# Sustainable Food Production and Consumption:

# Recommendations to inform the Post-2020 Global Biodiversity Framework

*A submission from the International Union of Biological Sciences, IUBS, with support of the University of Sussex Sustainability Research Programme (SSRP)[[1]](#footnote-1)*

**Unsustainable production and consumption and food systems: the need for urgent and transformative change**

The vision of the 2010-2020 Strategic Plan of the UN Convention on Biological Diversity (CBD) states that *“by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people”*[[2]](#footnote-2). However, biodiversity is declining faster than at any time in human history, with human actions currently threatening more species than ever with global extinction[[3]](#footnote-3). Direct and indirect drivers of biodiversity and ecosystem loss continue, resulting in the loss of 85% of all wetlands, the loss of 32 million hectares of tropical or recovering primary forest between 2010-2015, and 66% of the global ocean area is now experiencing increasing cumulative impacts of overexploitation of aquatic organisms, land- and sea-based pollution, and coastal development for infrastructure and aquaculture2.

Society’s unsustainable production and consumption patterns are either directly or indirectly at the root of current trends in nature’s deterioration[[4]](#footnote-4). Although this was recognised in the Aichi Targets agreed by CBD COP 10 in 2010, little progress has been made[[5]](#footnote-5),[[6]](#footnote-6),[[7]](#footnote-7). While consumption patterns for a growing global population increase – albeit unequally – production practices are increasingly fragmented and spatially dispersed[[8]](#footnote-8) which creates significant challenges for biodiversity governance.

**Recommendations**

Drawing upon discussions in four science-policy fora,[[9]](#footnote-9) intended to provide input to the CBD Post-2020 Global Biodiversity Framework, we make four major cross-cutting recommendations for supporting transformative shifts in the sustainability of production and consumption patterns in food systems. These are: (1) Ensure alignment with the SDG[[10]](#footnote-10)s, (2) Explicitly address the sustainability of food systems, (3) Strengthen accountability and compliance mechanisms within the CBD, and (4) Work with ‘agents of change’ for more sustainable production and consumption and mainstreaming biodiversity. We then list a proposed set of action targets – and indicators against which these could be assessed – in relation to the sustainable production and consumption patterns in food systems (Table 1). The wide range of ideas originally contributed in the four science-policy fora are listed in a summary table in Annex 1.

**1. Ensure alignment with the SDGs**

The 2030 Agenda for Sustainable Development provides a major opportunity for complimenting, supporting, and being supported by, a post-2020 biodiversity agenda by addressing production and consumption patterns. The CBD Zero Draft document makes links with Agenda 30, stating *“Implementation of the 2030 Agenda for Sustainable Development and progress towards the Sustainable Development Goals, such as the Goals on quality education, gender equality, reduced inequality, and peace and justice, as well as sustainable production and consumption, will help to create enabling conditions for the implementation of the post-2020 global biodiversity framework”[[11]](#footnote-11)* However, given the significant role of unsustainable food production and consumption patterns in nature’s deterioration, addressing this is also in the remit of the CBD. Therefore, and because there are numerous existing indicators within the SDG indicator framework (Table 1, ‘indicator’ column); which could be used in combination with other indicators in Member States’ reports to the CBD, we propose the use of the same indicators, thus reducing reporting burden while tracking progress against targets.

**2. Explicitly address the sustainability of food systems**

Included in the Zero Draft document are draft action targets relating to sustainable practices in supply chains, sustainable lifestyles and the sustainable use of biodiversity in agricultural and other managed ecosystems, without explicit mention of food, specific actions or targets related to sustainable production (other than increasing productivity), or consumption. We suggest that the CBD post-2020 framework places the agenda of sustainable production and consumption more prominently, particularly in relation to food, if it is to drive transformative changes needed to tackle the root causes of biodiversity loss.

