be overcome through smart policy design and compensatory measures.

An example are European exports of fat-filled milk powder to West African countries. Indirect subsidies on the product encourage overproduction and low prices for farmers in Europe. This has toughened competition and severely impacted smallholder farmers in Africa and stalled development of local dairy production industries. There are three objectives to address here: food security in West Africa, the modernization of West Africa's dairy industry, and the need to find a market for dairy products that cannot be sold in Europe. The technical solutions to these questions require political decisions about priorities to be taken (Brand et al., 2021). In several cases, goal conflicts can be overcome through smart policy design and compensatory measures.

Figure 5.2
Government spending in energy sector during COVID-19 pandemic (2020–2021)



Source: Production Gap Report (2021).

Fortunately, there are several ways forward to reducing political/policy incoherence, to ensure strong and consistent incentives for action towards sustainable development. A first, basic step is to **encourage more open debate on genuine and resolvable goal conflicts**, to ensure they are not wilfully avoided or unintentionally ignored (Wong & van der Heijden, 2019).

Second, **we must set up effective organizations that radically improve coordination and collaboration, between government departments and between UN agencies**, to handle 'nexus' issues in an integrated and systemic way. For example, discussions on the impact of climate change on human health, migration and resilience of infrastructure take place at different platforms, such as the UN Security Council in New York City, the Human Rights Council in Geneva, and UNEP in Nairobi; policy coherence requires alignment of policy objectives, deliberate conflict checks and coordination on measures to achieve outcomes for all stakeholders, in all of these places. The need for coherence will rise with increasing impacts of climate change, which serve to push and merge predefined governance mandates of multilateral institutions.

Third, a range of **analytical and process tools can support more integrated and systemic policymaking and to reduce policy incoherence**. The SDGs have inspired a new wave of science-based tools to help decision makers think systematically about how different policy proposals and interventions could avoid trade-offs between goals and instead maximize synergies across many goals (Allen et al., 2021; Bennich et al., 2020); examples include the SDG Interlinkages Analysis & Visualisation Tool, the SDG Synergies tool, and the EnablingSDGs tool. Their value often lies in the process, which enables policymakers and stakeholders to reflect and expand their perspectives.

Another innovative stream of policy analysis approaches looks at how positive tipping points can be triggered and how change can become self-reinforcing, through positive feedback loops, leading to more systemic and transformative change (EEIST, 2021; Lenton et al., 2022; Sharpe & Lenton, 2021). An important element here is to broaden the focus from monetizing costs and benefits of a given action, to assessing wider risks and opportunities from both action and inaction.

Finally, we must recognise the political economy of ambitious policy change and ensure that **procedures for consultation and participation create a level playing field for different interests and voices to be heard**. Deep-seated goal conflicts and persistent policy incoherence can be traced back to interest groups that actively maintain them. As communities, nations and regions get locked into technologies, infrastructure, economics and politics (Erickson et al., 2015; see Section 3.3), interest groups have an incentive to mobilize and preserve certain goals and instruments. Some groups have disproportionate influence (Franta, 2021; Oreskes & Conway, 2011), and as we note in Section 3.3, future generations may have no influence. Ensuring fair participation and transparency of procedures is therefore key to tackling policy incoherence.

For transformative action on the planetary crises we face, the question should be how synergistic policies can be designed and how self-accelerating change can be triggered, rather than what the optimal solution at a given moment might be. A zero-carbon transition – implicit in any scenario that stabilizes atmospheric concentrations and temperatures – will involve wider changes in the structure of the economy, behaviours, and the nature and composition of industry and infrastructure. For these changes to yield social, environmental and economic dividends to the public, an integrated approach will be essential. To sum up, **goals agreed in the face of a global threat should be based on science, risk and precaution, and they demand transformative rather than marginal change**.

Recommendations to tackle the barrier of policy incoherence:

- **Incoherent policies with a bearing on sustainability goals must be better mapped, analysed and addressed, by many societal actors, to unlock effective action.**

- **National governments and international organizations should only use integrated and systemic approaches to policymaking. They should use tools for systematically analysing SDG interlinkages (synergies and trade-offs), apply wider system boundaries and extended timescales to account for future generations, and use frameworks for sequencing policy interventions to trigger positive tipping points.**

- **National governments and international organizations should set and enforce higher standards for transparency and public participation in the procedures for policymaking, to enable multiple perspectives on the resolution of goal conflicts and pursuit of synergies. This includes perspectives of future generations.**

5.2 Solidarity: foster renewed multilateralism

The gap in trust and solidarity between countries acts as a barrier to new agreements, to raising ambition and to accelerated national implementation. Opportunities exist now to renew multilateralism, to more effectively tackle environment and development crises and to rebuild solidarity: developing multilateral responses to chronic risks, replacing technology transfer with a new paradigm of 'co-development of technology', and setting norms for the global financial system.

The year 1972 marked the birth of environmental and sustainable development multilateralism and diplomacy (Chasek, 2020). The Stockholm Declaration envisioned a large and bold programme of multilateral cooperation, with the establishment of UNEP as a central piece.

Behind this push was the recognition that environmental challenges with transboundary dimensions needed collective action and governance platforms across countries. Equally, for development to not be compromised and burdens to be shared equitably, solidarity was to be bedrock of cooperation, centred around 'supporting measures' of financial support, technology transfer and capacity building (see Box 2.1).

There was another imperative, namely that cooperation on sustainable development could foster peace and security, even as Cold War tensions continued (BP Michel) and the process of decolonization remained incomplete. It would be fair to say that many of these imperatives remain salient today and that some have even grown in prominence.

Cooperation on sustainable development could foster peace and security.

