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# STRATEGIC SCIENTIFIC AND TECHNICAL ISSUES RELATED TO THE IMPLEMENTATION OF THE STRATEGIC PLAN FOR BIODIVERSITY 2011-2020

# BIODIVERSITY, FOOD SYSTEMS AND AGRICULTURE

## I. INTRODUCTION

1. The Conference of the Parties, in decision XII/1, requested the Subsidiary Body on Scientific, Technical and Technological Advice to review the main implications and findings of the fourth edition of the *Global Biodiversity Outlook* (GBO-4) and its underlying technical reports as well as additional information from fifth national reports (5NRs) and other submissions. The Subsidiary Body was requested to identify, for consideration by the Conference of the Parties at its thirteenth meeting, further opportunities and additional key actions for the achievement of the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, and other actions for the targets where there has been the least progress at the global level (decision XII/1, paragraph 18). In its multi-year programme of work (decision XII/31), the Conference of the Parties decided, inter alia, to consider at its thirteenth meeting the implications of the findings of GBO-4 and strategic actions to enhance national implementation, in particular through mainstreaming and the integration of biodiversity across relevant sectors, including agriculture, forests and fisheries. This document also takes into account a related request by the Conference of the Parties concerning the Executive Secretary and the Food and Agriculture Organization of the United Nations strengthening their collaboration on relevant matters (decision XII/6, paragraph 17).

2. Section II of this document describes the issue regarding food systems and agriculture based on the findings of GBO-4, including the inter-linkages between food systems and agriculture and the other elements of Aichi Biodiversity Target 7 and other relevant targets (and *vice versa*). Section III describes the outcomes required for food systems and agriculture. Section IV provides an overview of relevant tools and guidance to achieve these outcomes. Section V provides an overview of additional relevant information from national reports received since GBO-4 was compiled. Section VI considers some general aspects of what could be the next steps at the thirteenth meeting of the Conference of the Parties.

3. Except where otherwise noted, information or conclusions in this note are derived from GBO-4, including its supporting documents.[1] The Executive Secretary has also made available an information note

* UNEP/CBD/SBSTTA/19/1.

(UNEP/CBD/SBSTTA/19/INF/1) providing a more detailed summary and further discussion of policy scenarios for agriculture, biodiversity and sustainable development. The Food and Agriculture Organization of the United Nations (FAO) has also provided an information note on guidance for the achievement of Aichi Biodiversity Target 7 for food systems and agriculture (UNEP/CBD/SBSTTA/19/INF/4).

4. Throughout this document, unless otherwise stated, "agriculture" includes the production of all agricultural goods (including food, fibres, relevant bioenergy and biomaterials, oils and cosmetics), livestock and, as relevant, agro-forestry.

## II. WHAT IS THE ISSUE? - KEY IMPLICATIONS OF FOOD SYSTEMS AND AGRICULTURE FOR THE STATEGIC PLAN FOR BIODIVERSITY 2011–2020

### A. Context and challenge

5. **Agriculture delivers substantial benefits**, including underpinning food and nutrition security and poverty reduction, and already contributes much to biodiversity conservation. Apart from feeding the current world population, the sector has largely successfully overcome prophesies of widespread famine made in the late 1950's,[2] largely through the so called "green revolution" based on the intensification of production. Agriculture also underpins significant socioeconomic benefits – in particular in developing countries where the sector remains the chief source of livelihood in most rural areas and is widely regarded as a route out of poverty. Examples of how agriculture has also made a significant contribution to the conservation and sustainable use of biodiversity include, for example, the contribution of indigenous peoples and local communities to maintaining agro-biodiversity. The cumulative area under the Conservation Reserves Program[3] of the United States Department of Agriculture, which supports conservation efforts of comparatively large scale farmers, exceeds the total area of National Parks in the country, excluding Alaska, and many Parties have similar programmes. The current expenditure on positive incentive measures for biodiversity through agriculture, although dwarfed in value compared to perverse incentives, is already probably the single largest source of biodiversity financing and by far the largest source of potential financing through switching negative incentives to positive. Because of human activities over millennia, farming systems and landscapes can also support unique biodiversity that cannot be replaced by natural systems. Farming also dominates landscapes in many areas and agro-ecosystems are, therefore, often the main source of ecosystem services (including other than provisioning), and these services can be managed.

6. There is, however, consensus that **this agricultural development has resulted in significant natural resource use, environmental externalities, biodiversity loss and adverse impacts on ecosystem services, and that this trend is no longer sustainable**. Nevertheless, significantly increased production and better quality of food (and other commodities) is required to meet projected demand. Clearly, agriculture must produce a lot more, and with better quality, with more efficient use of resources (including land, water, energy and chemicals).

7. Consumption of food influences demand for produce. This is amply illustrated in GBO-4 by the fact that the trend in meat consumption (meat production having a very high footprint) is the single most

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[1] These are: (1) PBL Netherlands Environmental Assessment Agency. 2014. How Sectors can Contribute to Sustainable Use and Conservation of Biodiversity. Secretariat of the Convention on Biological Diversity, Montreal, Canada. Technical Series No. 79; and (2) Leadley, P.W., Krug, C.B., Alkemade, R., Pereira, H.M., Sumaila U.R., Walpole, M., Marques, A., Newbold, T., Teh, L.S.L, van Kolck, J., Bellard, C., Januchowski-Hartley, S.R. and Mumby, P.J. (2014). Progress towards the Aichi Biodiversity Targets: An Assessment of Biodiversity Trends, Policy Scenarios and Key Actions. Secretariat of the Convention on Biological Diversity, Montreal, Canada. Technical Series No. 78.

[2] Famine has occurred since but generally attributed to socio-political crises, and breakdown in food distribution, rather than an ability of the sector itself to produce food.

[3] http://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index.

influential variable determining projected outcomes for terrestrial biodiversity by 2050. Our food systems are also characterized by high levels of wasted produce and the juxtaposition of needs for better access to food by the poor and problems of over-consumption by the wealthy, including its impact on human health. Overall, there remain significant issues of food quality, including its nutritional value and the presence of chemical contaminants. Hence, "food systems", and not just production, is the topic to be addressed.

### B. General implications of current trends

8. **Under business as usual, the drivers linked to food systems and agriculture account for about 70% and 50% of the projected loss of terrestrial and freshwater biodiversity respectively by 2050.** Land use change through expansion of area devoted to agriculture (cropping and grazing) is the single largest direct cause of biodiversity loss. Today, agriculture is mainly expanding in the tropics, mostly replacing forests, woodlands and natural grasslands, leading to biodiversity loss and further greenhouse gas emissions. Ecosystem degradation and fragmentation and the abstraction of water can also change habitats and the ecosystem services they provide. Water for food production currently accounts for the majority of global water consumption and dominates projected future increases in global water demand. Pollution from pesticides, fertilizers and other agro-chemicals is also an important cause of biodiversity loss, largely through processes associated with agricultural intensification. While farmers over millennia have enhanced the genetic diversity of many crops and livestock, simplification of cropping systems, due to many reasons, is leading to the loss of this diversity, through declining use and habitat loss and simplification, and decreasing diversity of food systems.[4] This compromises the productivity, stability, ecosystem services and resilience of agricultural ecosystems as well as nutrition and health outcomes. At all scales, agriculture responds to demand for products (consumption). Sustainable production and sustainable consumption are two inter-dependent dimensions of sustainable food systems.

9. **The impacts of drivers associated with food systems and agriculture are greater than the projected impacts of climate change on biodiversity by 2050** (at least for terrestrial and freshwater ecosystems)[5] and are probably more easily addressed in the short to medium term. In addition, options to mitigate climate change have significant implications for demands made on agricultural systems, and hence on biodiversity, particularly regarding policies for biofuels expansion.