**3. Strengthen accountability and compliance mechanisms within the CBD**

Compliance and accountability mechanisms should be strengthened, through increased transparency of individual state progress, a more direct link between national and global goals and a compulsory peer review mechanism for NBSAPs[[12]](#footnote-12). Progress against SDGs 17.18 and 17.19 and associated indicators, can mutually support countries in reporting their progress against targets set in the Post-2020 Global Biodiversity Framework.

**4. Work with ‘agents of change’ for mainstreaming biodiversity into sustainable production and consumption**

Notably, we stress the importance of creating enabling conditions for more sustainable production and consumption, which will require broader actions from multiple ‘agents of change’ beyond the conservation community. These agents include, but are not limited to: small-scale farmers and fishers, large-scale producers, consumers/citizens, local communities, local/regional and national governments, NGOs/CSOs, businesses, consultants and experts, standards bodies, academic communities, international organisations, funding agencies and the finance sector. Concerted actions by these agents can support the development of enabling conditions to shift production and consumption patterns onto a sustainable path, and to fulfil a more transformative Post-2020 Global Biodiversity Framework. Recognising the diverse knowledges these actors represent – and the uneven ways in which they are responsible for and are affected by – unsustainable practices and biodiversity loss, collective action is needed to make the wider shifts needed towards more sustainable production and consumption systems.

* *Governments* have a significant role to play in holding industry to account for the sustainability of their practices in food systems, delivering awareness campaigns to citizens and businesses, and implementing sustainable procurement policies. Importantly, governments should seriously review current incentive programmes that promote unsustainable production and consumption practices, and direct these to support to low-income groups for sustainable healthy diets. Governments play a role in enforcing biodiversity-related regulations, and enacting stronger controls of advertising encouraging unsustainable purchases. Governments should work to develop natural capital accounting systems that incorporate noneconomic values and diverse conceptualisations of nature. Importantly, alternative pathways for sustainable economic development should be considered, which requires alternatives to GDP metrics, but through recognition of the need for ‘just sustainability’.
* *Businesses* should make ambitions and transparent science-based commitments to address biodiversity impacts and report progress against these, demonstrate legal compliance, dedicate resources to implementation of their commitments, internalise costs of monitoring, and demonstrate compliance with sustainability standards and certification.
* *Academic communities* are responsible for exchanging multidisciplinary knowledge with policy communities – paying attention to justice and equity concerns. Diverse perspective and knowledges should be valued through social and technological innovations.
* Through socio-cultural shifts, more awareness is needed by *consumers* of biodiversity impacts in supply chains, product lifecycles, and the biodiversity impacts (and other sustainability impacts) associated with their diets.
* *NGOs* play an important role in influencing governments and industry to recognise and address biodiversity loss, in the education of consumers, supporting activist groups, and strengthening the requirements and assurance mechanisms of sustainability standards.

Table 1. Proposed targets and indicators for the Post-2020 Global Biodiversity Framework