Without solidarity, it is unlikely that multilateral platforms will become effective or new mechanisms for finance or technology will gain trust, given the failures in converting many promises to action over the past half century. Unless solidarity increases and multilateralism is strengthened, many of the actions proposed in Chapter 4 will not be impactful, for all stakeholders.

A single institution need not have the capacity to perform all functions and contribute to the long-term sustainability of complex regulatory systems (Ghosh, 2011; UNDP, 2017). Instead, complex environmental challenges could be confronted through a functional division of tasks (UN General Assembly, 2017; UNDP, 2017).

A rich structure of multilateral cooperation and institutions has been built since 1972, but cooperation mechanisms have not been strong enough to set us on a path towards achieving the SDGs, themselves defined in multilateral processes. There are exceptions and success stories, most notably the multilateral cooperation on phasing out ozone-depleting substances and

agreements to increase marine protected areas (Section 2.1). However, **several weaknesses remain that cut across environmental regimes and domains**:

- *Fewer binding agreements:* the tendency over time to move from 'hard law' approaches to 'soft law' (Abbott & Snidal, 2000), culminating in 'governance-by-goals' with the SDGs (Kanie & Biermann, 2017), which has recently been assessed to have had very limited impact (Biermann, Hickmann, et al., 2022).
- *Growing fragmentation:* a lack of coordination across environmental regimes, creating ambiguities and loopholes (Hickmann et al., 2020; UN General Assembly, 2018).
- *Poor delivery of supporting measures:* insufficient funding of financial mechanisms operating under environmental regimes and core funding of international institutions (see Box 2.1), especially in light of differentiated responsibilities of richer and poorer countries.

Although multilateralism can be considered a potentially more efficient and legitimate means towards enhanced human development and security (Ghosh, 2020) through global cooperation, **today the premise of multilateralism is itself at risk, as weak multilateralism has allowed for rising human insecurity and breached planetary boundaries** – and eroded confidence in multilateralism even further (BP Ghosh & Raha).

A structural challenge is the **persistence of coloniality in global institutions and the lack of priority on justice and equity between countries**. International regimes that seek to develop frameworks of common responsibility to act

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without defining resources as common goods (BP Mallya & Raha) perpetuate historical exploitation and weak action in developing countries. These issues are reflected in the design of climate finance and technology transfer instruments, which limit solidarity and confidence in multilateralism.

These weaknesses have resulted in a lack of trust between parties and weakening of incentives to act collectively, not least between the Global North and South. **This gap in trust and solidarity acts as a barrier to new agreements at the international level, and dampens raising ambition and national implementation of commitments**. To close this gap in trust, parties must fulfil past and existing commitments, to unlock ambition and action in new and emerging areas.

We all have an interest in avoiding our 'common aversions'.

To build solidarity from the bottom up, it is also critical to enhance legitimacy and trust in the multilateral system in the eyes of people. There is today an 'elite–citizen gap', where citizens consistently have less confidence in international organizations than elites do – across countries and across international organizations (BP Dellmuth & Fornborg). Episodes such as Brexit, street protests against international economic institutions, and the rise of populism suggest a possible divergence in views of global governance between political and societal leaders on the one hand and the general public on the other.

A common argument purports that today's elites, as the main winners of globalization, are out of touch with ordinary citizens, who bear the brunt of its burdens (Dellmuth & Tallberg, 2021; Rodrik, 2018). The alleged result is a significant political disjuncture, as well as a major obstacle to effective and democratic global cooperation. **Public trust is critical for member states to empower and entrust the multilateral system.**

Against this backdrop of gap in trust, we see three avenues forward to renew multilateralism and rebuild international solidarity.

Multilateralism is necessary for managing chronic risk. As new forms of international cooperation emerge, we must focus on chronic risks outcomes that all countries would want to avoid, our 'common aversions' (Ghosh, 2020). We all have an interest in avoiding new pandemics, climate change-induced extreme weather events, and a collapse in agricultural output (Adams et al., 2021).

Renewed drive for collective action can come from the way we organize multilateral institutions to respond to shocks, as a form of *de minimis* multilateralism (BP Ghosh & Raha). Private and national interests are not adequate for resolving collective challenges of such scale. We need global and just solutions to global problems, even if these require structural change in existing paths for decision-making.

The communal platforms we have – the UN, formed in the aftermath of World War II to avoid another such calamitous conflict; the G20, founded in 1999

in response to global economic crises; and others – need to regroup now and explore ways to 'prevent environmental crises of planetary scale and significance' (Ghosh, 2020; BP Ghosh & Raha). Box 5.1 offers concrete ideas to build resilience to climate risk, in view of vulnerability and equity.

Box 5.1 **Multilateralism for chronic risks – concrete ideas** (BP Ghosh & Raha)

A **Climate Risk Atlas for Developing Countries**, covering critical vulnerabilities to extreme weather events such as floods, droughts and cyclones, coastal degradation, heat and water stress, and crop loss at a granular level, **should be a priority for multilateralism structured around chronic risks**.

The Atlas should draw inputs from agencies such as the UN Framework Convention on Climate Change (UNFCCC), the UN Office for Disaster Risk Reduction (UNDRR), the UN Convention to Combat Desertification (UNCCD), CBD, UNDP and UNEP, as well as official banks and insurance and reinsurance companies. It should be formalized through intergovernmental processes and linked to national and subnational disaster risk reduction plans of countries, and international bodies like the Sendai Framework for Disaster Risk Reduction and the Coalition for Disaster Resilient Infrastructure (Mohanty & Wadhawan, 2021). **The data from the Atlas should feed into a Global Climate Risk Index.**

Moreover, a series of overlapping and related shocks – such as a combination of cyclones, landslides, drought and crop losses – could overwhelm insurance firms. As seen during the Covid-19 pandemic, even the richest countries can slide into financial and institutional crisis when faced with shocks of a certain magnitude compressed into a shorter time frame.

