

INCLUDING FOOD SYSTEMS, BIODIVERSITY, NUTRITION AND DIETARY HEALTH IN THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK ZERO DRAFT

A joint submission from the Alliance of Bioversity
International and the International Center for
Tropical Agriculture (CIAT), and the United Nations
Environment Programme (UNEP)

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Alliance



Endorsed by:



The
Food and Land Use
Coalition



Including Food Systems, Biodiversity, Nutrition and Dietary Health in the Zero Draft of the Post-2020 Global Biodiversity Framework

Purpose: To propose revisions to key goals, targets and indicators of the Zero Draft of the Post-2020 Global Biodiversity Framework (CBD/WG2020/2/3) for consideration by the Open-Ended Working Group (OEWG) at its second meeting. This includes suggested additional milestones and indicators, which strengthen opportunities to address food systems, biodiversity, nutrition and dietary health.

Proponents: This paper is a joint submission by the Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) (the Alliance), and the United Nations Environment Programme (UNEP), endorsed by:

- EAT
- Food and Land Use Coalition (FOLU)
- Kenya Agricultural & Livestock Research Organisation (KALRO)

Scope: The Zero Draft of the Post-2020 Global Biodiversity Framework highlights three key long-term Goals for 2050 which are especially relevant in ensuring sustainable, diverse and resilient food systems, food and nutrition security. These are draft Goals 1, 3 and 4(i). In this paper, we propose minor revisions to both Goals 3 and 4. The Zero Draft also highlights two key action-oriented Targets for 2030 particularly relevant to ensuring sustainable food systems, and food and nutrition security, namely Targets 7 and 8. We suggest minor revisions to both Targets, as well as to the associated preliminary indicators identified for both Targets. We feel such revisions are necessary to ensure that progress towards achieving the vision and goals of the Post-2020 Global Biodiversity Framework take full account of food systems, food and nutrition security and livelihoods while at the same time conserving and enhancing the use of biodiversity in agricultural and other managed ecosystems as well as in natural ecosystems. Finally, we also suggest consideration of the additional proposed milestones and indicators not exclusively for the Goals and Targets highlighted above but also for additional Post-2020 draft 2030 Targets 12, 13, 14 and 17, and which also link to SDGs 2, 3, 4, 12, 13, 15 and 17.

Focus: Sustainable, diverse and resilient food systems, agrobiodiversity, genetic resources and associated traditional knowledge, human diets, food and nutrition security and dietary health.

Proposed revisions to the goals, targets and indicators of the Zero Draft of the Post-2020 Global Biodiversity Framework including suggested additional milestones and indicators

The Zero Draft of the Post-2020 Global Biodiversity Framework (CBD/WG2020/2/3) for consideration by the Open-Ended Working Group (OEWG) at its second meeting presents significant opportunities to address food systems, biodiversity, nutrition and dietary health as fundamental to the vision of a world living in harmony with nature where: “By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.”

Such a vision must ensure food and nutrition security for all people in an inclusive manner based on sustainable, diverse and resilient food systems that conserve and sustainably use biodiversity and ecosystem services.

The Zero Draft of the Post-2020 Global Biodiversity Framework highlights three key long-term Goals for 2050 which are especially relevant in ensuring sustainable food systems, food and nutrition security, namely:

- **Goal 1:** 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.
- **Goal 3:** Genetic diversity is maintained or enhanced on average by 2030, and for [90%] of species by 2050; and,
- **Goal 4:** Nature provides benefits to people contributing to: (i) Improvements in nutrition for at least [X million] people by 2030 and [Y million] by 2050

To strengthen Goals 3 and 4, we suggest a slight rewording as follows:

Revised Goal 3: Genetic diversity, of wild and domesticated species, is maintained or enhanced on average by 2030, and for [90%] of species by 2050; and,

Revised Goal 4: Nature provides benefits to all people contributing to: (i) improvements in food and nutrition security through sustainable and resilient food systems for half the people who are currently undernourished by 2030 and for all people by 2050.