|  |  |  |
| --- | --- | --- |
| **Goal** | **Target(s)** | **Indicators,** **alignment with SDG indicators or targets(\*)** |
|  |
| Zero net conversion of forests, wetlands, grasslands, savannahs freshwater and marine ecosystems  | * No net loss by 2030 in the area and integrity of freshwater, marine and terrestrial ecosystems, and increases of at least [20%] by 2050, ensuring ecosystem resilience *(currently included in Zero Draft document)*
* Retain and restore freshwater, marine and terrestrial ecosystems, increasing by at least [50%] the land and sea area under comprehensive spatial planning addressing land/sea use change, achieving by 2030 a net increase in area, connectivity and integrity and retaining existing intact areas and wilderness *(currently included in Zero Draft document)*
 | Change, and rate of change, in area of natural ecosystems and biomes (overall, for each biome/ecosystem type, and for intact areas, e.g. primary forests). *(currently included in Zero Draft document)*Forest area as a proportion of total land area.Trends in forest extent and/or tree cover.Trends in primary forest extent.\*Continuous Global Mangrove Forest CoverLive coral cover.Species Habitat Index.Wetland Extent Trends Index.Biodiversity Habitat Index.Red List for Ecosystems.Change in ecosystem integrity resilience and degradation and rate of ecosystem restoration. Proportion of land that is degraded over total land areaGlobal Ecosystem Restoration Index.Cumulative human impacts on marine ecosystems.Ocean Health Index.Vegetation health indexHuman footprintSDG 14.7.1 Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countriesSDG 14.c.1 Number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resourcesSDG 15.1.1 Forest area as a proportion of total land areaSDG 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type15.2.1 Progress towards sustainable forest management15.3.1 Proportion of land that is degraded over total land areaSDG 15.a.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems |
| Sustainable diets | * By 2024, develop dietary guidelines that address both health and sustainability, promoting a more diverse diet (higher proportion of fruits and vegetables, 33% lower proportion of animal protein)
 | Number of countries with dietary guidelines that address both health and sustainabilityMeat consumption kilograms/capita (OECD Agriculture Statistics)Fruit and vegetable consumption kilograms/capita (OECD Health Statistics)SDG 12.1.1 Number of countries with sustainable consumption and production (SCP) national action plans or SCP mainstreamed as a priority or a target into national policies SDG 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) |
| Subsidies/incentives harmful to biodiversity | * By 2024, develop policy plans, including a prioritized list of measures, with timelines, leading to the eventual removal, phase-out, or reform of harmful incentives.
* Redirect capacity-enhancing subsidies to support sustainable activities
 | Number of countries with policy plans for removal or reform of incentives harmful to biodiversity Percentage of harmful subsidies removed and/or redirected (at least 50% by 2030, 100% for 2050)Sector-level government financial transfers to the agriculture and fisheries sectors (OECD databases) SDG 14.4.1 Proportion of fish stocks within biologically sustainable levels[SDG 2.b.1 Agricultural export subsidies] |
| Sustainability certification standards | * By 2024, sustainability certification standards strengthen biodiversity requirements, including NNL as a minimum and management and monitoring of High Conservation Value (HCV) areas
* By 2024, corporate commitments need to use transparent and SMART indicators and report on progress against commitments
* Sustainable public procurement plans adopted
 | Number of companies with biodiversity commitments/policiesNumber of companies reporting against SMART biodiversity indicators% of ISEAL members with stronger biodiversity requirements, including NNL as a minimum, and management and monitoring of High Conservation Value (HCV) areasBiodiversity Impact Indicators for Commodity Production (BIICP):* % of farmland area in land classes of different habitat quality
* Conversion of natural habitat cover in terms of land-use change over time
* Area-based conservation management by land area
* Water use per unit area or unit product
* Pesticide and organic fertilizer use per unit area or unit product
* Biological oxygen demand at sampling sites
* Soil organic matter per unit volume
* Fossil fuel use per unit area or product
* Carbon footprint of product or land area

SDG 2.4.1 Proportion of agricultural area under productive and sustainable agricultureSDG 12.6.1 Number of companies publishing sustainability reportsSDG 12.7.1 Number of countries implementing sustainable public procurement policies and action plans |
| Food waste and loss reduced | * By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses *(aligned with SDG 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses)*
 | Accounting and Reporting Standard (FLW Standard) Reporting at Global Food Loss Index and National Food Loss Index (http://www.fao.org/3/CA2640EN/ca2640en.pdf)SDG 12.3.1 Global food loss index, Food Loss and Waste  |
| Mainstreaming biodiversity in agriculture and fisheries sector | * By 2030, improve progressively, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation – taking into account biodiversity
* Through planning systems, tenurial/use rights; defined role of Indigenous people and local communities; key role of agrobiodiversity, and nature based solutions
 | SDG 2.4.1 Proportion of agricultural area under productive and sustainable agricultureSDG 8.4.1 Material footprint, material footprint per capita, and material footprint per GDPSDG 8.4.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDPSDG 2.4.1 Proportion of agricultural area under productive and sustainable agriculture SDG 14.4.1 Proportion of fish stocks within biologically sustainable levelsSDG 14.6.1 Degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishingAlignment with SDG targets: SDG 2.5; Agrobiodiversity Index (Bioversity Intl.)SDG 11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning[SDG 2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, …]  |
| Governments and businesses account for the full and transparent life cycle of their products.  | * Municipal/National level data aggregation and monitoring using standardized protocols.
* Inclusion of multiple stakeholders, e.g. small-scale farmers and informal markets, in LCA reporting, enhancing transparency.
* LCA and ecological footprints are made freely available to the consumer when buying a product
* Waste management tracked and disclosed at all levels of LCAs
* Reduction of carbon/ water/ biodiversity footprint by XX per kg of crop produced/consumed
 | Proposed:* Reduction of carbon/ water/ biodiversity footprint by XX per kg of crop produced/consumed.
* SDG 6.4.1 has ‘Water-use efficiency’, similar to ‘water footprint’.
* Reduction of waste…mainly follows what is available in the SDGs:

SDG 12.4.1 Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreementSDG 12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatmentSDG 12.3.1 Global Food Waste |
| * Integrate biodiversity into national accounting
 | * By 2026 a system of natural capital accounting is implemented including economic, cultural, social, intrinsic and inter-generational values of biodiversity.
* By 2025 a system of natural capital accounting system is implemented that promotes ecosystem sustainability and resilience, and global environmental benefits.
* Integrate into financial systems to induce behaviour change and in turn ensure ecosystem sustainability, resilience and global environmental benefits.
* Include diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services, standardized methods for valuations with multi-disciplinary assessment.

  | Country implements and reports on System of Environmental-Economic Accounting (SEEA) accounts. However, this looks only at economic aspect of ‘value’ and relates only to ‘state’ decisions not businesses.Number of countries that have integrated biodiversity in National Development Plans, poverty reduction strategies or other key development plansSDG 15.9 by 2020, integrate ecosystems and biodiversity values into national and local planning, development processes and poverty reduction strategies, and accounts. |

(\*) In brackets, SDG indicators/targets that might be counterproductive for biodiversity

In summary, we propose that to achieve zero net conversion of terrestrial, freshwater and marine ecosystems, and fisheries operating within sustainable limits, a number of enabling conditions will be necessary:

* biodiversity values ought to be integrated into national and local development processes, planning, poverty reduction strategies and accounts;
* mainstreaming biodiversity into agriculture/fisheries sector through planning systems, fair user rights distribution, inclusion of indigenous people and local communities, recognizing the role of biodiversity and nature base solutions;
* strengthen transparent country level governance of sustainable production and consumption (as in SDG 12.1.1 to ensure sustainable consumption and production patterns) and through implementation of NBSAP, monitoring, reporting and enforcement mechanisms,
* remove, phase-out or reform harmful incentives
* producers and consumers will need to reduce food waste and food losses;
* promoting use of life cycle assessments (LCA) by diverse stakeholder groups with the aim of reducing the ecological footprint of food production and consumption;
* businesses adopt sustainability standards and certification including at production landscapes;
* consumers adopt sustainable varied diets, including reduced rates of meat consumption.

**Annex 1.** Proposed actions, targets and indicators, from four science-policy for a: IPBES visioning workshop, New Zealand 2017; 4th Science Forum, CBD COP 14, Egypt 2018; Ninth Trondheim Conference on Biodiversity, Trondheim 2019; IUBS 100th General Assembly: Dialogue between science and policy, Oslo 2019.