A multilateral mechanism – a **Global Resilience Reserve Fund** – for countries with varying levels of vulnerability to pool their risks to climate shocks to avert common disaster would partially overcome this challenge, given that different countries face different kinds of climate risks. **By pooling risks, the peaks of risk curves could be lowered for each country**. Such a fund could be based on a voluntary allocation of a share of a country's Special Drawing Rights (SDRs) in the International Monetary Fund, and be drawn on only for disasters above a certain threshold. Such a mechanism should not replicate the structural inequities inherent to economic institutions regarding decision-making, voting and veto rights, and conditioning of withdrawals to political measures like structural adjustment.

The compelling motivator of common aversions could also spur action for industrial decarbonization. Industries, irrespective of their location and sector, require a holistic check to determine the extent to which they contribute to sustainability objectives, and a restructuring of industrial production to balance economic growth and sustainability of ecosystems. Multilateral solutions could revise industrial standards for products and processes, create measures to limit adverse impacts to countries' competitiveness, and avoid both tariff (e.g. unilateral carbon border adjustments) and non-tariff (technical standards) barriers that may restrict trade.

Multilateralism is also required for the co-development of technology. Another practical approach to rebuilding solidarity is to narrow the technology divide. Out of approximately 3.3 million patent applications received globally in 2020, only 0.1% came from low-income countries, while almost 97% came from high-income and upper-middle income countries combined (World Intellectual Property Organization, 2021).

Technology and innovation are key to sustainable development, and vice versa: sustainable development is both a planetary need and can be vital for boosting economic competitiveness and dynamism, in order to bring benefits from the opportunities that a greener economy would bring. **By corollary, if the technology gap widens and poorer economies fall further behind, sustainable development would be unlikely to get political support.** A current example is vaccine inequality against the backdrop of the Covid-19 pandemic (see Box 2.2): the failure to share or transfer lifesaving technologies today increases the distrust of technologies to counter far more severe shocks from the climate crisis – the de facto assumption is that these will end up excluding the poor and vulnerable.

Multilateralism as a form of inclusive governance cannot emerge without ushering a shift in the still ineffective and one-sided status quo of technology transfers. A standard means of implementation in environmental regimes and established in the 1972 Stockholm Declaration (Principle 20), 'technology transfers' are plagued by colonial challenges of inflexible patent norms, limited financing, and political will of the Global North to support the actual transfer of knowledge or production capacities for low-cost manufacturing of agricultural, energy and health technologies to the Global South (BP Ghosh et al.).

'Sustainability measures' are not sustainable if they widen the technology gap.

As argued above (section 4.3), a key proposition for renewed multilateralism is technology co-development and inclusive governance over transactional transfers (BP Ghosh et al.). There is a need to reduce the technology divide and gaps in access for emerging technologies of the future. Some measures required include creating ease of licensing and co-ownership of intellectual property rights, pooling resources through innovative financial and non-financial incentives, and managing risk and liability to ensure local adaptation in developing countries. 'Sustainability measures' are not sustainable if they widen the technology gap; we must enable sustainable development to a shared path for all.

Finally, multilateralism is required for orienting financial systems to sustainable development. As discussed in Section 4.3, increased and redirected public and private finance is crucial to boost investment in sustainable development. The funding needs are particularly big in the Global South, where little of the private financial flows are going, where domestic public funds are limited and where multilateral public funds have fallen short of promises (BP Dutt et al.). Multilateral cooperation and institutions have several roles to play in reorienting financial systems to better serve sustainable development.

First, delivering late on the climate finance goal of mobilizing USD 100 billion by 2020 will be important to rebuilding trust generally in international cooperation on climate change. Second, as previously discussed, concessional finance support to developing country parties is necessary as a form of catalytic finance, to plug the existing finance gaps. A further measure could be to develop a global risk mitigation mechanism, to reduce the cost of de-risking investments.

Multilateralism plays an important role for equity and justice, as well as for directing investment.

Third, financial regulation and standards need to be harmonized for sustainable finance. Traditionally, Global South interests have not been well represented in such initiatives and fora but should be included as equal partners in shaping the global sustainable finance architecture (BP Dutt et al.).

Photo: Artur Debat / Moment / GettyImages

A new opportunity for the multilateral system will be to operationalize the 'climate consistency goal', i.e. Article 2.1(c) of the Paris Agreement, to make 'finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development' (Zamarioli et al., 2021). This goes beyond a specific funding target and requires the multilateral system to set norms for the financial system to follow (see Box 5.2).

Box 5.2 **Making sustainability a norm** (Source: BP Desai)

How will this 'greening' of market-based investment flows move from ad hoc voluntary initiatives to working practices that are considered normal by investors and fund managers? Such value-framed conduct, for instance, avoiding investments in activities based on child labour, is common today.

The most standard working practice is the pursuit of profit. This motivation can be influenced by fiscal measures that reflect externalities through taxes and subsidies and hence shape the prospects of profit. With the risks of climate change looming large in public consciousness, carbon pricing is an important example.

But unilateral moves in this direction can affect the competitiveness of a country's producers if they are not part of an agreed global norm. Hence, some measures would help to change what is normal in the world of global finance: global agreements where possible, clearer methodologies for measuring the costs and benefits of externalities, and support to poorer countries that may face serious short-term costs if they were to do this.

The working practices of financial firms are shaped by shareholders and investors, and a systematic effort to build an ethic of social and environmental responsibility amongst people can increase the pressure on profit seeking financial intermediaries to incorporate this ethic in their working practices.