The Zero Draft of the Post-2020 Global Biodiversity Framework also highlights two key action-oriented Targets for 2030 particularly relevant to ensuring sustainable food systems, food and nutrition security, namely:

- **Target 7:** Enhance the sustainable use of wild species providing, by 2030, benefits, including enhanced nutrition, food security and livelihoods for at least [X million] people, especially for the most vulnerable, and reduce human-wildlife conflict by [X%]
- **Target 8:** Conserve and enhance the sustainable use of biodiversity in agricultural and other managed ecosystems to support the productivity, sustainability and resilience of such systems, reducing by 2030 related productivity gaps by at least [50%].

To strengthen both Targets we suggest a slight rewording as follows:

Revised Target 7: Enhance access to and the sustainable use of wild and domesticated species, including local varieties and breeds, underutilized species, and their wild relatives, providing, by 2030, benefits, including enhanced food and nutrition security and livelihoods for at least half the people who are currently undernourished, especially for the most vulnerable, and reduce human-wildlife conflict by [50%]

Revised Target 8: Conserve and enhance the sustainable use of biodiversity in agricultural and other managed ecosystems at multiple levels (genetic, field/farm, and landscape) for enhanced food and nutrition security, productivity, sustainability and resilience [climate mitigation], reduced pollution, and for maintaining biodiversity's contribution to ecosystems services [e.g. pollination, pest control, soil nutrient cycling and water supply] in support of sustainable and diverse production systems and landscapes, reducing by 2030 related production and consumption gaps by at least [50%].

The Zero Draft of the Post-2020 Global Biodiversity Framework also highlights suggested elements for monitoring and a preliminary list of indicators to assess progress towards the 2050 goals. In the case of the above Goal 4(i) and Target 7 the suggested elements for monitoring include *Change in Nutrition*, and the corresponding indicator, *Change in nutrient availability from biological resources, especially for vulnerable populations*. In relation to this indicator we suggest a minor revision as follows:

Change in nutrient availability derived from the genetic diversity of crops, trees, livestock, fish and wild species, especially for vulnerable populations.

Further, we also propose this revised indicator (and the element for monitoring, *Change in Nutrition*) to be added to the preliminary list of indicators for Revised Target 8 above.

Such revisions, we feel, are necessary to ensure that progress towards achieving the vision and goals of the Post-2020 Global Biodiversity Framework take full account of food systems, enhanced food and nutrition security and livelihoods, while at the same time conserving and enhancing the use of biodiversity in agricultural and other managed ecosystems.

Finally, we also suggest the OEWG considers several additional proposed milestones and indicators as outlined below. These should be considered for the Goals and Targets highlighted above but also for additional Post-2020 draft 2030 Targets 12, 13, 14 and 17, which also provide linkages to SDGs 2, 3, 4, 12, 13, 15 and 17.

Proposed additional milestones for 2030 and 2040, linked with SDGs 2, 3, 12, 13, 15 and 17

1. By 2025 all parties have put in place laws, policies and programs that promote food security and improved nutrition from healthy, diverse and safe diets in an inclusive manner to all, in particular the poor and people in vulnerable situations, so as to address by 2030 the nutritional needs of all and in particular of children, adolescent girls, pregnant and lactating women and older persons.

[linked to SDG 2, targets 1 and 2; SDG 3, targets 1 and 2, and possibly 4; SDG 4, target 2; SDG 12, possibly targets 5 and 6]

2. By 2025, all parties have put in place laws, policies and programs that incentivize diversification of food production systems applying sustainability principles and practices and conserving and sustainably using biodiversity and ecosystem services, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

[linked to SDG 2, 12, 13, 15]

3. By 2030, at least 30% of total food production comes from diversified, resilient and sustainable food production systems, applying sustainability principles and practices and conserving and sustainably using biodiversity and ecosystem services, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

[linked to SDG 2, target 4; SDG 4, targets 4 and 7; SDG 12, targets 1 and 2, and possibly 3; SDG 13, targets 1 and 2, and possibly 3; SDG 15, targets 1, 4 and 9, and possibly 3]

4. By 2030, parties have built up nutritional information of available food biodiversity and have information and capacity built on its propagation/reproduction, cultivation/growth, harvesting, storage, marketing and use.

[linked to SDG 15, target 9; SDG 17, targets 6, 7, 9 and 18]

5. By 2030, public food procurement mechanisms (i.e. schools, hospitals and other institutions) incorporate increased diversity of nutritious and safe foods from local, sustainable and resilient sources, with increased use of local underutilized food biodiversity, of domesticated and wild species.