10. **Future projections for 2050 based on current trends ("business as usual") demonstrate unsustainable outcomes**: increased *demand for fertile land* from agriculture, including bioenergy, result in increased pressure on natural terrestrial habitats and large declines in biodiversity; collapse of *many wild fisheries,* and their replacement by aquaculture, with potential consequent increased pollution and demand for high protein feed and therefore further competition for land; c*limate change leading to biodiversity loss, ecosystem change and disruption of food production systems,* and *increased water scarcity in many regions,* resulting in reduced water flow for vulnerable freshwater ecosystems. At local farm and landscape scales, declines in biodiversity are already undermining agricultural productivity (most notably regarding soil health). At regional scales, c*ombinations of drivers could push some ecosystems beyond tipping points.* For example, the degradation of the Amazonian tropical humid forest (driven to an extent by agricultural expansion) could lead to the collapse of the regional hydrological cycle that supports agricultural production regionally as well as huge losses of biodiversity in forests, not to mention potential impacts on global climate stability.

11. **Agriculture depends on biodiversity in various ways and at multiple scales.** Biodiversity is the source of the c*omponents of production* (crops, livestock, farmed fish, harvested wild biodiversity),

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[4] See Khoury, C.K., Bjorkman, A.D., Dempewolf, H., Ramirez-Villegas, J., Guarino, L., Jarvis, A., Rieseberg, L.H., Struik, P.C. (2014) Increasing homogeneity in global food supplies and the implications for food security. Proc. Natl. Acad. Sci. USA 111, 4001–4006 and Remans, R., Wood, S., Anderman, T.L., Saha, N., DeFries, R. (2014) Measuring nutritional diversity of national food supplies. Global food security. DOI: 10.1016/j.gfs.2014.07.001.

[5] See Figure 21.5 of GBO-4 (page 137, English version) and Figure 4.16 (page 82) of CBD Technical Series No. 78 - *Progress towards the Aichi Biodiversity Targets: An Assessment of Biodiversity Trends, Policy Scenarios and Key Actions*.

and the genetic diversity within these that allows for *adaptation* to current needs and *adaptability* to future ones. A diversity of species, varieties and breeds, as well as wild sources (fish, plants, bush-meat, insects and fungi) underpins dietary diversity and good nutrition. Biodiversity is also essential for *agricultural production systems*, underpinning ecosystem services such as pollination, pest and disease regulation and water and nutrient cycling and these can be substituted for only partially. At the *landscape level and larger continental scales* biodiversity underpins ecosystem services such as soil formation, erosion regulation and water supply upon which agriculture depends.

12. **Biodiversity loss leads to a decline in many ecosystem services threatening to undermine the productivity and sustainability of agriculture, among other negative impacts on human well-being.** Biodiversity loss includes the reduced distribution and abundance of populations of species, species loss (local) and extinctions (global), loss of genetic diversity, and the loss of unique habitats. The loss of species and habitats, and of the interactions among species in ecosystems, can undermine ecosystem functioning and resilience at various scales and lead to a decline in regulating, supporting and cultural ecosystem services, with negative impacts on human well-being including food security, nutrition and health.

13. **Safeguarding and monitoring biodiversity and reversing biodiversity loss is crucial for sustainable food systems and agriculture.** Ecosystem services that are being degraded are often needed to address future challenges in agriculture and other societal goals. However, projections for future agricultural demand and supply based on current models generally do not account for potential negative feedbacks on biodiversity from the loss of biodiversity and ecosystem services.

14. **Increased agricultural efficiency, productivity and sustainability and the conservation of biodiversity are necessary and inter-dependent components of sustainable development.** This is reflected in the current discussion on the United Nations post-2015 sustainable development agenda and the Sustainable Development Goals. Biodiversity underpins the productivity and resilience of agricultural and other ecosystems. Therefore, the increased production and quality of food required to meet future human requirements needs to be pursued in a more efficient way, through the provision of essential ecosystem services, to minimize the negative impacts on biodiversity, food security and human health. This will involve identifying and managing trade-offs and the distribution of costs and benefits of various approaches among stakeholders.

15. **Approaches that are integral to sustainable food systems can simultaneously deliver on multiple sustainable development agendas including food/energy/water/environment security and poverty reduction while remaining within the agreed limits to global warming.** Therefore, this subject also provides a clear intersection between the strategies of multiple multi-lateral environment agreements including CBD, UNFCCC, UNCCD and Ramsar Convention. The strategies for transformational change that are identified in GBO-4 are very much in-line with similar strategies developed through other forums; for example, the IAASTD (2009), the OECD green growth strategy for agriculture, FAO's current approach to sustainability (see later) and Bioversity International's Strategy 2014 - 2024. This is unsurprising since reducing the impacts of agriculture on biodiversity is already implicitly a core objective of these approaches, although not always necessarily referenced as such.

### C. Inter-linkages among the Aichi Biodiversity Targets

16. Food systems and agriculture are relevant to, and have significant implications for, all of the Aichi Biodiversity Targets and in particular the targets that depend on land area and its condition and pollution (Targets 5, 11, 7, 8, 11, 14 and 15). The sustainable agriculture element of Target 7 is key for success of the Strategic Plan for Biodiversity 2011 – 2020 (noting that progress in other targets relate to achieving Target 7). Agriculture accounts for about 60% to 80% [6] of the current world deforestation

[6] CBD Technical Series No. 78 notes 60% while a figure of 80% is given by Boucher, D. et al. (2011) The Root of the Problem: What's Driving Deforestation Today? Union of Concerned Scientists and Kissinger, G. et al. (2012) Drivers of Deforestation and Degradation: A Synthesis Report for REDD+ PolicyMakers. Lexeme Consulting.

(forest element of Target 7). As noted in the United Kingdom case study[7] species and habitat conservation priorities (e.g. Targets 5 and 11) are often outcomes of ecosystem management (e.g. Target 7) rather than inputs to it.

17. One of the actions identified in GBO-4 to enhance progress towards Target 13 refers to integrating the conservation of crop (and livestock) wild relatives into protected area networks (Target 11). The Executive Secretary, in collaboration with the Secretariats of the Commission on Genetic Resources for Food and Agriculture, the International Treaty on Plant Genetic Resources for Food and Agriculture and Bioversity International, has issued notification 2015-092[8] that provides further details on this topic and alerts Parties to relevant needs and opportunities. This also represents a good example, among many, of the convergence of interests between "conservation" (e.g. Target 11) and agriculture (Targets 7 and 13) and how the two interests can strengthen their interaction for their mutual benefit.[9]

18. Agriculture is the main driver of land conversion and degradation, and therefore a dominant factor in most land restoration considerations (Target 15); that is, unless drivers of degradation are addressed, restoration activities will be hampered. Some Parties have noted the need for safeguards in restoration of degraded agricultural land because the abandonment of some farm lands can lead to the loss of unique biodiversity, where farming was required to sustain it, which cannot be replaced by restoration to natural systems (e.g., European Union, United Kingdom 5NRs). The inter-play between agriculture and restoration occurs from local through to global scales. Because agricultural commodities are globally traded, the status of sustainability and productivity of agriculture in one region can affect ecosystem conservation and restoration potential in another.

19. Subsidies and incentives (Target 3), and other ongoing investments, in agriculture represent a major means to mobilise biodiversity related financing (Target 20). This applies to targeted investments in biodiversity conservation within farming systems and to general investments in improved sustainability in food systems and agriculture.[10] Collectively, OECD countries transferred an annual average of USD 601 billion to agricultural producers in the years 2012-14 and they spent an additional USD 135 billion on general services that support the overall functioning of the sector and some large emerging economies have begun to reach the average level of support provided by OECD countries.[11] As a rough comparison, this annual funding alone is approximately one thousand five hundred times the current average annual GEF allocation for biodiversity.[12] However, the reality is that the vast majority of agricultural subsidies go to support conventional agriculture and can be harmful for biodiversity. Possibly the majority of public funding, and almost all investment by the private sector, for agricultural research and development also support conventional agricultural intensification.

20. Food systems and agriculture is the dominant consideration under sustainable production and consumption (Target 4) and the main source of reactive nitrogen and phosphorous pollution (Target 8). Many solutions to address this are based on restoring biodiversity/ecosystem services through ecological intensification (Targets 7 and 14). Agriculture remains a leading source of introductions of invasive alien species (Target 9) that also directly cause reduced efficiency of agricultural production (both crops and

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[7] CBD Technical Series 78.

[8] https://www.cbd.int/doc/notifications/2015/ntf-2015-092-gspc-en.pdf.

[9] See for example the Bridging Agriculture and Conservation Initiative: https://www.cbd.int/doc/notifications/2013/ntf-2013-070-agri-en.pdf.