Reorienting the working norms of private financial institutions will be a long haul. This is where Multilateral Development Finance Institutions, aid agencies and sovereign welfare funds can accelerate adoption of sustainability standards by **making sustainability norms a condition for their own activities and, more importantly, for co-financing operations.**

Today, providing resources for sustainability looks like a form of forward-looking venture funding. But if pursued systematically **it could become the norm**, as, for instance, the funding of internet-based activities has become, after starting as a high-risk venture operation in the 1990s.

In the immediate future, **this normalization of sustainability criteria** in financial operations may only be accepted in climate mitigation activities. But with coordinated multilateral persistence, it can extend to other areas such as water conservation, biodiversity protection, air quality improvement and more, to keep our activities within the planetary boundaries discussed above.

Multilateralism continues to play an important role for equity and justice. It plays an essential role for inclusive participation in global decision-making, in the context of groupings of major economies and powers. It also plays an essential role in directing funds to places where private capital is not invested.

At the same time, calls for enhanced justice within and through multilateral institutions are intensifying. In today's polycentric governance landscape, conscious effort needs to be made to recognize the role of and to empower non-state parties, particularly civil society institutions. Greater participation and empowerment of civil society can bridge the gaps in trust between citizens and global governance institutions, as well as promote accountability and transparency.

Recommendations to foster renewed multilateralism:

- **International organizations, in collaboration with national governments, should develop new ways of communicating about procedure and performance to build trust with citizens, and engage specifically with sceptics.**
- **New multilateral initiatives and mechanisms should be developed for dealing with chronic global risks and especially for protecting the vulnerable who lack social safety nets.**
- **A new paradigm of 'technology co-development' should replace ineffective technology transfer mechanisms; Stockholm+50 should provide a first UN platform for exploring it.**
- **Multilateral institutions should use their norm-setting power to make sustainability a customary practice for private finance and international harmonization efforts of financial regulations, and standards for sustainable finance should be inclusive of developing countries.**
- **High-income countries should deliver on climate finance goals as an essential means of rebuilding trust.**

5.3 Accountability: ensure a culture of accountable promises

Filling the accountability gap could yield benefits within existing environmental regimes, by improving their effectiveness, but also building trust across regimes, as successes in one issue area raise confidence in others. We must ensure constructive accountability, which incentivizes and leads to bold action and change rather than threatens and lead to pre-emptive action and reduced ambition. We need to make goals and targets matter and have value.

Weak accountability is emerging as a third important structural barrier, 50 years after the birth of environmental multilateralism. Despite much progress by states on agreeing to global environmental targets, the track record on achievement is poor (Figure 2.2). The **follow-up and review mechanisms for the SDGs are generally seen as weak and not enabling states to be held accountable, neither at international level or domestically** (Campaign for a Decade of Accountability for the SDGs, 2021; Å. Persson et al., 2016).

Existing accountability mechanisms, typically in the form of submitting national reports, have not compelled action.

Compliance remains a concern, with the proliferation of MEAs. Inadequate investment in the capacity to ensure effective compliance at the national and subnational levels and an inability to assure timely legal redress at the international level has undermined confidence in multilateralism. Existing accountability mechanisms, typically in the form of submitting national reports, have not compelled action, and the UN institutions receiving the reporting have not had the mandate to take more action.

A parallel trend, since around 2015, has been the proliferation and groundswell of **multi-stakeholder cooperative initiatives, partnerships and pledges** announced outside of the legally binding agreements, under several domains (climate, biodiversity, oceans, SDGs). They take diverse forms, some of which are target-based with various degrees of measurability (e.g. targets, pledges, campaigns, declarations, principles) and some of which are collaborative (e.g. networks, alliances, coalitions, partnerships; Future of Climate Cooperation, 2021). For example,

- The UNFCCC Global Climate Action portal, which started in 2014, now features over 26 000 individual actors and more than 150 cooperative initiatives; however, only 60 of these had reported on progress by 2021.
- The SDG Partnership Platform lists more than 6200 voluntary commitments and multi-stakeholder partnerships, and it remains unclear how many have reported progress.
- The CBD Action Agenda lists 343 pledges and 129 partnership initiatives, and again, it is unclear how many have reported progress.

In addition to these partnerships, the UNFCCC COP26 saw the announcement of several pledges involving both states and non-state actors, on methane emissions, deforestation, phasing out coal and ending international fossil fuel finance (UK Presidency, 2021). With the exception of the Breakthrough Agenda for advancing key clean energy technologies, few of these had details on follow-up and progress tracking.

A third trajectory has been at the level of **individual non-state actors** – companies, cities, organizations. They have committed to a proliferation of 'net zero' climate targets, as well as targets for nature. So far, for the net-zero climate-related goals, very few of these targets are clearly associated with accountability mechanisms (Figure 5.3). This holds across

actor categories: national government, regional government, city government and large companies. Independent analysis has shown that several companies' targets do not yet meet rigorous standards (New Climate Institute, & Carbon Market Watch, 2022). The Science-Based Targets Initiative and the Science-Based Targets for Nature are examples of non-profit organizations assisting companies that are striving for climate and sustainability goals – while the will to act is obvious, accountability again remains a challenge.

The will to act is obvious; accountability is a challenge.

While long known as a problem in global environmental governance, the lack accountability is increasingly being called out by a range of actors: from citizens and youth taking governments and companies to court, from environmental movements highlighting greenwashing, from investors wanting to differentiate quality of commitments, and from the UN Secretary-General, establishing a High-Level Expert Group on Credibility, Transparency and Accountability of the Net-Zero commitments of Non-State Actors (HLEG; Aggarwal et al., 2020; Persson, 2021). This push for greater accountability has also brought an awareness for individual accountability.