|  |  |
| --- | --- |
| **Proposed actions/interventions** | **Possible targets/goals and data needs** |
| Zoning and land use planning |  |
| Legal or policy framework for land use or spatial planning. Integrated land-use planning, strategic environmental assessment Recognising the multiple values of biodiversity in the strategies and processes that drive decisions about development; encouraging a landscape matrix that equally supports nature and biodiversity/ systematic spatial planning changes the value system to a "green-attitude" |  |
|  Use Information tools as a basis for setting land use policy that takes account of the needs of multiple agendas while maintaining the essential ecological functions. Eg. China’s ‘ecological civilization’ |  |
| Zoning system includes a strict no-take zone coinciding with ancient sacred areas |  |
| High seas are closed to fishing (Rogers et al. 2014; White and Costello 2014; Sumaila et al. 2015) |  |
| Agriculture |  |
| 10% of buildings’ energy and food needs supplied through GREEN INFRASTRUCTURE (vertical farming, green roofs) |  |
| Promoting sustainable increases in the productivity of existing agricultural land and rangeland |  |
| Governance and responsibility for land management to indigenous and local communities (respected, subject to national legislation and relevant international obligations) |  |
| Ecological restoration in agricultural landscapes |  |
| Increased adoption of good agricultural practices |  |
| Improved targeting and efficiency of fertilizer, pesticide and water use |  |
| Use of diverse and well-adapted crop varieties |  |
| No till techniques |  |
| Promoting public policies and incentives that maintain local varieties of crops and indigenous breeds in production systems |  |
| Organic certification and conservation agriculture  | Certain percentage of organic farming; organic production is x% of total consumption |
| Urban agroecological gardens, vertical food gardens, ‘dry agriculture’ (drought resistance, pest resistance, etc.) and desalinisation (using solar energy) |  |
| High-tech and traditional agrotechnologies are applied to the agro-food system to maximize ecosystem services |  |
| Technological innovations, co-developed with producers, with researchers and industry |  |
| Decentralized networks (farmerfield schools, Trainer-to-Trainer programmes) |  |
| Advisory services for small-scale producers |  |
| Improved access to finance (especially for women) for food production and biodiversity conservation and sustainable use |  |
| Multifunctional/diverse agricultural landscapes |  |
| Increasing levels of food sovereignty and food production in the hands of small farmers |  |
| Inputs from the land are well managed (including cumulative effects and full bans of single-use plastics).  |  |
| Climate smart agriculture |  |
| Sustainable use of varieties of crops and trees, their wild relatives, and breeds of livestock; gene banking |  |
| Agroforestry systems |  |
| Aquaponics production systems |  |
| Pay attention to the relationship between tenurial rights to agriculture and conservation/develop relevant framework to address this lack of effective tenure systems |  |
| Agricultural systems shift to local, cultural, away from massive monocultures  |  |
| Short circuit food provision: e.g., 'la rouche qui dit oui' in France which cuts out the middleman in food production and supply |  |
| Community gardens |  |
| Eating according to the season, locally sourced food |  |
| Industry and trade |  |
| Governments and businesses commit to 500-year strategies (e.g., Weitzman et al. 2001; Sumaila and Walters 2005) |  |
| Innovative trade relations: Countries will need to negotiate the potential decreases in trade in certain exotic types of food |  |
| Conservation and sustainable use in corporate sustainability plans |  |
| Realizing the full potential of emerging sustainability standards and certification |  |
| Incentives to align sector activities with biodiversity conservation and sustainable use |  |
| Moratoria on soya and meat produced on recently-cleared land |  |
| Action to require the industry to exclude deforesters from their supply chains: addressing commodity supply chains to restrict products from illegal or unsustainable sources |  |
| Payments for ecosystem services, biodiversity offsets |  |
| Markets for green products |  |
| Identify thresholds for sectors to stay within sustainable use of biodiversity |  |
| Further development of certification schemes to fill current gaps |  |
| Strengthening the biodiversity component of emerging voluntary sustainability initiatives such as standard-setting and certification within international supply chains |  |
| Strengthening the perspective of buyers and consumers on biodiversity by raising awareness of the impacts of different products, as well as the importance of biodiversity for food security and healthy diets |  |