[linked to SDG 12, target 7]

6. By 2040, 50% of total food production comes from diversified, resilient and sustainable food production systems, applying sustainability principles and practices, and conserving and sustainably using biodiversity and ecosystem services, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

[linked to SDG 2, target 4; SDG 4, targets 4 and 7; SDG 12, targets 1 and 2, and possibly 3; SDG 13, targets 1 and 2, and possibly 3; SDG 15, targets 1, 4 and 9, and possibly 3]

Proposed additional indicators and baseline information¹

We acknowledge and support the preliminary list of indicators identified in the Zero Draft of the Post-2020 Global Biodiversity Framework. In addition, consideration of the proposed indicators below would strengthen key relevant Goals and Targets towards the achievement of more sustainable food production systems including enhanced food and nutrition security:

Indicators proposed at Goals level monitoring:

- Include an indicator on change in edible plant species abundance
- Include an indicator on change in crop wild relative conservation status
- Include an indicator for the diversity of plant genetic resources for food and agriculture secured in medium- or long-term conservation facilities
- Include a red list index for crop wild relatives
- Suggested rewording related with the “Change in nutrient availability from biological resources, especially for vulnerable populations” indicator: Change in nutrient availability derived from the genetic diversity of crops, trees, livestock, fish and wild species, especially for vulnerable populations.
- Include an indicator for the nutritional functional diversity of food in supply AND/OR an indicator for the proportion of energy from non-stables, roots or tubers.
- Percentage of agricultural land integrating at least 10% natural land AND/OR Crop species diversity in production as a proportion of available crop species diversity

Indicators proposed at Targets level monitoring:

- At least 10% natural/semi-natural habitat is maintained at the 1 km² scale in order to maintain biodiversity’s capacity to support food production (pollination, pest control, sediment capture).
- Include an indicator for relatively sustainable (e.g. organic OR conservation) agriculture as proportion of total agricultural land
- Include agroecosystems as an ecosystem type
- Include an indicator on resilience of agrobiodiversity to impacts of climate change, e.g. proportion of agriculture that is diversified under agroforestry, intercropping, crop rotation, mixtures or other diversification practices
- Suggested re-wording of the target: “Estimates of numbers of people benefiting from wild harvest of fish, wildlife, medicinal plants etc” as follow: “Estimates of numbers of people benefiting from wild harvest of fish, wildlife, medicinal plants and wild relatives of crops and breeds”
- Under Target 8 and element of the targets for monitoring “Change in trends in the genetic diversity of crops and domesticated animals protected” a new indicator should be developed for monitoring changes in trends in genetic diversity of PGRFA in situ and on farm.
- Number of countries implementing the *Voluntary Guidelines on Mainstreaming Biodiversity into Policies, Programmes and National and Regional Plans of Action on Nutrition* and *Voluntary*

¹ Please refer to Excel file “Alliance-Comments_Addendum-1-CBDPost-2020Framework” for more details to which Goals and Targets these proposed indicators are aligned to.

Guidelines on Food Systems and Nutrition (to be endorsed by CFS in 2020), as well as other relevant instruments, tools and voluntary guidelines for transforming food systems