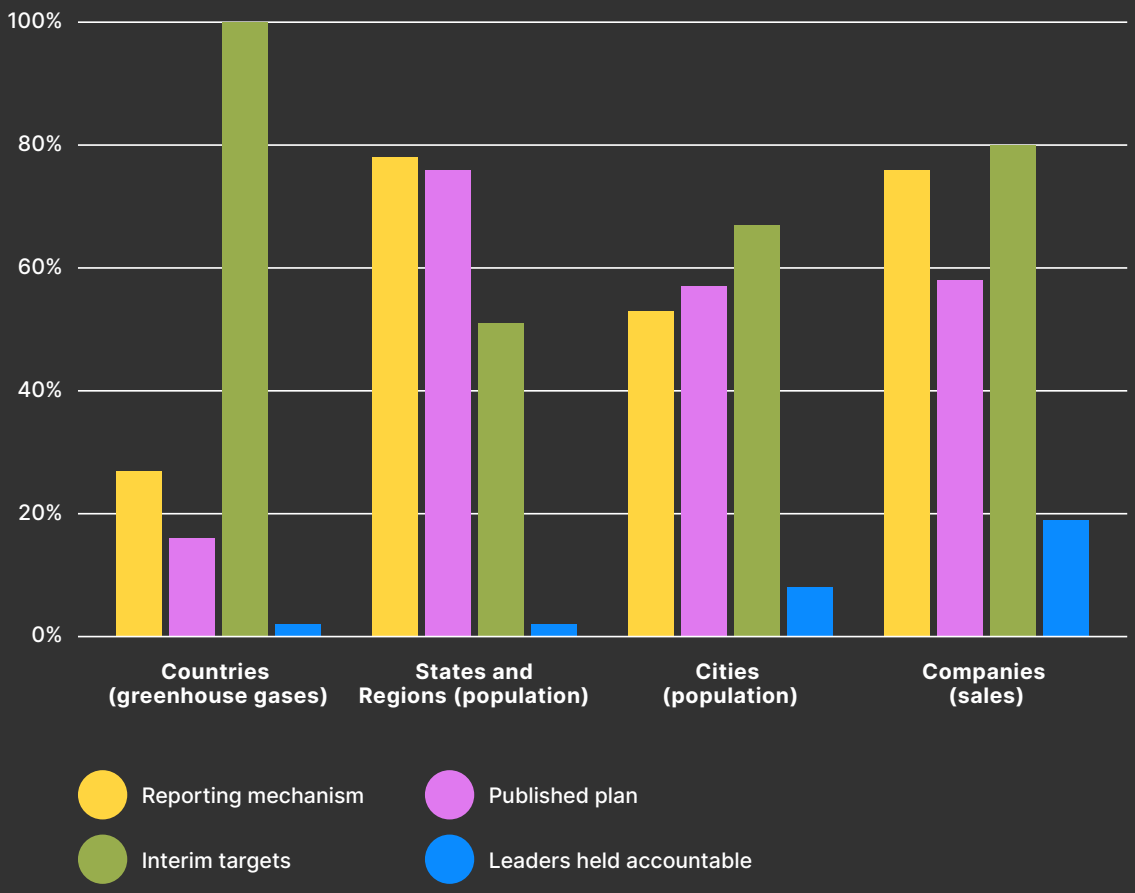
Weak accountability is a problem for two reasons. **First, it severely limits effectiveness in solving environmental problems and meeting targets**. In global environmental governance, it has been found that that accountability mechanisms are often designed with respect to a specific governance institution's goals (e.g. complying with procedural steps) rather than achieving environmental outcomes (Kramarz & Park, 2016), which can lead to an 'accountability trap' (Park & Kramarz, 2019). The culture of unaccountability in global environmental governance (Halle & Najam, 2010) also has risks, according to (Halle & Najam, 2010, p. 6): 'the structural lack of mechanisms to monitor the level of implementation of obligations also has a detrimental impact on negotiator behaviour, since the norm is to seek big promises today without any reliable means to determine tomorrow whether they are kept.'

The second reason is that it erodes public trust and credibility. Accountability is a key element of democratic legitimacy, and integral to SDG16. It is also important for social legitimacy, which is critical when success depends on broad acceptance and buy-in (see Section 3.3; Figure 5.4).

Filling the accountability gap could then yield benefits within existing environmental regimes, by improving their effectiveness. It could also build trust across regimes, as successes in one issue area give confidence that other challenges could also be confronted.

Keeping in mind the trends described above, accountability extends well beyond countries and national governments. Accountability must ensure that governments fulfil their commitments primarily within their territories, rather than 'outsource' actions (such as emissions mitigation) largely to other countries. The burden of performance, combined with changes in lifestyles, regulations or pricing of externalities, should lie largely within a government's

Figure 5.3
Indicators of net-zero target governance



Source: Net Zero Tracker (2021).

jurisdiction. Only residual gaps should be bridged by offsets in other geographies (see also Fankhauser et al., 2022).

Beyond government accountability, the proliferation of non-state actions must be accompanied by standardized metrics of performance, transparency of actions, independent review, and market and non-market means of combatting greenwashing. Accountability mechanisms have four key elements (Breuer & Leininger, 2021; Karlsson-Vinkhuyzen et al., 2018; Mashaw, 2006; Schedler et al., 1999):

- **Responsibilities:** Actors should be assigned clearly defined duties, performance standards or responsibilities to take certain actions. If and when standards are not clear, they should be developed scientifically.