[10] See Narloch, U. et al. 2013. How to achieve fairness in payments for ecosystem services? Insights from agrobiodiversity conservation auctions. Land Use Policy 35:107-118; Narloch, U. et al 2011. Payments for agrobiodiversity conservation services (PACS) for sustained on-farm utilization of plant and animal genetic resources. *Ecological Economics 70(11): 1837-1845;* Narloch, U. et al. 2011. Payments for agrobiodiversity conservation services (PACS) for sustained on-farm utilization of plant and animal genetic resources. *Ecological Economics 70(11): 1837-1845;* Narloch, U., et al 2011. Cost-effectiveness targeting under multiple conservation goals and equity considerations in the Andes. *Environmental Conservation* 38(4): 417-425.

[11] Agricultural Policy Monitoring and Evaluation: Highlights 2015. OECD Paris. http://www.oecd.org/tad/agricultural-policies/monitoring-evaluation-2015-highlights-july-2015.pdf.

[12] GEF-6 allocations for biodiversity are approximately only 350 million USD per year.

livestock).[13] Chemicals to control invasive alien species in agriculture are a significant cost but also can have negative impacts on agricultural productivity.[14] Eradication or control of priority invasive alien species and applying measures to prevent introduction of these species is already a priority in the agriculture sector.

21. There is strong justification for paying particular attention to the importance of food systems and agriculture in national biodiversity strategies and action plans (NBSAPs; Target 17) and explicit guidance is not captured in decision IX/8, paragraph 8 (referring to NBSAP revision). The example of Brazil (5NR) in promoting and mainstreaming the importance of native biodiversity for sustainable food systems, dietary diversity and improved nutrition as part of its NBSAP revision process is a useful example for other countries. At a global level such initiatives are further supported by the recent endorsement of a set of 'voluntary guidelines for mainstreaming biodiversity into policies, programmes and national and regional plans of action on nutrition'.[15]

## III. WHAT OUTCOMES FOR FOOD SYSTEMS AND AGRICULTURE ARE NEEDED?

22. **Solutions for achieving sustainability exist.** The consensus is that three mutually reinforcing outcomes - ecological intensification of production, improved diversity in farming systems and landscapes and sustainable consumption - are critical for the reshaping of food systems and agriculture towards greater productivity and sustainability. All Parties need to focus on all three outcomes, but specific opportunities vary among them. All three outcomes are prominent on the agendas and actions of a number of national, regional and global forums and organizations. Although there is progress in all these areas, it is at insufficient scale and receives too little government and private sector support.

### A. Ecological intensification of production

23. Ecosystem services provide the key solution at production level to simultaneously deliver improved resource use efficiency, reduced externalities, biodiversity conservation and sustainable use and improved and more sustainable social and economic benefits. For high input intensively farmed systems this involves the rehabilitation of the ecological foundation of farming, including retrofitting landscape diversity, which, overall, can often at least sustain overall production and in some cases increase it even further; for example, GBO-4 cites the rapid uptake of "conservation" or low tillage agriculture in this regard. In areas where there are significant yield gaps, particularly in developing countries, similar principles underpin the now widely promoted approach of "ecological intensification" of crop and livestock production,[16] a knowledge-intensive process that requires optimal management of nature's ecological functions and biodiversity to improve agricultural system performance, efficiency and farmers' livelihoods.

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[13] Examples of negative impact on agricultural production are : US$ 17.7 billion in Brazil http://ainfo.cnptia.embrapa.br/digital/bitstream/item/119854/1/oliveira2014.pdf ; US$1.9 million in Kenya, US$ 1.5 million in South Africa with trade banning of import from these countries for a single pest species http://www.academicjournals.org/journal/AJAR/article-full-text/1257CFB51903#ECONOMIC LOSSES AND IMPACT OF FRUIT FLIES; For pests and disease see https://www.bioversityinternational.org/research-portfolio/agricultural-ecosystems/pests-and-diseases/.

[14] The major economic and environmental losses due to the application of pesticides in the USA were: public health, $1.1 billion year; pesticide resistance in pests, $1.5 billion; crop losses caused by pesticides, $1.4 billion; bird losses due to pesticides, $2.2 billion; and groundwater contamination, $2.0 billion. Pimentel D Environment, Development and Sustainability (2005) 7: 229–252.

[15] See, http://www.fao.org/3/a-mm464e.pdf.

[16] For example, FAO's *Save and Grow*: http://www.fao.org/ag/save-and-grow/ ; https://www.bioversityinternational.org/fileadmin/user_upload/research/BVIs/BVI_B_-_Productive_and_resilient_farms_and_forests/Productive_resilient_farms_forests_factsheet.pdf; and, http://www.fao.org/agriculture/crops/thematic-sitemap/theme/biodiversity/ecological-intensification/en.

24. Whereas "sustainable intensification" is generally loosely defined, ecological intensification proposes landscape approaches[17] that make smart use of the natural functionalities that ecosystems offer. Landscape approaches emphasize adaptive management, stakeholder involvement and multiple objectives.

### B. Biodiversity maintained in production landscapes

25. Production landscapes need to have (or maintain) a richer mix of species, habitats and landscape diversity. Biodiversity in agricultural landscapes is necessary for the sustainability of agriculture itself, to ensure that intensification does not lead to unsustainable increases in inputs, and also as a significant supplement to other conservation efforts focussing on protecting natural habitats. Maintained diversity of genetic resources for food and agriculture in farming systems and landscapes is an integral outcome of these approaches. Improving resilience of agriculture, and landscapes, is an important benefit of maintaining or restoring this biodiversity. Greater productivity, greater carbon sequestration, greater retention of nutrients, and greater ability to resist and recover from various forms of stress, including herbivorous pests, diseases, droughts, and floods, are among the effects of increased biological diversity in agricultural systems noted in a recent review.[18] A recent study of highly simplified and intensive mono-cropping systems demonstrates that landscape diversification not only delivers biodiversity benefits but also improved water, nutrient and soil management as well as simultaneously increasing crop production.[19]

### C. Sustainable consumption – reduced food waste and sustainable diets

26. Achieving sustainable consumption moderates increasing pressures on production systems to meet rising demand. In the region of 40% of current food production is wasted through losses post-production. That is, in theory, roughly 30% of the projected loss of terrestrial biodiversity by 2050 which can be avoided just by eliminating food waste, at the same time also meeting much of the future increased demand for food. Food waste reduced to sustainable limits is therefore a priority outcome to reduce biodiversity loss and it is important to embed this in biodiversity strategies. However, the challenges to reducing waste vary significantly between country groupings and socioeconomic classes and depend on the specific conditions and local situation in a given country or culture. Few poor people deliberately waste food and in developing countries major losses arise through poor infrastructure throughout the supply chain. In developed countries, infrastructure related losses tend to be lower and most waste occurs at the level of retailers and consumers.

27. Ecological intensification approaches can also significantly reduce pre-harvest food losses while reducing the need for damaging external inputs as demonstrated by ongoing work in China, Ecuador, Morocco and Uganda to determine how planting different varieties of the same crop in mixtures, can reduce pest and disease damage.[20]

28. Although achieving sustainable diets may be particularly challenging, as it requires significant consumer behavioural change, it also has the potential to be particularly effective. Significant allies in this area are public health interests because unsustainable diets, characterized by low diversity of foods with high proportions of meat and processed foods, are also unhealthy and projected impacts on national public health expenditures in treating impacts are huge, running into trillions of dollars.[21] Ways and means to

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[17] Ten principles for a landscape approach to reconciling agriculture, conservation and other competing land uses http://www.pnas.org/content/110/21/8349

[18] Cardinale BJ, Duffy JE, Gonzalez A, Hooper DU, Perrings C, et al. 2012. Biodiversity loss and its impact on humanity. *Nature*. doi: 10.1038/nature11148.