- Number of countries that have mainstreamed biodiversity for food and nutrition into relevant national development strategies and plans including National Biodiversity Strategy and Action Plans (NBSAPs), Multi-sectoral Nutrition Plans, National Agricultural Plans, National Climate Change Adaptation Programmes of Action (NAPAs) and National Climate Change Adaptation Plans (NAPs) and other relevant national development strategies and plans
- Number of countries with policies in place which provide subsidies/incentives for the sustainable production of healthy biodiverse foods
- Proportion of countries that have increased production and availability of food biodiversity with sustainable agricultural management practices
- Number of best practices for mobilizing nutritionally rich biodiversity to improve dietary diversity identified and promoted
- Number of countries that have in place national food-based dietary guidelines which highlight the importance of food biodiversity not only for healthy diets² and nutrition outcomes but also the many other multiple benefits including environmental sustainability and social equity
- Number of databases at regional and national level, with food composition tables which include reliable nutritional value information on food biodiversity and associated traditional knowledge
- Number of species, varieties and breeds in regional and national databases with food composition tables which include reliable nutritional value information on food biodiversity and associated traditional knowledge
- Number of people trained to deploy and benefit from nutritionally rich biodiversity
- Number of new markets developed for food biodiverse products with high nutritional value, including more nutritious convenience foods based on biodiverse products
- Economic survey/analysis indicating income levels changing due to sales of nutritionally rich biodiverse products
- Number of information events conducted that foster greater appreciation of consumers, policy makers and others, of nutritionally rich biodiversity as a resource for development and wellbeing
- Number of publications highlighting nutritionally rich biodiversity, recipes and processing methods developed
- Amount of marketing budget and advertising directed toward the promotion of food biodiversity informing consumers about the benefits of food biodiversity in their location
- Number of people consuming a healthy diversified diet including 200-600 g per day of vegetables, 100-300 g per day of fruits, and increased consumption of a diversity of whole grains (250 g/day), beans and pulses (0-100 g/day) and nuts 90-75 g/day) in line with dietary recommendations. (and including a 0-1500 g per week of a diversity of animal sources proteins).

Opportunities should also be sought to reinforce the ties between the proposed revisions to the specific goals, targets and indicators of the Zero Draft and Sustainable Development Goal 2 (SDG 2 *Zero Hunger: End hunger, achieve food security and improved nutrition and promote sustainable agriculture*). As explained extensively in the rationale below, food is likely to be one of the most important and direct benefits that biodiversity provides (Nature's Contribution to People per IPBES in Diaz *et al.* 2018). In food, biodiversity underpins human well-being, contributing directly to support food systems, agricultural productivity, ecosystem functioning, food security and livelihoods, among other roles critical to achieving zero hunger within safe ecological limits. In

² A healthy diet requires adequate amounts of fruits, vegetables, legumes, nuts and seeds that globally we do not produce enough of and neither consume enough. There is a need for agrobiodiversity to meet population requirements of these components, which are currently severely unmet. An analysis of the Global Burden of Disease Study highlights that underconsumption of a diversity of fruits, nuts, vegetables and legumes is nearly universal (Afshin *et al.* 2019).

proposing these revisions, we specifically welcome explicit links and alignment to SDG target 2.4: *By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality*, and target 2.5: *By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed*. We also welcome links and alignment to SDG 3 (*Good Health and well-being: Ensure healthy lives and promote well-being for all at all ages*), SDG 12 (*Responsible consumption and production: Ensure sustainable consumption and production patterns*), SDG 13 (*Climate Action: Take urgent action to combat climate change and its impacts*) and SDG 15 (*Life on earth: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*). Each one of these contributions was clearly articulated in the IPBES Global Assessment which flagged an alarming decrease in biodiversity's contribution across all of Nature's Contributions to People (NCP).

Rationale

As outlined in this paper, consideration of the proposed revisions to the Zero Draft can strengthen progress towards achieving the vision and goals of the Post-2020 Global Biodiversity Framework, while ensuring food and nutrition security for all people is achieved in an inclusive manner. This is based on sustainable, diverse and resilient food production systems that conserve and sustainably use biodiversity and its ecosystem services in agricultural and other managed ecosystems, as well as in natural ecosystems.

Poor dietary health has become the single-most important driver of mortality globally accounting for nearly 11 million pre-mature adult deaths per year (Afshin *et al.* 2019, Willett *et al.* 2019). One of the monumental challenges facing humanity is how to secure universal access to sufficient, nutritious, safe, healthy and affordable food, produced sustainably in resilient systems and landscapes, ensuring the conservation and sustainable use of biodiversity. Existing agriculture and food systems produce and make available large quantities of food, but not enough of the nutrient-rich foods needed for healthier and sustainable diets (Afshin *et al.* 2019). Underconsumption of a diversity of nutritionally protective fruits, nuts and seeds, vegetables, whole grains, is universal (Afshin *et al.* 2019 fig. 1). Indeed, satisfaction of nutritional needs is even more poorly distributed amongst low-income groups including in high-income countries.