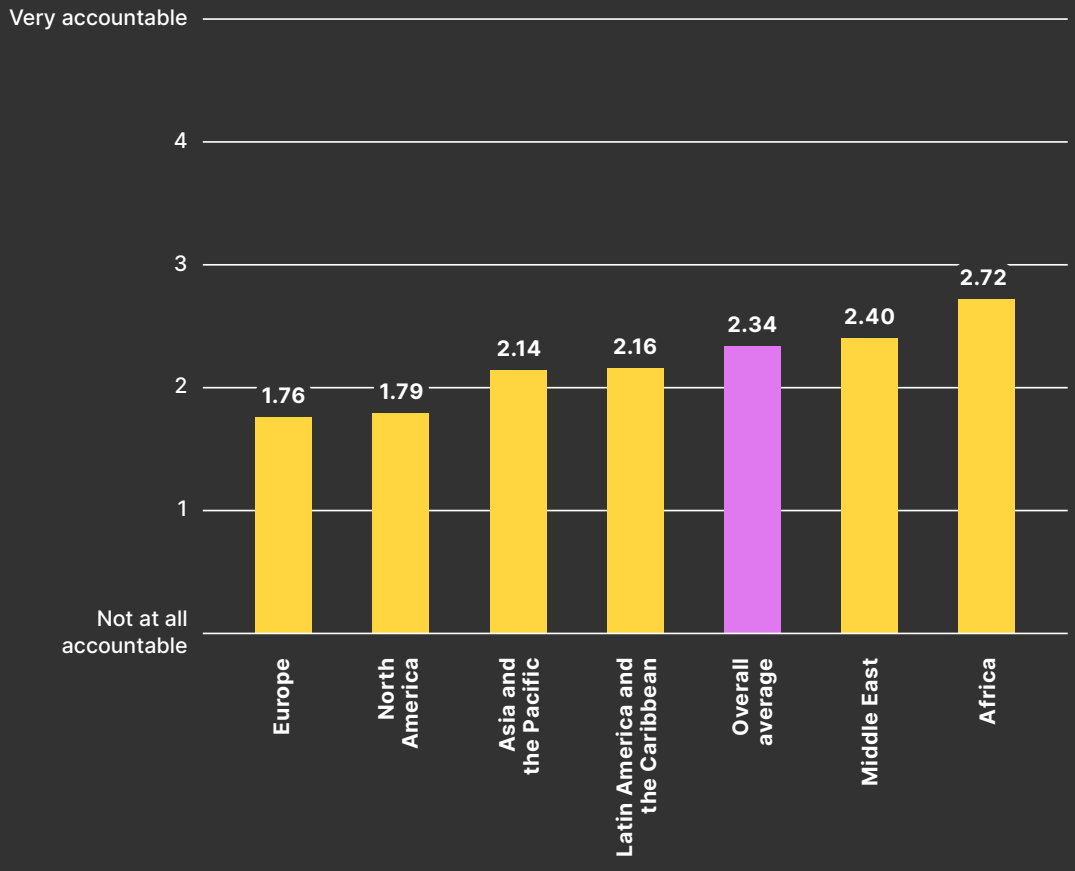
- **Information:** Rights to access the information that is needed to effectively hold actors to account should be strengthened, through national or international law (e.g. Aarhus Convention). Information should be provided in a meaningful way, with milestones and benchmarks for progress and aggregated at appropriate levels. With increasing digitalization comes growing opportunities to pursue

open-source approaches and to rely on communities of practice, including third parties (see e.g. CAMDA under the UNFCCC Global Climate Action portal).

- **Answerability:** Actors should be obliged to provide information and reasoned justification for their actions, especially to the people affected by them. This requires well-functioning fora for dialogue, exchange and peer review. For example, the UNFCCC can conduct a Climate Policy Review (similar to the WTO's Trade Policy Reviews or the IMF's reviews) with an enhanced focus and frequency of assessment for the largest historical emitters.

- **Consequences:** Actors should expect that they may be subject to (i) formal or informal and (ii) positive and negative consequences (sanctions) for their action or inaction in relation to assigned responsibilities. Currently, consequences are limited mainly to reputation at the intergovernmental level. The risk of legal action against non-performance by states is largely missing because standards of action have only been formalized into international law at a procedural level. This limits assessment and determination of international liability. It may be equally relevant to empower existing technical mechanisms under international conventions with quasi-judicial power to regulate state conduct. These and other suggestions, however, will need the political will of member states to submit to binding rules of conduct at the global level.

Figure 5.4
Perception of global accountability for the SDGs



Source: Campaign for a Decade of Accountability for the SDGs (2021, p. 37).

Consequences for actors more broadly may be considered mainly of a negative kind, such as reputational risk, naming-and-shaming, trade sanctions, boycotts, divestment and litigation. However, it is equally important to develop a wide range of positive consequences, such as praising, investment and preferential access, especially for actors who make significant leaps in performance in relation to their starting points.

We must ensure constructive accountability, which incentivizes and leads to bold action and change rather than threatening and pushing actors to pre-emptive regressive or negative actions and reduced ambition. We need to make goals and targets matter and have value.

Multilateral institutions must return to the core principles of cooperation – 'joint monitoring and data sharing, building trust, investing in institutional and human capacity, enforceable legal instruments, raising more financing, and equitably sharing the gains' (Ponzio & Ghosh, 2016) – to reclaim lost ground. Collective action for more sustainable development will need accountability for past behaviour from industrialized nations, proactive resolution of environmental issues by developing nations, and a conscious change in the current and future patterns of consumption (BP Ghosh & Raha).