| Strengthening the perspective of buyers and consumers on biodiversity by raising awareness of the impacts of different products |  |
| Track and tracing systems of environmental and social features of food (self-evaluation of food production management and practices, rather than third party accounting); particularly for value chains involving disjunctions between consumption, production and waste disposal |  |
| CREATE A SYSTEM of transparent life-cycle assessments supporting wise and sustainable consumption and production. Governments and businesses account for the full life cycle of their products |  |
| Diet/consumption |  |
| By 2030 we reduce by 25% the ecological footprint of food production and consumption and reduce by 50% by 2050. Concept of ‘food print’ | Environmental footprint per citizen is --- |
| Twitter, cloud-based applications, QR-codes etc. could provide a more detailed picture for consumers |  |
| Tools to trace individuals’ footprints to influence consumption decisions |  |
| Leveraging the power of consumer choice by emphasizing the health and cost benefits of choices that also benefit biodiversity |  |
| Slow food movement |  |
| Addressing shifts in consumption patterns, including moderate meat consumption, veganism, synthetic meat.Dietary guidelines - credible information on the environmental impact of their food choices  | Reduce meat consumption by X% |
| Engagement of citizens in biodiversity issues to promote its sustainable use |  |
| Public (consumer) awareness programs (environmental, ecological and nutrition consciousness) |  |
| Reduce demand for endangered species consumption/ derived from illegal killing and trade | Illegal trade in threatened species decreased by 80% |
| Eating artificially produced fish protein, food produced from waste products or eating across the food chain |  |
| Regulations (including production protocols) in driving more informed choices |  |
| All plant-based material is produced from 100% sustainable sources |  |
| Monitoring and enforcement |  |
| Set a goal in relation to monitoring, control, enforcement and surveillance systems |  |
| Participatory monitoring, control, enforcement and surveillance systems for a sustainable management of ecosystems and their benefits (e.g., forest and fisheries) |  |
| Gathering more data and establishing harmonized indicators to measure effectiveness and track progress of policies on sustainable consumption and production |  |
| Scientific data and results are publicly available, in a form useable by policy makers, other researchers and society |  |
| Developing the voluntary peer review system already being used at the CBD (under monitoring and enforcement) |  |
| Waste  |  |
| Reducing waste and losses in supply chains  |  |
| Circular economy concept |  |
| Waste streams are managed (bycatch, food waste, life-cycle analysis, et.) |  |
| Sustainable and cheaply produced artificially grown fish protein, as well as manufactured food from waste products (e.g., fish skeletons) |  |
| Investing in marketing and storage infrastructure and low tech solutions to eliminate food waste |  |
| Knowledge  |  |
| Empower IPLC to implement nature-based solutions |  |
| Environmental education at all levels (with teaching on local food diversity, school gardens, with biodiversity and ecosystem services in university textbooks) |  |
| Fishing |  |
| Use of ‘multitrophic aquaculture’ in which seaweed can be produced for human food, fish feed and pharmaceuticals, reducing feed demand and pollution (e.g., eating invasive species, algae, jellyfish). |  |
| Fishing at or within maximum sustainable yield (MSY) |  |
| Community co-management of fisheries |  |
| Enhancing, in each country, monitoring and enforcement of regulations to prevent illegal, unregulated and unreported fishing by flag-vessels  |  |
| Phasing out fishing practices and gear which cause serious adverse impacts to the seafloor or to non-target species |  |
| Giving priority to farming native species, so as to avoid possible to invasions of native habitats by escaped alien species, and species lower down the food chain (e.g. herbivorous fish rather than carnivores). This can be achieved through a combination of regulations and promoting changes in consumer preferences  |  |
| Minimizing pollution by improving management practices, for example by reducing overfeeding |  |
| Using waste from one species to be converted to protein by another species, thereby reducing nutrient pollution |  |
| Guidelines of fisheries and other sectors to become OECMs |  |
| Indigenous and local communities are actively involved in the management and restoration of the coasts (including, for example, participating in community coral gardening). |  |
| Coastal zones are managed sustainably (ban of unsustainable fishing practices). |  |
| Governance that crosses the land-sea interface (e.g., Arctic Council, cumulative effects) |  |