Our current food systems undermine biodiversity, including agricultural biodiversity, and are the primary driver of environmental degradation. Food and land-use systems are the single biggest driver of environmental damage. They contribute up to thirty per cent of the greenhouse gas emissions driving climate change. Food and land use systems account for more than 80% of freshwater withdrawals. They occupy nearly 40% of the ice-free surface of the earth and are responsible for the continuing conversion of the world's tropical forests, grasslands, wetlands and other remaining natural habitats, and thus are the main culprit driving the ongoing 'sixth extinction'³ of biodiversity. The overuse of fertilizers and increasing use of agrochemicals is polluting air, water and soils further

³ Kolbert E. 2014. *The Sixth Extinction: An Unnatural History*. Henry Holt and Company. 319 p. ISBN 978-0-8050-9299-8

threatening both biodiversity and human well-being (Ripple *et al.* 2017, Rockstrom *et al.* 2009, IPBES 2019).

The recent State of the World's Biodiversity for Food and Agriculture report (SoW-BFA) (FAO 2019a) warns that, despite growing evidence of biodiversity's key role in food security and nutrition, the diversity of food production systems worldwide is in decline. Of the tens of thousands of plant and animal species cultivated or raised for food in the past, fewer than 200 currently contribute substantially to global food output and only nine account for 66% of total crop production. In 48 years, from 1961 to 2009, diets worldwide have become increasingly homogenous, dominated by rice, maize and wheat at the expense of a rich global food biodiversity marginalized by specialized modern agricultural production systems (Khoury *et al.* 2014). Today three staple crops (rice, maize and wheat) account for more than 50% of the plant-derived calories consumed globally. Even across the diversity of horticultural crops, and tree crops, tremendous homogenization is occurring with the loss of locally-adapted species and varieties and their replacement with a highly-simplified subset undermining agricultural biodiversity's contribution to resilience. The wide range of nutrient-rich varieties, cultivars and breeds of plants and animals and wild species used by humanity throughout history are being forgotten and lost, and traditional knowledge on the use of these species eroded. This simplification severely undermines the resilience of food systems in the face of growing environmental change as well as to their capacity to support dietary health.

The SoW-BFA, the first global assessment of biodiversity for food and agriculture worldwide, and the first ever Global Assessment Report on Biodiversity and Ecosystem Services (IPBES 2019) present alarming pictures of unprecedented biodiversity loss caused by current food systems, and future scenarios of accelerated rates of loss if we fail to act immediately. The second note of the High-Level Panel of Experts (HLPE) on Food Security and Nutrition on Critical and Emerging Issues for Food Security and Nutrition, also identifies the decline of the diversity of our food production systems as one out of nine major critical emerging issues (HLPE 2017a), stating that:

“modern agricultural practices are reducing available agrobiodiversity while it is the most needed to address challenges. [...] Thousands of plant species and livestock breeds have been raised throughout human history, for food, feed, fibre, shelter and fuel. Since the 1900s, some 75 percent of plant genetic diversity has been lost as farmers worldwide have discarded their multiple local varieties and landraces for genetically uniform, high-yielding varieties. Today, about 30 crops provide 95 percent of human food energy needs and 75 percent of global food production is based on 12 commercial crops and five animal species. The consequences of the gradual erosion of the rich biodiversity of plant varieties and animal breeds need to be better assessed, in particular for the inhabitants of threatened ecosystems, such as deserts, mountains, forests, coastal belts, wetlands and arid regions. Mapping and assessing agrobiodiversity within and between ecosystems, and better understanding their role for sustainable agricultural production could be a priority area for Food Security and Nutrition” (HLPE 2017a).

The IPBES assessment reports the extinction of 559 of the 6,190 domesticated breeds of mammals used for food and agriculture (over 9%) while 1,000 more (over 16%) are threatened (IPBES 2019). Data from the USDA indicated that over 80% of crop varieties utilized in the 19th century had disappeared by 1990 (Fowler, 1994). In Mexico, less than 20% of maize landraces cultivated in the 1930s was still cultivated in the 1990s while in China the number of wheat varieties cultivated dropped more than ten-fold, from over 10,000 in the 1950s to less than 1,000 in the 1970s. Furthermore, a study conducted in Latin America indicated that 16 to 22% of wild relatives of peanut, potato and black-eyed bean will be threatened with extinction by 2055 (FAO 1997). Wild and semi-cultivated foods sourced from field margins and natural areas in the landscape provide critical sources of nourishment for many rural communities (Termote *et al.* 2014; Ong and Kim

2017; Asprilla-Perea and Díaz-Puente 2019), while the availability and accessibility of these resources is threatened by numerous factors including use of pesticides, land use change, and conservation policies (e.g. Shumsky *et al.* 2014a, b).