Recommendations to ensure a culture of accountable promises:

- **Multilateral agreements and processes (UNFCCC, CBD, etc.) should strengthen systematic tracking of action and progress on multi-stakeholder pledges. Tracking should be simultaneously conducted by secretariats and by independent third parties, drawing both on official data submitted through national reporting and other data sources.**

- **Develop proxy indicators of progress to measure the pace of transformation, if and when the target is far in the future and ultimate indicators will take time to show progress.**

- **Convene a UN Climate Accountability Summit at the UN General Assembly or at COP meetings or other major meetings, start with an accountability forum to give a dedicated and high-status platform for follow-up and review of performance to date, before announcement of new pledges and commitments. Set criteria where high achievers – in terms of demonstrating effective action or demonstrating high ambition in relation to starting point – are given a platform to inspire and incentivize accelerated action and implementation.**

- **Build a community of practice within (and across) environmental domains around tracking progress and convene diverse actors who can build the knowledge bank, e.g. national statistics offices, academia, civil society and philanthropic organizations. Research and philanthropic funders should invest more in datasets and evaluation methodologies to enable accountability mechanisms to be effectively used.**

6

Accelerating change

Anniversaries provide moments of reflection: Where have we been? Where are we going? Half a century after what can be considered a global awakening to needed actions to protect humans and the only planet we have, we are looking to the future.

The next decade will drive what happens to us and to the planet in the next 50 years and beyond. We must act now if have any hope of reaching a sustainable existence in some of our lifetimes, in our children's and our children's children's lifetimes. We do not want to see a Stockholm+100 meeting – unless it is a global celebration of what we have managed to set in motion at Stockholm+50.

By then, sustainable development will have been normalized. If we act now, in 50 years, we will not talk about 'green' or 'sustainable' finance, cities, lifestyles, jobs and so forth – because they will all be inherently sustainable already (BP Desai).

For now, however, we need to focus and act on the specific areas of change that we see will bring us closer to sustainable development for the environment and humans. Both incremental and giant steps, for changes to lead to systemic change (Chapter 4), include environmental education for all, sustainable economies, and public support for innovation. A paradigm shift towards co-development of technology could have transformative effects on equitable prosperity.

We can also see that systemic changes are needed to remove barriers that have long held us back from achieving the goal of human-environment development in a sustainable fashion. We need to improve the conditions for change by strengthening multilateralism and trust, establishing a culture of accountability, and insuring transparency and capacity-building, among other steps forward (Chapter 5).

Those who will celebrate Stockholm+100 need to be given voice and power now, as well as environmental and sustainability education to ensure they can tackle the problems we leave them; many youth alive today feel the stress already of future climate impacts, and indicate that they are willing to take action now (Aggarwal et al., 2022). We – all of us – need to take action now, to make up for the slow pace of the past and speed up the pace for the future.

The next steps taken, beyond Stockholm+50, could prove this to be the watershed moment we need now. We hope we leave a legacy that unlocks a sustainable future for all humans and our planet.

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Appendix

Figure 2.2 background information

Assessment of achievement of global environment and sustainable development targets

Below is the underlying data and sources for Figure 2.2

Set of global targets	Achievement
Pre-2012 global environmental goals • Pre-2012 • 320 goals identified • Of which 90 goals assessed	By 2012: • UNEP first identified 320 goals in MEAs, in non-legally binding instruments (since 1972), and outcomes of conferences convened by specialized agencies. The majority were action-oriented rather than target-oriented. • 90 goals assessed in GEO-5: about half of the goals showed no or little progress, or further deterioration. • 34 goals assessed in 2012 Measuring Progress report: 3 goals showed significant progress. (UNEP, 2012)
Millennium Development Goals • 2000 – 2015 • 8 goals, with 18 targets	By 2015: • 8 goals: 1 goal was fully met (MDG 3) • Out of 14 targets that can be assessed quantitatively, 3.5 targets were achieved. (United Nations, 2015)
Aichi targets • 2011 – 2020 • 20 targets, with 60 elements	By 2020: • 20 targets: 0 had been fully achieved, 6 targets partially achieved. • 60 elements: 7 had been achieved, 38 showed progress, 13 show no progress or negative trend, 2 level of progress was unknown. • National-level targets did not reflect the level of ambition that countries had committed to in the Aichi targets and only 37% of national targets had been met or were on track to. (Secretariat of the Convention on Biological Diversity 2020)
Environmental dimension of SDGs • 2015 – 2030 • 92 indicators for SDG targets	By 2021: • 92 indicators (2000 – 2018 data): 26 showing positive trend 2000 – 2018 (does not represent that the SDG target will be achieved), 2 showed very little change, 11 showed negative trends, 52 had no or insufficient data (UNEP 2021) By 2019: • The 2019 GSDR assessed selected targets under each of the 17 SDGs. Goals 12, 13, 14 and 15 with a strong environmental focus showed the worst performance of all 17 goals, with negative long-term trends.

Method to compile Figure 2.2

Adjustment was made to ensure the same achievement categories could be used across the sets of targets.

- For the **pre-2012 global environmental goals** a first inventory by UNEP identified more than 300 goals. 90 of these goals were assessed in GEO-5, about half of which showed progress. The data displayed here represent the sub-set represented in the UNEP Measuring Progress report from 2012. Their assessment 'Environmental scorecard' figure (p. 3) lists 34 targets assessed as 'significant progress', 'some progress', 'little or no progress', 'further deterioration', and 'insufficient data to assess'. In our figure, the 'little or no progress' and 'further deterioration' were both counted as 'no progress'. For the 8 targets that were represented as ranging across assessment categories, the highest category was chosen in our figure.
- For the **Millennium Development Goals**, the summary assessment by Our World in Data was used. Targets assessed as achieved (green) by them were identified as 'achieved/significant progress' in our figure. 10 of the targets that were assessed as 'missed' (red) were coded as 'some progress' in our figure based on the data and 2 of the targets assessed as 'missed' were coded as 'no progress' in our figure (MDG7.A and MDG7.B).
- For the **Aichi targets**, the assessment from the 2020 Global Biodiversity Outlook was used. Their assessment categories were similar to those used in our figure.
- For the **environmental dimension of SDGs**, the assessment made in UNEP's Measuring Progress 2021 report was used. It looked at SDG indicator data from 2000 to 2018. Indicators assessed as 'showing positive trend' (26) were assessed here as 'some progress' to reflect the uncertainty of outcome of these indicators by 2030, i.e. whether it will be significant by then or not. Indicators assessed as 'showing very little change' (2) and 'showing negative trends' (11) were in our figure assessed as 'no progress'.