[19] Liebman, M, Schulte, L. A. 2015. Enhancing agroecosystem performance and resilience through increased diversification of landscapes and cropping systems. Elementa: Science of the Anthropocene. 3: 000041. doi: 10.12952/journal.elementa.000041. elementascience.org

[20] http://www.bioversityinternational.org/research-portfolio/agricultural-ecosystems/pests-and-diseases/

[21] See *Connecting global priorities: Biodiversity and Human Health – A state of Knowledge Review.* Secretariat of the CBD and WHO. 2015. https://www.cbd.int/health/SOK-biodiversity-en.pdf

achieve sustainable diets primarily involve influencing supply chains and consumer choice, including through promoting traditional local, or national, food cultures that are often more sustainable and healthy.

29. Reducing excess (waste) agricultural inputs (e.g. water, fertilisers, chemicals) involves improving resource use efficiency and is very much part of the ecological intensification approach captured in sub-section A above.

## IV. WHAT TOOLS ARE NEEDED?

30. Tools and guidance are required across many relevant areas. Enabling tools are at the centre of the process of transition towards improved sustainability and include: guidance, standards, regulations, institutional rules and frameworks, and incentives needed to help producers move towards sustainable practices. The tools used must be adjusted based on the accumulating evidence and on the consensus reached through dialogue. There are extensive tools and guidance already available particularly through partners actively working in this area, including: especially for promoting sustainability in agricultural production; addressing behavioural change in supply chains including food processing and trading, retail and food service companies and by consumers; and, reducing post-harvest losses and food waste. GBO-4 itself does not highlight any significant gaps. The FAO has provided an information note on guidelines for implementation of Aichi Biodiversity Target 7 for food systems and agriculture (UNEP/CBD/SBSTTA/19/INF/4), an overview of its work regarding the Strategic Plan for Biodiversity 2011–2020,[22] an extensive list of its available tools and guidance to support its work on sustainability[23] and a list of its relevant publications.[24] Bioversity International's Strategic Plan 2014-2024 and supporting initiatives also make available significant resources, decision-making tools and guidance that address many relevant aspects, as does the Platform for Agrobiodiversity Research.

31. Land use planning is one of the most relevant tools at the landscape scale. Most Parties have been using land use planning tools for a considerable period of time, often for millennia, and in practice it can be very challenging, especially where capacity is weak (as mention for example in Ethiopia's 5NR), due to conflicting demands on land. Building a consensus or vision for objectives and addressing trade-offs and incentives among stakeholders, as part of an inclusive and participatory land-use planning process, have been central to most examples of successful implementation.

32. There are four broad categories of stakeholders where behavioural change is required – producers, consumers, and the private and public sectors. Given an appropriate enabling environment, *producers* can manage the immediate direct impacts of agriculture and, therefore, behavioural change by producers is a key outcome for transforming agriculture. A key tool should therefore be the identification, and removal, of constraints to positive behavioural change by producers. Approaches need to identify where the economic costs are incurred, and by whom, and explore opportunities to transfer expenditures on dealing with the costs at end point to reducing the problem at source (that is, internalizing external costs). Payments for ecosystem services can be an effective tool but is not applied widely enough. There are now emerging examples of such incentive mechanisms being applied to agrobiodiversity, with strong government uptake in Peru and pilot project implementation in Ecuador and Guatemala.[25] There are many examples of rapid uptake of improved practice, often led by farmers themselves, usually prompted by the reinforcing links between improved sustainability and farm profitability. *Consumers* create the demand for agricultural products. There may be additional opportunities for leveraging the power of consumer choice by emphasizing the food security, health, biodiversity, cost and sustainability benefits of choices consumers make. However, the challenges in creating the level of behavioural change needed should not be underestimated. *The private sector* will be instrumental in contributing to behavioural change in production and consumption patterns and waste reduction. Major food marketing chains in particular can

[22] https://www.cbd.int/financial/idb2015/fao-cbdtargets.docx

[23] https://www.cbd.int/financial/idb2015/fao-foodagro.docx

[24] https://www.cbd.int/financial/idb2015/fao-publications.docx

[25] https://www.bioversityinternational.org/news/detail/incentives-to-conserve-agricultural-biodiversity-peru-at-the-forefront.

be very influential as they are few in number compared to producers and consumers. The main barriers regarding the agricultural input industry are the conflicts of interest between seed, pesticide, fertilizer and machinery producing and marketing companies and biodiversity objectives. From an economics perspective, these arise where private and public costs/benefits are not aligned. *The public sector* remains indispensable in creating an enabling environment through an appropriate mix of regulations and incentives. Many policy and non-policy tools are in the hand of Governments and can contribute to improvement of the enabling conditions for sustainable food systems and agriculture. These may relate to incentive measures such as better targeting of subsidies, abolishment of distorting subsidies and import tariffs[26] and investments in research and knowledge infrastructure and capacity building. Ill-defined or non-existent land tenure rights remain a significant barrier to investments in sustainability by many farmers in some countries.

33. Engagement with the private sector is an important tool for funding biodiversity outcomes. Corporate social responsibility programmes and the increasing recognition that business sustainability depends on a range of biodiversity-relevant ecosystem services means that at least some business models have reduced conflicts between profitability and biodiversity conservation; for example, a protocol has been developed and applied on a pilot basis in Bolivia for identifying and mapping potential private/public sector agrobiodiversity-related ecosystem service beneficiaries and purchasers.[27] Public sector entities (such as municipalities, as well as public food purchase and distribution programmes) can also be usefully mapped using this approach. Public food programmes could be better oriented towards creating sustainable demand for food products that come from biodiversity-rich production systems. Further, the growing concerns of consumers about food production approaches and the demand for environmentally friendly approaches that provide adequate rewards for rural communities and safe food provide important entry points for exploring the contributions that biodiversity can make to these wider social goals.[28]

34. Agricultural commodities – and in particular palm oil, sugar, soy, rice, wheat and meat – are key components of the national development plans of many developing countries. These are among the fastest growing commodities in the market. Governments are concerned with both supporting commodity production and reducing deforestation. Deforestation in some regions (for example South-East Asia) is mainly attributed to large-scale agro-industry, especially oil palm plantations, while in most developing countries increased demand for land for local food production continues to be a major driver of habitat loss. There is significant progress in using sustainability criteria and standards and certification schemes through supply chains for some major commodities, including with regards to biodiversity, notably for soy, palm oil and biofuels,[29] although these still do not cover the majority of production in each commodity. These provide a useful model for application to a broader set of commodities and supply chains.

35. Globalization, trade and displacement effects remain weakly covered in strategies. Progress in improved sustainability at national level can be offset (globally) through increasing external footprints arising through increasing reliance on imported commodities: for example, the increasing dependency of

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[26] Modalities for the full operationalisation of Aichi Biodiversity Target 3 (incentives and subsidies) were considered further at SBSTTA-18 and by the fifth meeting of the Working Group on Review of Implementation (documents UNEP/CBD/SBSTTA/18/11 and UNPE/CBD/WGRI/5/4/Add.1).

[27] Martinez-de La Cruz, D, Drucker, A.G, Cadima, X., Neves, B. and Gatto, P. 2015. Assessing public and private sector current and potential involvement in the conservation and use of agrobiodiversity: A Bolivian Case Study. Bioversity International.

[28] See Chapter 5 Agricultural biodiversity, food security and human health: *Connecting global priorities: Biodiversity and Human Health – A state of Knowledge Review.* Secretariat of the CBD and WHO. 2015 https://www.cbd.int/en/health/stateofknowledge.

[29] Roundtable on sustainable biomaterials: http://rsb.org; the Global Bioenergy Partnership http://www.globalbioenergy.org; the Round Table for Sustainable Soy http://www.responsiblesoy.org/en/; Roundtable for Sustainable Palm Oil http://www.rspo.org/about; European Food Sustainable Consumption and Production Roundtable: http://www.food-scp.eu; Progress in this regard for biofuels was considered at SBSTTA-16 leading to recommendation XVI/13, and background information provided for this is summarized in CBT Technical Series 65: https://www.cbd.int/doc/publications/cbd-ts-65-en.pdf.

domestic livestock production on imported feedstock (notably Soy) in some countries. Attention to sustainability measures in supply chains for major commodities will go some way to addressing this problem.

36. One major barrier is the very large number of actors that need to be working collectively towards a common goal in order to achieve the required level of success. Effective approaches will require the engagement of all stakeholders. Tools to alleviate this problem include awareness raising, consensus building across stakeholders and effective participation and dialogue in policy development.