As biodiversity in food systems has declined, since 2015 the number of undernourished people has increased from 780 to 821 million (FAO, IFAD, UNICEF, WFP and WHO 2019), signaling a rise in world hunger and a reversal of trends following a prolonged decline. Child stunting remains unacceptably high with approximately 151 million children affected and 51 million children wasted. At the same time, one in eight adults are obese—over 672 million people worldwide—and three out of four deaths are caused by non-communicable, diet-related diseases (e.g. diabetes, cancer, cardiovascular diseases), particularly in emerging economies and in low-to-middle income countries (HLPE 2017b). Furthermore, about 2 billion people lack the key micronutrients they need for physical and mental development such as iron and vitamin A. An analysis of the Global Burden of Disease Study highlights that underconsumption of a diversity of fruits, nuts, vegetables, beans and pulses is nearly universal (Figure 1; Afshin *et al.* 2019). A case of concern is the huge increase in the supplement industry selling pills with health claims unsupported by science to otherwise healthy people (Couzin-Franzel 2015, Guallar *et al.* 2013), rather than focusing on nutritious biodiverse diets comprised of real foods as a sustainable solution.

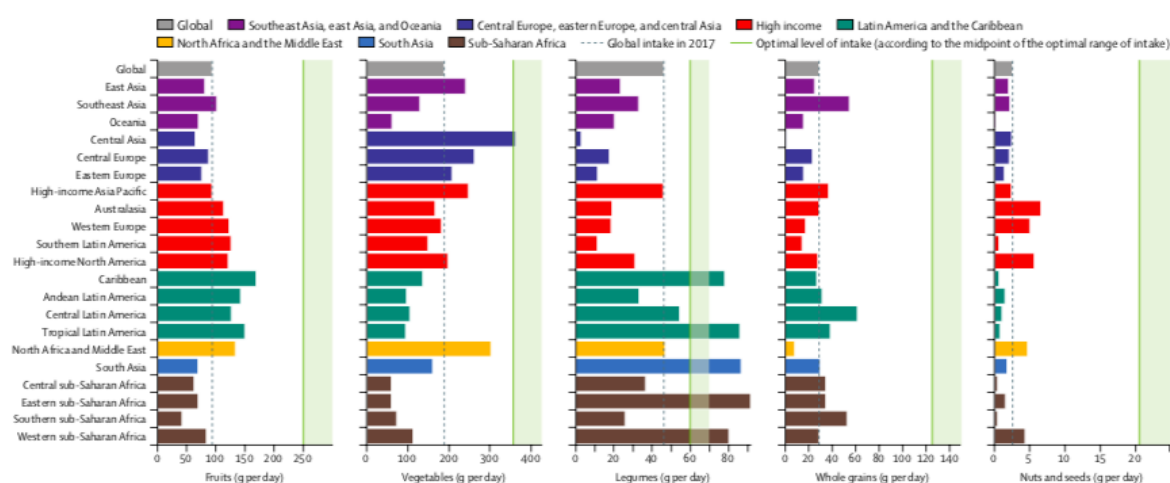


Figure 1: Regional assessment of current uptake of protective foods compared to optimal uptake (green bar) and global uptake (dashed line). (Extract from Figure 1 in: Afshin *et al.* 2019)

Consuming a diversity of foods is vital to human nutrition: there is a positive association between dietary species richness and micronutrient adequacy of diets, which is consistent across different world regions (Figure 2; Lachat *et al.* 2018).