Figure 2.3 background information

Environmental Assessment: achieved, but not translated into policy at the needed level of ambition.

- *Evaluation and review* conducted at multiple levels today include formalized intergovernmental scientific assessment processes, e.g. the International Panel on Climate Change (IPCC, since 1990), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, since 2016), Global Environmental Outlook (GEO, since 1997), and a new international panel on chemicals and waste to be established (UNEA-5 resolution, UNEP/EA5/L13/REV.1). In addition, regular global outlook reports are published by UN bodies, e.g. on natural resource use, biodiversity, chemicals and sustainable development.

- *Research* on the environment has grown by as much as 30-fold, as measured by the number of peer-reviewed journal articles published annually in the field of 'environmental sciences' (search performed in academic database Scopus, 12 February 2022).

- *Monitoring* of environmental data and indicators remains unsatisfactory. By 2021, 57% of environment-related SDG targets still did not have sufficient data globally to allow for regular and meaningful monitoring (see Figure 2.2 on achievement of global environment and sustainable development targets; UNEP, 2021e).

- *Information exchange* has increased substantially, with numerous intergovernmental and multi-stakeholder conferences, digital information platforms, scientific and popular communication (see Figure 2.1).

Environmental Management: achieved, according to outputs rather than outcome and impact.

- *Goal-setting and planning*: Up to 2012, more than 300 goals had been set globally either in international agreements or voluntary declarations. Since then, at least three major sets of global targets with relevance for the environment have been agreed, with quantified and measurable goals and targets to a large extent. However, goals set have not generally been achieved, and may not be the 'right' goals.

- *International consultation and agreements*: More than 1300 multilateral environmental agreements (MEA) have been agreed since 1972 (Mitchell et al., 2020a). The trend is towards more goal-based rather than rule-based international governance; still, recent new agreements under consultation include the Marine Biodiversity in Areas Beyond National Jurisdiction (BBNJ) and a global agreement to end plastic pollution (UNEA-5.2). Many MEAs suffer from poor implementation.

- **Supporting measures:** difficult to assess in terms of key indicators; generally poorer track record.

- *Education and training*: no reliable global indicators; stable progress can be assumed in several parts of the world. Environmental education in schools has increased, with more than 92% of school curricula in 46 countries now including environmental issues, although depth and breadth can be improved (UNESCO, 2021). Environmental training in the private sector has increased substantially, considering the rapid growth rate in certificates issues for corporate environmental management, according to the International Standards Organization (ISO) 14001 standard (ISO, 2020).

- *Public information*: no global reliable indicators; stable progress can be assumed in several parts of the world. Several governments have legislation on public access to environmental information. Public requests for environmental information from the EU are increasing (European Environmental Bureau, 2019). However, barriers persist, despite the Aarhus Convention on environmental information in the UNECE region. The start of the internet and digital information flows led to wider and quicker access, including through crowdsourced information (Petiška & Moldan, 2021).

- *Organization* has steadily progressed through establishment and renewal of institutions, at the international (UNEP; UN Environment Management Group; multiple international organizations with an expanded environmental mandate; Mitchell et al., 2020b) and national level (Busch & Jörgens, 2005; Egelston, 2013), as well as through transnational networks and partnerships (Kalfagianni et al., 2020; see also BP Michel). Many kinds of organizations have emerged in a complex landscape, but a critique persists that environmental organizations are typically too weak in terms of mandate, staff and budgetary resources (Ivanova, 2021) and that a 'constitutional moment' is needed for transformative institutional reform (see Biermann et al., 2020).

- *Financing*: progress, but with large gaps to the levels agreed among parties and/or to the levels needed as assessed by science and experts, and with problems of access in low-income parts of the world. The SDG funding gap is estimated at USD 2.5 trillion, set to increase as a consequence of the Covid-19 pandemic (OECD, 2020a). Environmentally damaging financing continues, in the form of public subsidies and private investments (Koplow & Steenblik, 2022a). Mobilization of private finance for sustainable investment has increased rapidly, but remains heavily skewed towards high- and middle-income countries (UNCTAD, 2021; see also BP Dutt et al.).

- *Technical cooperation*: lacking. Efforts have not met expectations for building capacity in low-income countries to manage environmental problems through technological, social and regulatory means. Official development assistance (ODA) has increased for projects, programmes and technical cooperation in absolute terms, but decreased as a percentage of Gross National Income (GNI) and is far from reaching the target of 0.7% of GNI (UN, 2021). Technology transfer as a means of implementation remains weak, when measured in dedicated ODA funding (UN, 2019) as well as implementation (BP Ghosh et al.)

Figure 3.3 background information

Sources: Business Sweden (2020); Dennis, M. (2021); European Parliament (n.d.); Linnér & Selin (2018); Parliamentary Monitoring Group (n.d.); Statista (2022); Strategy& (2018); Union of Concerned Scientists (2017); World Bank (n.d.).

About us

SEI is an international non-profit research and policy organization that tackles environment and development challenges. SEI was founded in 1989 and is named after the Stockholm Declaration of 1972. We look to the Declaration as the origin of our mandate, and we fulfil that mandate through research and engagement.

CEEW is one of Asia's leading not-for-profit policy research institutions. The Council uses data, integrated analysis, and strategic outreach to explain – and change – the use, reuse and misuse of resources. The Council addresses pressing global challenges through an integrated and internationally focused approach. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with the wider public.