37. A significant barrier is the ongoing debate regarding the appropriate agriculture "paradigm": for example, high input/low diversity/industrial scale "western" agriculture *versus* high diversity, low input, smaller-scale farming systems ("traditional" farming) and related debates about "land sparing" *versus* "land sharing" approaches.[30] This debate, however, is often over-simplified involving unrealistic assumptions, ignoring the realities of indigenous peoples and local communities, and which all too often overlooks the contribution of biodiversity to food, nutrition, ecosystem functions and resilience.[31] Nevertheless, developing and applying common criteria for sustainability, including utilising enhanced ecosystem services to achieve it, no matter what the scale or mode of production, can help reduce polarised discussion. Agriculture needs to be allowed to develop under country appropriate policy frameworks. In particular, in most developing countries there is a high dependency of populations on small-scale farming and, from both socioeconomic and biodiversity conservation perspectives, attention needs to be on the poverty reduction benefits of sustainable increases in smallholder productivity. Imposing western "modern" style high input approaches to agricultural intensification in these systems is neither sustainable nor appropriate. Nevertheless, despite the environmental and social costs of the "western" farming model being well established, its widespread promotion, and support via damaging subsidies and incentives, as the solution for developing countries, often driven by corporate interests, remains a very significant barrier to uptake of country appropriate strategies.

38. Lack of consensus on definitions of sustainable agriculture is a further barrier identifiable from 5NRs. For example, Sweden (5NR), despite reported success in mainstreaming across the sectors, notes that the concept of sustainable use has not been given an operational definition within the sectors: it is still not clear what specific action is needed to achieve sustainability, or how it is measured and monitored. It is also common for sustainability to be defined within sectors but not across them. However, the FAO Council in 1988 usefully defined sustainable agricultural development more broadly as *"the management and conservation of the natural resource base, and the orientation of technological change in such a manner as to ensure the attainment of continued satisfaction of human needs for present and future generations. Sustainable agriculture conserves land, water, and plant and animal genetic resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable"*. This definition provides a useful tool by capturing not only the end point (satisfaction of human needs) but also the means to achieve it (conservation of resources, non-degrading etc.). In practice the end point of "sustainability" in food systems and agriculture is probably difficult, if not impossible, to define – but an operational approach is to identify whether development pathways are leading towards or away from sustainability. Further guidance on operational criteria, indicators and monitoring for this might be useful.

39. Efforts to increase diet quality and sustainability should focus on increasing the production and consumption of unrefined (raw or minimally processed) nutrient-rich foods such as fruits, vegetables, beans, nuts and seeds. Nutrition-sensitive landscape approaches which focus on building diversity into landscapes and food systems to improve food diversity at the production level, and multiple sources of nutrients as well as vital ecosystem services, are tools to influence supply chains, as are nutrition-sensitive value chains, to increase access to, affordability of, and demand for nutritious foods sourced from

[30] See for example: Phalan, B., Onial, M., Balmford, A. & Green, R.E. (2011). Reconciling Food Production and Biodiversity Conservation: Land Sharing and Land Sparing Compared. *Science* 333, 1289-1291.

[31] See Land Sparing and Land Sharing: Perspectives of Indigenous Peoples and Rural Communities. Platform for Agrobiodiversity Research http://agrobiodiversityplatform.org/files/2013/11/PAR-Land-sparingsharing1.pdf.

sustainable production and food systems.[32] Many of these food resources can also be promoted within a local food system context where traditional fruits, vegetables, legumes, nuts and seeds are adapted to the local climatic conditions and are also culturally appropriate to local populations. Utilizing a combination of push-pull or supply-demand tools to increase production and consumption of local nutrient-rich foods has proven effective in numerous contexts.[33] Many country examples and case studies promoting traditional local, or national, food cultures that are often more sustainable and healthy have been documented.[34]

40. Realigning investment (including realigning subsidies) to support sustainable agriculture and enhance biodiversity values in agricultural landscapes is the major tool to increase financial resources for effectively implementing the Strategic Plan for Biodiversity 2011–2020 (with regard to terrestrial and freshwater ecosystems). Modalities for the full operationalization of Aichi Biodiversity Target 3 were considered at SBSTTA-18 (document UNEP/CBD/SBSTTA/18/11).

41. An important tool is strengthening the mainstreaming of agriculture into the biodiversity community. There are identifiable needs, for example: gaps in coverage of GBO-4 (and many 5NRs) regarding agriculture in targets 2, 5, 14 and 15; and, the limited or lack of attention to food systems in many 5NRs. Biofuels is the only relevant area given prominent attention at the more recent meetings of the Conference of the Parties to the CBD, and at SBSTTA, creating the opportunity to address possible imbalances in attention to food systems leading up to COP-13. Mainstreaming biodiversity in food systems and agriculture requires biodiversity specialists to better recognize the importance of doing so and to better understand the challenges, approaches, policy tools and terminology of the food and agriculture sectors in order to identify the most effective intervention points to support the biodiversity agenda in this domain.

42. The Strategic Plan for Biodiversity 2011–2020 (and Aichi Biodiversity Targets) is one of the most significant and influential tools – and in particular for engaging through a common platform on biodiversity across a broad spectrum of stakeholders. The Aichi Biodiversity Targets already cover the main aspects of food systems and agriculture, including relevant drivers, desired outcomes, and responses, and, collectively, they provide the required cross-sectoral and holistic approach. For this tool to be more effectively used there needs to be much stronger recognition of the inter-dependency between it and food systems and agriculture.

43. A recent evaluation notes that resilience to climate change is a significant gap in agricultural policies, recommending that an over-arching aim of policy makers should be to "future-proof" the sector, to help it face multiple challenges.[35] The modelling underpinning GBO-4 did not factor in the implications of climate change for natural resource requirements for agriculture. Integrating resilience into food and agriculture and enabling agriculture to contribute optimally to climate change mitigation and adaptation are key components of sustainability. Some practical tools and guidance are already available on the topic.[36] The Scientific and Technical Advisory Panel of the GEF has also commissioned work on a resilience, adaptation and transformation framework that seeks to develop a tool to move the topic from

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[32] Nutrition-sensitive landscapes http://www.bioversityinternational.org/research-portfolio/diet-diversity/nutrition-sensitive-landscapes/ and Nutrition-sensitive value chains http://www.ifpri.org/blog/identifying-opportunities-nutrition-sensitive-value-chain-interventions.

[33] See, Diversifying Food and Diets (2013) http://www.bioversityinternational.org/e-library/publications/detail/diversifying-food-and-diets/ and FAO, 2011 Combating micronutrient deficiencies: Food-based approaches http://www.fao.org/docrep/013/am027e/am027e.pdf.

[34] http://www.b4fn.org/case-studies/african-leafy-vegetables-alvs/.

[35] Agricultural Policy Monitoring and Evaluation: Highlights 2015. OECD Paris. http://www.oecd.org/tad/agricultural-policies/monitoring-evaluation-2015-highlights-july-2015.pdf.

[36] For example: FAO-Adapt www.fao.org/docrep/014/i2316e/i2316e00.pdf ; Climate-Smart Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation www.fao.org/docrep/013/i1881e/i1881e00.htm ; Climate-Smart Agriculture (CSA) sourcebook www.fao.org/docrep/018/i3325e/i3325e.pdf; Developing a Climate-Smart Agriculture at the country level lessons from recent experience: www.fao.org/docrep/016/ap401e/ap401e.pdf.

theory to practice.[37] The CGIAR Research Programme on Climate Change, Agriculture and Food Security (CCAFS) also has a major focus on embedding resilience into food and agriculture and facilitating agriculture to contribute to climate change mitigation and adaptation and provides considerable enabling policy guidance on this.[38] CCAFS and the Platform for Agrobiodiversity Research (PAR) recently collaborated with the FAO Commission on Genetic Resources for Food and Agriculture to develop the *Voluntary Guidelines to Support the Integration of Genetic Diversity into National Climate Change Adaptation Planning*[39] which was endorsed by the Commission which invited the CGRFA Secretary to transmit those *Guidelines* to UNFCCC and other relevant international bodies.[40] One very good tool to promote climate-smart agricultural practices is to include them in the National Adaptation Plans that countries are developing under UNFCCC and guidance on how to do so is available,[41] as is guidance on the role and importance of genetic resources and agricultural biodiversity in coping with climate change.[42]

44. Knowledge regarding policy coherence and alignment beyond the agriculture and biodiversity sectors is a major gap. Also, significant knowledge gaps in relation to the optimum use and deployment of agricultural biodiversity in production systems remain (as mentioned in some 5NRs e.g. Turkey). The ways in which agricultural biodiversity can improve ecosystem-regulating and-supporting services is still poorly understood in terms of how to achieve real benefits in different production systems. This will involve a substantial programme of integrated trans-disciplinary research, which fully involves producers, and links the production of improved crop and livestock materials to the adoption of agronomic practices that support biological functions in production systems.