Underutilized food biodiversity provides valuable macro- and micronutrients, as well as beneficial bioactive non-nutrients that contribute to dietary health, a requisite target for achieving Sustainable Development Goal 2 by 2030. Underutilized food biodiversity includes plants of a variety of growth forms (field crops, trees, shrubs), animals and other organisms (e.g. fungi, algae) used for food, both cultivated and from the wild (Bioversity International 2017), many of which are capable of producing food under marginal, low-input conditions and challenging climate conditions, and are maintained by indigenous communities and women. This food biodiversity represents a natural wealth for many countries yet most fail to value, develop, and conserve it adequately for this purpose. Even a relatively small terrestrial land area such as the Pacific islands demonstrates the unique wealth of food biodiversity.

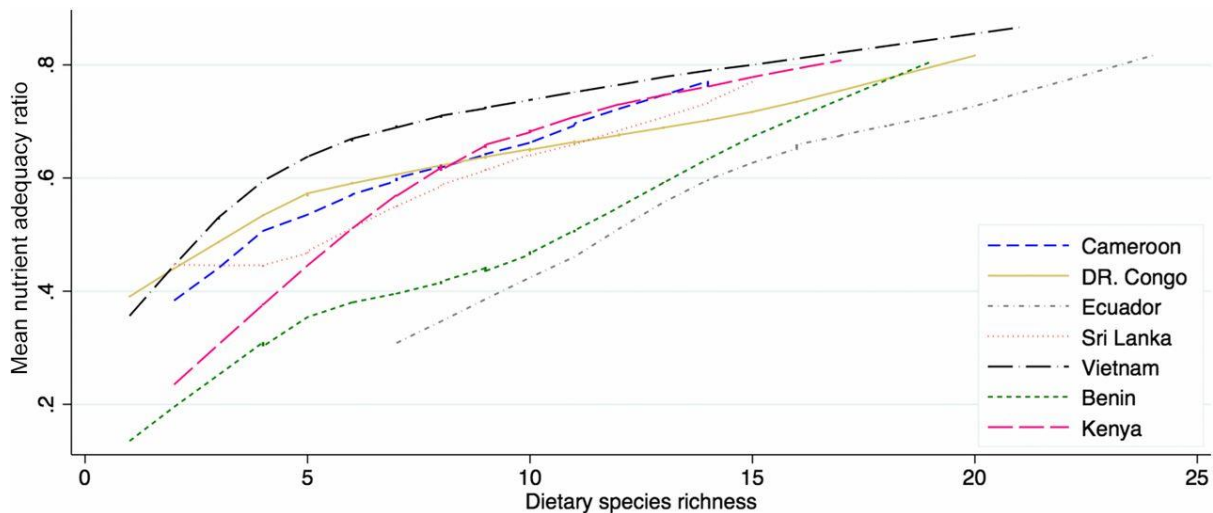


Figure 2. Positive association between dietary species richness and micronutrient adequacy ratio consistent across countries, populations, and seasons (Lachat *et al.* 2018)

Many Pacific islands harbor globally significant unique and novel varieties of locally important species (e.g. banana, pandanus, breadfruit, taro, yam), which often have higher nutrient contents than more commonly consumed imported varieties that dominate their markets. Yet, many of these nutrient-rich traditional varieties are disregarded and overlooked by agricultural research and development initiatives for a variety of socio-economic or political reasons. In the case of some local banana varieties, the pro-vitamin A carotenoid content ranges from as little as 1µg to as much as 8500µg per 100g of edible portion, more than a 1000-fold greater than the common Cavendish variety bananas. This is a nature-based solution that is locally and culturally appropriate for addressing micronutrient deficiency. Underutilized food biodiversity can be a key asset in actions needed to “simultaneously achieve food security, biodiversity protection and sustainable use [as] context-appropriate climate change mitigation and adaptation”.