| Collective land-ocean governance vision (e.g., IPBES and other intergovernmental process lead the way to the establishment of an Oceans Council) |  |
| GDP |  |
| Recharacterisation of gross domestic product (GDP) “growth” to ensure it is connected to well-being and nature. Including metrics such as biodiversity, quality of life and natural resource use (metric contrasting natural capital and consumption) e.g., Bhutan happiness index, taxation. Green GDP can be a key tool for measuring progress and guiding decisions around sustainable use.  |  |
| Engineering and technology |  |
| Genetic engineering, ecological engineering, and the construction of green infrastructure are used to produce novel ecosystems that enhance nature’s adaptive capacity while also meeting human needs |  |
| Fewer non-renewable resources, sustainable use of renewable resources. Increasing production intensity to lower footprint |  |
| Fossil fuel and broad lobbyism banned |  |
| Blockchain and similar technologies to improve traceability of commodities and highlight unsustainable trade |  |
| Governance |  |
| Adopting a pragmatic approach focusing on particular products and countries |  |
| Forming an integrated governance system with links to other legal regimes |  |
| Engaging all sectors/mainstreaming biodiversity across them |  |
| Financial |  |
| Biodiversity in climate change funding |  |
| Increased transparency of public budget |  |
| Financial reporting has to be more explicit - the funding flows have to be made transparent. There must be a mechanism to have users contribute to the implementation of the target. Have the users of Natural Resources (Agriculture, Industry) assist in developing the target, so that they have a part in achieving the target. Some sectors are actually showing that they would like to surpass existing targets |  |
| Improved valuation, accounting and reporting of biodiversity and ecosystem services (national accounting systems capturing economic, cultural, social, intergenerational growth). |  |
| Internalizing environmental costs and getting the price right is necessary to reach and maintain sustainable food production systems and consumption. Economists valuing internalised ecological and social features. Pricing the externalities of food production/consumption waste to drive production/consumption systems that maximize quality and accessibility, minimize impact on biodiversity and minimize cost |  |
| Use of positive incentives e.g. subsidies rewarding farming practices that safeguard the environment, for switching to organic agriculture or integrated practices (public money for public goods), subsidies help people in impoverished areas to be able to offer their locally sourced products |  |
| Negative incentives for “non-compliance” with sustainable production requirements  |  |
| Green/ resource use taxation e.g. increasing the price of urea by 10% in IndiaPrices that reflect the scarcity of natural resources as well as the environmental impact of farming can contribute to greater efficiency, polluter pays principle needs to be enforced through charges and regulations; international natural resource consumption taxation system that redistributes funds to a common international funding pool to alleviate poverty, support environmental management, and provide venture capital for sustainable technological innovation.  | Consumption metric, which then transfers monetary wealth from high consumer countries to others, and a considerable budget is also allocated to nature |
| Mobilizing finance by improving the business case for biodiversity and green investments. This requires anchoring natural capital in the reporting of companies, thus influencing the decisions of executives and investors, thus shifting sectoral flows into a direction more beneficial to conservation and sustainable use of biodiversity. Natural Capital accounting and its integration into General Systems of Accounts - Natural capital accounting is key to impact production and consumption patterns that drive land use change. Develop and standardize methods for valuations. Integrate into financial systems in order to induce behavior change to ensure ecosystem sustainability, resilience and global env. benefits |  |
| Removal, phase-out, or reform of harmful incentives (fishing encouraging overcapacity, removing or reforming bio-energy subsidies) | % of GDP that goes to harmful subsidies is less than\_\_\_ |
| Biodiversity-specific requirements to be taken into account by public agencies when applying for funding |  |

1. Produced by Dr. Lily O. Rodríguez (CIMA/IUBS) and Dr. Izabela Delabre, Dr. Joanna Smallwood, Prof. Jorn Scharlemann, Dr. Anthony Alexander, Dr. Alexander Antonarakis, and Dr. Pedram Rowhani (SSRP, University of Sussex). [↑](#footnote-ref-1)
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