## V. ADDITIONAL INFORMATION FROM FIFTH NATIONAL REPORTS

### A. Status of agricultural impacts on biodiversity

45. Agricultural development in general was highlighted as one of the major causes of loss of biodiversity in most 5NRs. Recent trends in agricultural development such as agricultural expansion, changing from manual to mechanized farming, the shift from traditional mixed cropping systems to monoculture, changing from organic (non-chemical) to chemical inorganic fertilizers, and shifting cultivation with shorter fallow periods are the major causes of loss of agricultural biodiversity and impacts on ecosystems. For example: In Zimbabwe, one of the major causes of forest biodiversity loss includes agricultural expansion and the resulting land use change; Zambia reported that high human population growth has increased the demand for land for human settlements and farming which puts undue pressures on wildlife habitat within the country; in Moldova, the main activities that caused considerable pressure on natural habitats include the undermining of biodiversity through expansion of agricultural lands, destruction of the hedges, borders, grassy strips between land sectors, and excessive use of mineral fertilizers and pesticides in agriculture; Mexico reported no significant advances in terms of agriculture specifically when compared against Target 7, where agriculture is focused on the production of profitable produce with insufficient attention to agro-biodiversity or the state of ecosystems,

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[37] O'Connell, D., Walker, B., Abel, N., Grigg, N. (2015) The Resilience, Adaptation and Transformation Assessment Framework: From Theory to Application. CSIRO, Australia. http://www.stapgef.org/the-resilience-adaptation-and-transformation-assessment-framework/.

[38] https://ccafs.cgiar.org/.

[39] Voluntary Guidelines to Support the Integration of Genetic Diversity into National Climate Change Adaptation Planning. In: Report of the Fifteenth Regular Session of the Commission on Genetic Resources for Food and Agriculture. Appendix D. http://www.fao.org/3/a-mm660e.pdf.

[40] http://agrobiodiversityplatform.org/par/2015/01/20/cgrfa-15-regular-session-updates/; https://ccafs.cgiar.org/publications/agricultural-biodiversity-climate-change-adaptation-planning-analysis-national#.VbuHOfn5U3l.

[41] http://www.bioversityinternational.org/news/detail/promoting-genetic-diversity-in-agriculture-through-national-adaptation-plans/.

[42] http://www.fao.org/publications/card/en/c/0099d145-f240-4e61-b30e-3d210972ceb8/ and http://agrobiodiversityplatform.org/blog/wp-content/uploads/2010/05/PAR-Synthesis_low_FINAL.pdf.

agricultural areas are increasing (mainly at the expense of forests), and there is little or no information on the use of agrochemicals and its impact on biodiversity.

### B. Holistic policy frameworks that incorporate a land-use perspective

46. About 60% of 5NRs recognize the value of, or need to incorporate, a broader landscape perspective but less than half of these report progress in incorporating this into a land use policy framework. A number of Parties (5NRs) recognize the need for a synergistic and dynamic biodiversity coordination mechanism and process (e.g., Mauritius, Turkey). The absence of an umbrella policy mechanism to coordinate cross-sectoral needs remains a significant constraint in many countries: for example, Georgia (5NR) notes there is no strategy for sustainable development, which would be an essential tool for environmental policy integration.

47. Brazil (already cited in GBO-4 and its 5NR) remains the most widely cited example in the literature of effective landscape scale, cross-sectoral policy reform. The broader principles of the approach would be applicable to many other Parties but the specifics may not necessarily be easily transferred to Parties with different capacity, environment and socioeconomic settings (in particular high population density, food deficient, low-income countries with rapid population growth). In addition to Brazil, more comprehensively reported examples of mainstreaming biodiversity in land use planning include South Africa (5NR and [43] ) where an assessment concluded that conservation of just 75% of plant diversity was not achievable through a formal protected area approach and that targets could only be met by integrating conservation efforts into production areas. The South Africa approach has three essential elements: (i) working beyond the boundaries of protected areas; (ii) focusing conservation efforts on biodiversity priority areas within the landscape; and (iii) using a range of tools in these priority areas to expand protected areas, mainstream biodiversity priorities in land-use planning and decision-making, and engage with production sectors to encourage biodiversity-compatible production practices. Implementation is supported by: national biodiversity policy and planning tools; tools for mainstreaming in land-use planning and decision-making; tools for biodiversity stewardship; tools for working in production landscapes; environmental public works programmes; and, creating partnerships for implementation.

48. In Micronesia, the conservation and sustainable use of agro-biodiversity contributes to the nation's development and the future food security. This theme represents another area in which considerable progress has been made since the 4th national report. Throughout the state, natural resource management agencies and NGOs are supporting food security programming in accordance with climate change adaptation and mitigation strategies and to promote increased agro-biodiversity. In Malaysia, a policy document titled 'A Common Vision on Biodiversity' serves as a guiding tool for planners, decision makers and practitioners at all level of governments with respect to biodiversity planning and management. It largely constitutes a three-pronged implementation approach that consists of: (i) Strengthening the Protected Areas System; (ii) Land/Seascape Management for Biodiversity; and (iii) The Mainstreaming of Biodiversity. In Morocco, The Green Morocco Plan is articulated around a comprehensive approach that covers all agriculture industry players. It is based on two major pillars: modern agriculture and agriculture solidarity and is a strategy to drive and reform the agricultural sector, promote the integration of agriculture into international markets and help agriculture achieve sustainable growth.

49. Belize's National Food and Agriculture Policy (2002–2020) seeks to achieve a transformed/modern sector that is fully competitive, diversified and sustainable, although Belize also reports delayed implementation of an integrated land use planning framework as a tool to guide national planning (the framework recognises that the management and protection of the integrity of natural resources and the natural environment in general is essential for the long-term, sustainable utilization of land). In Guyana, the National Land Use Plan was developed in 2013 and provides support to decision

making through looking at development options and constraints throughout the country. It was compiled by assessing current land use, potential, constraints and stakeholders' concerns. It provides a strategic framework to guide land development in Guyana. As such, the National Land Use Plan is built upon a number of national policies and strategies that have a direct relevance for land use and land management. The Guyana National Land Use Plan seeks to enable financial resources to be targeted at optimal land uses at the regional level and to provide a spatial element to development planning. In China, the National Master Plan for Land Use (2006-2020) issued by the State Council stressed the guiding principle of coordinating land use for production, livelihood and ecology conservation by giving priority to nature and ecology conservation. Chapter V of this plan clearly requires that land essential for ecology should be protected and greater efforts will be put into ecological and environmental improvements with land ecology improved based on local conditions. In Ethiopia, The Climate Resilient Green Economy Strategy has taken into account agricultural and land use efficiency measures to protect and re-establish forests for their economic and ecosystem services. The strategy is based on four pillars, which include, among others: improving crop and livestock production practices to increase food yields, hence food security and farmer income, while reducing emissions. In Iran, "The Central Zagros Mountains' Conservation & Sustainable Development" plan will be developed for mainstreaming of conservation of biodiversity and sustainable use with activities done in various fields, particularly in: agriculture, forestry, rangeland, water, infrastructure development and tourism. The main principles of the Ukraine National Ecological Policy to 2020 include preventing loss of biological and landscape diversity and ensuring environmentally sustainable natural resource management – supported by the National Environment Protection Action Plan – and harmonization of Ukrainian environment protection legislation in accordance with the requirements of the European Union Directives by 2020.

50. Although a majority of Parties do not explicitly refer to well developed, relevant, holistic and integrated landscape approaches a suite of measures may nevertheless be in place, or being developed, as is the case, for example, in some individual European Party 5NRs. The suite of policies in place in the European Union, collectively, cover a broad attempt at an integrated policy agenda – although some European Parties (5NRs) note the need for further reform, particularly with regard to the Common Agriculture Policy.

### C. Policy measures for sustainable productivity gains

51. About half of Parties report on policy measures that support sustainable productivity gains in agriculture and many refer to projects doing the same. However, few report on progress being achieved. The UK Government's Foresight Global Food and Farming project commissioned assessments of 40 projects and programmes in 20 countries where sustainable intensification was developed during the 1990s-2000s and included a comprehensive analysis of initiatives that addressed crop improvement, soil conservation, conservation agriculture, agroforestry, IPM, horticulture, livestock and fodder crops, aquaculture and novel enabling environments. It was concluded that by early 2010 the projects in question had demonstrated benefits for almost 10.4 million farmers and their families and improvements on about 12.75 million hectares.

52. Ecuador is setting forth a National Strategy to change their production matrix implying a switch from an extractive pattern of primary export, to one that privileges diversified, eco-friendly production with more added value, where services are based on the economy of knowledge and biodiversity. In Mozambique, The Strategic Plan for Agriculture Sector Development (2010-2019) recognizes the impact of agriculture on biodiversity and draws some actions to reduce this impact. In Georgia, the preservation of biodiversity is one of the main directions of the "Rural - Agricultural Development Strategy for the years 2015-2020". Brazil highlighted The Low Carbon Agriculture launched in 2010 and initiated in 2011 as part of the Brazilian commitments to reduce carbon emissions in agriculture that provides incentives for the adoption of more sustainable and low emission practices by agriculture and livestock producers, such as recovery of degraded pasture land, and crop, livestock and forestry integrated systems, among others. Uzbekistan reports a GEF/UNEP project "Conservation and sustainable use of agricultural biodiversity to improve regulating and supporting ecosystem services in agriculture production in Uzbekistan (2014-2015)". The goal of the project is to mainstream the conservation and use of fruit trees

for the improvement of regulatory functions of ecosystems and improvement of sustainability of traditional agricultural production systems under conditions of low water level.

### D. Supply chains and certification schemes

53. A number of Parties report that supply chain considerations, and in particular the setting of standards and certification by countries that import their produce, is providing significant impetus for the adoption of sustainability approaches at national level.

54. In Chile, the fruit agricultural sector plays a major role in the agricultural supply chain. They have established APLs (Clean Production Accords) in this industry. They have specifically sought to diminish the lethal effects this industry has on bees, therefore they introduced a plan called "Sustainable Pollination" whose objective is to introduce good agricultural practices that allow the necessary equilibrium between phytosanitary security and protection for the biological pollinizing agents.

55. The Belize shrimp farming industry is now promoting environmental certification under the Aquaculture Stewardship Council. Belize will be first country where 75% of shrimp farms are certified, and the first in the world to achieve certification. Additionally, the sugar cane industry has been certified under Fair-trade certification and needs to maintain its environmental compliance to keep its market. However, many leaders in the agricultural sector consider the certification requirements to be too demanding, and would like an opportunity to negotiate to customize some areas for realistic implementation and targets for the Belize context.

56. Costa Rica recognized that the production of pineapple, rice, palm oil and sugar cane are major threats to biodiversity. They have set forth regulations in the case of pineapple and rice productions, including the creation of an Action Plan for the responsible production and commerce of pineapple in Costa Rica 2013-2017. For the rice production, they have a project called "Reducing the impacts of rice in and around the Terraba-Sierpe wetlands to protect communities and critical ecosystems in Costa Rica".

57. The Indonesian Government launched the Indonesian Sustainable Palm Oil (ISPO) standard designed to ensure that all Indonesian oil palm growers conform to environmental sustainability principles.

58. In Malaysia, The Malaysian Good Agricultural Practices (MyGAP) initiative was launched in 2013. It is essentially a rebranding and consolidation exercise of three schemes namely the Malaysian Farm Certification Scheme for Good Agricultural Practices, the Livestock Farm Practices Scheme and the Malaysian Aquaculture Farm Certification Scheme. It is a comprehensive certification scheme for agricultural, aquaculture and livestock sectors that are implemented based on the Malaysian Standard (MS).

59. Brazil has provided a good case study of supply-chain solutions for zero-deforestation from cattle.[44]

### E. Sustainable consumption

60. No Parties report on efforts to reduce food waste. The reporting on waste, where present, revolves around domestic non-food waste, solid waste and wastewater. This does not necessarily mean that efforts are not underway among Parties to reduce food waste but does illustrate that the relevance of such measures for the Strategic Plan for Biodiversity 2011–2020 may not be fully recognized.

61. Although about half of 5NRs refer to efforts towards "sustainable consumption" very few explicitly refer to sustainable diets. There are exceptions: for example, Brazil's 5NR contains an extensive section on this, and related, areas including how the National Plan on Agro-ecology and Organic Production, the Minimum Price Policy for Sociobiodiversity-based Products, the federal Food Acquisition

[44] file:///Volumes/HD-PZU3/Office%20Back%20up%2021.05.15/Documents/CBD%20MEETINGS%20+%20SP/SBSTTA%2019/A%20Pathway%20to%20Zero-Deforestation%20Cattle%20Brazil.htm.

Program, and the National Program for School Nutrition, are among measures contributing to Aichi Biodiversity Target 7. The same report also provides information on a project mainstreaming biodiversity conservation and sustainable use for improved human nutrition and well-being, together with Kenya, Sri Lanka and Turkey. In India, major efforts to promote the nutritional and other beneficial attributes of local millets in the public distribution system made them available to more than 800 million people at a subsidized rate with improved market links for small-scale producers resulting in restaurants adding millet-based dishes to their menus, and new income opportunities for women producing millet-based snacks. In 12 districts in Central and South India, switching from white rice to minor millets in school lunches resulted in increased haemoglobin levels in children – up to 37% higher than the control group.

62. In Oman, the Department of Women's Affairs (2012) implemented six workshops on "the role of women in improving the consumption pattern of the family" in all governorates of the Sultanate, including the preservation of the environment.

63. Very few Parties are factoring in the external footprints of their food and agriculture sectors in their biodiversity plans (in 5NRs).

### F. Financing/subsidies/incentives as they relate to agriculture

64. About one third of Parties reported on information related to financing, subsidies and incentives as related to agriculture. For example: in Sierra Leone policies have favoured the large-scale clearance of land. To sustain and increase the rate of agricultural productivity, the Government of India is taking steps to encourage balanced fertilizer use so as to maintain soil biodiversity. A recent reform of fertilizer pricing has been brought into effect. The prices of potassium (K) and phosphate (P) fertilisers have been liberalized so that farmers are encouraged to use more P, K and micro-nutrient based fertilizers, compared with damaging urea, the price of which has been increased by 10%. There is a proposal to provide nutrient-based subsidies only to small and marginal farmers in the future. In Belize, the current political climate promotes land clearance for agriculture through reduced land taxes, and subsidised fuel and pesticides. Most large-scale clearance for agriculture is currently associated with the Mennonite commercial farms, the sugar cane farming industry, and clearance for cattle farming. The surge in sugar cane prices and the newly opened market for cattle are leading to increased forest clearance, with extensive farming practices, leading to degraded soils. In Sierra Leone, Policy directions for large scale clearing of land in various places countrywide for the establishment of commercial farms and mining have increased economic benefits, while inducing biodiversity losses and unsustainable land use.

65. In Croatia, support for agriculture is now linked with environmentally friendly agricultural practice rather than overall agricultural production that favoured intensive rather than sustainable agriculture. New incentives for biodiversity conservation have been designed as a part of agriculture-environment-climate and are incorporated into draft version of Rural Development Programme for the period 2014-2020.

66. In Tonga, the use of agricultural land as mortgage security or on long-term lease arrangement has resulted in the abuse of farming system to maximize profit. This has often resulted in the promoting of continuous short-term mono cropping in favour of long term mixed cropping.

### G. Organic Farming

67. Over half of Parties report the development of an organic farming sector, sometimes rapidly (e.g. Slovakia 5NR), although it remains a small proportion of total production and still very much a niche market. Malaysia has reported on the Malaysian Organic Scheme which is a certification programme to certify farms that are operated using organic methods according to the criteria and guidelines stipulated within the Malaysian Organic Scheme Standard. In India, organic farming is being promoted across the country under the National Project on Organic Farming (NPOF), a central sector scheme continuing since India's 10th Five Year Plan (2002-2007). A variety of incentives are disbursed to farmers under the NPOF scheme to encourage organic farming, which reduces negative impacts on the environment and biodiversity. In Macedonia the National Strategy and Action Plan for Organic Production for the period 2013-2020 is an instrument which provides the basis for further development of organic farming in the

country, the strategic objective of which is to increase the competitiveness of organic production for successful marketing in domestic and overseas markets.

68. Although organic farming is claimed by many Parties to reduce externalities it is not necessarily automatically positive for biodiversity: Kiribati, for example, has developed a national target whose objective is to integrate biodiversity conservation into organic farming. Other measures to reduce chemical use are widespread, whether classed "organic" or not, and usually part of recognised criteria for sustainable production (see aforementioned references on sustainability criteria in supply chains, for example, Chile's Clean Production Accord for its fruit sector). However, few Parties have assessed whether organic farming is increasing overall production efficiency (particularly regarding land-use requirements).

### H. Evaluation of impact of policies

69. Although a majority of countries have shown that they are devoting resources to sustainable agricultural actions and initiatives, no country has reported (in 5NRs) any form of structured programme to evaluate the impacts of such policies (with the notable exception of Brazil).

70. Assessments of impacts of projects (as opposed to policies) are more commonly reported. For example, Rwanda demonstrated, through a case study, the restoration of The Gishwati Forest Reserve. Gishwati had been deforested for cattle ranching development, followed by resettlement of refugees after the 1994 genocide from when land has been degraded due to free grazing of livestock, over cropping and plantations of non-native trees species. In 2005, more than 90% of Gishwati was cultivated; the remaining remnant forest was 600 hectares. Through different management plans, Gishwati natural forest reserve is gradually restored and the illegal use of forest resources has been prevented due to the commitment and collaboration of all stakeholders including local communities. Currently, the area has been divided into three main parts, which are: natural forest area, cattle ranching farms and cultivated area for crop production. Human settlements are to be shifted out of the area for ecosystem restoration and biodiversity conservation purpose. Bolivia carried out a study that showed the effectiveness of indigenous management of land as an alternative in the advancement of the agricultural frontier.

## VI. WHAT COULD BE THE NEXT STEPS AT COP-13?

71. There is great variation among Parties in the agro-climatic, social, cultural and economic contexts within which their agriculture and food sectors operate. This requires flexible, country appropriate solutions. There are also significant and widespread on-going efforts to promote and implement solutions for sustainable food systems and agriculture by Parties, other Governments, relevant organisations, farmers, indigenous peoples and local communities and the business sector. In addition, there are already extensive relevant decisions adopted by the Conference of the Parties. Opportunities at COP-13 might relate to raising the status of attention to food systems and agriculture and the identification of key policy responses, including as they might add value to ongoing efforts.

72. **Very substantial changes from business-as-usual trends are needed in order to meet agreed multiple global objectives.** All three desired outcomes for food systems and agriculture require significant behavioural change, political will and leadership to achieve, and especially require effective collaboration between all actors involved. The biodiversity community must be more proactive in championing these approaches than it has been to date. It is not enough to assume or expect that other sectors will come up with the knowledge or evidence base to demonstrate the value or cost-effectiveness of biodiversity as an intervention or approach. Both agriculture and biodiversity communities must work more effectively together, supported by other relevant sectors and actors. This can make a substantial contribution to the successful implementation of the Strategic Plan for Biodiversity 2011-2020 and progress towards the Aichi Biodiversity Targets as well as to the post-2015 sustainable development agenda. **There are opportunities for this topic to become more prominent on the agenda of the CBD which can be more prominent in advocating for reform**, including in other relevant global forums such as the Commission on Food Security and the Standing Committee on Nutrition, among others.

73. Food systems and agriculture is also a locally and globally relevant issue, requiring collective efforts. Trade in agricultural products and inputs create significant inter-dependencies between Parties, including among their national biodiversity conservation efforts. Collective efforts among Parties are therefore required to support the achievement of sustainable food systems and agriculture.

74. Agriculture needs to change. The CBD has a clear role in driving this change. The current trend of agricultural intensification is unsustainable, dysfunctional in terms of feeding the world, severely damages the environment and is the leading cause of biodiversity loss. The new agricultural paradigm that ensures improved sustainability and resilience, as well as a healthier and more nutritious food supply, requires the increased use of biodiversity. This includes harnessing the value of biodiversity within agricultural landscapes as an important contribution to biodiversity conservation, to supplement protected area approaches. Such approaches need to become mainstream policy. **Parties can shift from "project" based approaches to core policy reform.** This will require more champions within both the agriculture and biodiversity communities, neither can do it alone. **Such change must be truly transformational and can no longer be aspirational.**

75. Most constraints to up-scaling success are not technical but economic and socio-political. A significant jump is required from what is currently a disabling environment to one that is enabling for sustainable food systems and agriculture. This will require new and innovative policies, institutions and partnerships. Approaches to up-scaling ecological intensification involve moving from farm to landscape scale, from individual to collective decision-making, which requires novel institutions and approaches.

***Adopt or strengthen and implement landscape approaches and integrated, cross-cutting policy frameworks centring on food systems and agriculture***

76. **The key overarching requirement is implementation of a landscape, cross-sectoral, approach to biodiversity planning**, which is also fundamental to ecological intensification. An integrated policy framework aligned across multiple sectors supported by an effective enabling environment, including a mix of both regulation and incentives, and effective monitoring, is key to success. It is essential that food systems and agriculture is at the heart of this approach because of its dominance as a driver, but policies for other land uses such as aquaculture, tourism, wetlands, forests, grasslands and protected areas, also need integrating. To achieve this, biodiversity needs to be further mainstreamed across all relevant policy areas.

77. It is critical that biodiversity planning be harmonised with, and support, other sustainable development objectives including poverty reduction. At the international policy level, of particular relevance is the example of the Reviewed Strategic Framework 2010-2019 of the Food and Agriculture Organisation of the United Nations (FAO) endorsed by the 38th Session of the FAO Conference in June 2013 (decision C 2013/7).[45] Under this framework, the agreed three Global Goals of Member States (covering the majority of CBD Parties) are: (i) eradication of hunger, food insecurity and malnutrition; (ii) elimination of poverty and the driving forward of economic and social progress for all, with increased food production, enhanced rural development and sustainable livelihoods; and (iii) sustainable management and utilization of natural resources, including land, water, air, climate and genetic resources for the benefit of present and future generations. Five new Strategic Objectives represent the main areas of work: 1 - Contribute to the eradication of hunger, food insecurity and malnutrition; 2 - Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner; 3 - Reduce rural poverty; 4 - Enable more inclusive and efficient agricultural and food systems at local, national and international levels; and 5 - Increase the resilience of livelihoods to threats and crises. The Strategic Plan for Biodiversity and Aichi Biodiversity Targets are well referenced in this framework (in particular in Strategic Objective 2). The FAO has provided guidance and principles and approaches for

[45] http://www.fao.org/docrep/meeting/027/mg015e.pdf.

building a common vision for sustainable food and agriculture[46] and an overview of these principles and approaches is included in document UNEP/CBD/SBSTTA/19/INF/4.

78. In view of the range of experience and efforts among Parties, **a key opportunity is for Parties to share experiences that relate to developing sustainable food systems and agriculture in the context of biodiversity planning** and entry points can be identified across multiple scales and topics. There is also a clear opportunity for such to be developed, initially, under a smaller coalition of Parties willing to prioritise such efforts and/or having valuable experience to share. The CBD Secretariat and FAO, in partnership with other relevant organizations, should increase the sharing of successful lessons and support adaptive policy development among Parties in order to accelerate progress.

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[46] FAO. 2014. Building a common vision for sustainable food and agriculture: Principles and Approaches. http://www.fao.org/publications/card/en/c/bee03701-10d1-40da-bcb8-633c94446922/.