The IPBES Global Assessment Report on Biodiversity and Ecosystem Services goes on to highlight that the loss of local varieties and breeds of domesticated plants and animals, as well as their wild relatives, poses a serious risk to global food security and undermines the resilience of many food systems to threats such as pests, pathogens and climate variability, including extreme weather events (IPBES, 2019). Intraspecific diversity maintained *in situ* supports crop and livestock adaptation to climate change by enabling processes of farmer and natural selection (Vigouroux *et al.* 2011, Döring *et al.* 2011). In addition to eroding genetic diversity, decline in biodiverse farm and land management practices that are typical of many indigenous and traditional food systems has also undermined resilience (Mijatović *et al.* 2019). Planting multiple crop species and varieties with diverse responses to environmental conditions helps stabilize yields under irregular weather (Prieto *et al.* 2015, Reiss & Drinkwater 2018). Diversity-rich practices at farm level, such as crop rotation, polyculture, agroforestry, and integrated crop-livestock production encourage positive ecological interactions that increase productivity, support pest and disease control, and improve soil quality (Yarou *et al.* 2017, Peralta *et al.* 2018, Bybee-Finley and Ryan 2018). Similarly, maintaining different land uses and natural areas in production landscapes offers multiple and alternative livelihood resources, moderates the impacts of storms and drought, provides habitat and connectivity for pollinators and natural enemies of crop pests, and enables provision of other key ecosystem services (e.g. clean water) that underpin the function and resilience of these systems in providing for human wellbeing. Willett *et al.* (2019) propose a planetary boundary for biodiversity in agriculture making the case that maintaining at least 10% semi-natural areas embedded within agriculture at fine scales (<1 km²) is needed to maintain agroecological services provided by biodiversity while contributing to connectivity for wild biodiversity.

The IPBES report recognizes that “feeding humanity and enhancing the conservation and sustainable use of nature are complementary and closely interdependent goals that can be advanced through sustainable agriculture, aquaculture and livestock systems, the safeguarding of native species, varieties, breeds and habitats, and ecological restoration”. The EAT-Lancet Commission, and companion analysis (Springmann *et al.* 2018) go further and demonstrate that shifting to diversified healthy diets are a major lever in reducing food production’s impact on land, climate, and biodiversity. In other words, the proposed Goal 1 of zero net loss by 2030 is only possible with a transition to healthy diets (draft Goal 4i). Business-as-usual clearly carries too much cost with serious repercussions on both nutritional security and environmental security. It also results in additional burdens on health services and care and the dietary health epidemic (Willett *et al.* 2019), while doubling the GHG emission from food production, with an anticipated 60% increase in land requirements for food production (Springmann *et al.* 2018). Inversely, dietary shifts towards diversified healthy diets (quantity and quality) by 2050 permit reducing biodiversity loss and improving dietary health (Tilman and Clark 2014, Tilman *et al.* 2017).

Of the different earth ecosystem components assessed in the sixth Global Environment Outlook (GEO 6) report, biodiversity is the most affected by environmental degradation with adverse impacts on the resilience of ecosystems, including agricultural systems and food security (UN Environment, 2019). The irreversible loss of biodiversity has been identified as the global environmental problem that has already exceeded safe planetary boundaries (Rockström *et al.* 2009, Steffen *et al.* 2015). Such a situation, with its massive contribution to biodiversity loss and poor diets, is no longer tolerable. We need to move urgently beyond standard practices to achieve a global food system transformation (IPES-Food 2016, Caron *et al.* 2018, Willett *et al.* 2019). One that is centered on safeguarding, creatively using, and celebrating the rich diversity of food plants and animals that sustains all of us and that puts biodiversity at the heart of food systems. In this way they become more sustainable, resilient, and equitable and better equipped to provide healthy, culturally appropriate and delicious food to all, thus contributing towards the achievement of relevant SDGs.

The negotiations of the Post-2020 Global Biodiversity Framework offer a unique opportunity for parties and partners to commit and mobilize, provide real political will and leadership and coalesce actions around the transformation of agriculture, food systems and diets based on conservation and use of biodiversity. Creative approaches are required to better utilize biodiversity for food and agriculture and to diversify food systems, supply chains and public food procurement, including innovative approaches that incentivize demand and desirability for food biodiversity. Only when we are actively using biodiversity for sustainable farming and food systems that deliver diverse, nutritious foods can we hope to effectively safeguard this green gold for future generations and reverse current alarming rates of biodiversity loss.

Recent pilot-scale initiatives such as the GEF-supported ‘Mainstreaming Biodiversity Conservation and Sustainable Use for Improved Human Nutrition and Well-being’ (Biodiversity for Food and Nutrition (BFN)) project⁴ have demonstrated the often-superior nutritional value and additional benefits of much of our underutilized food biodiversity by using innovative research partnerships and approaches to increase the knowledge, appreciation, awareness and utilization of this diversity encompassing both cultivated and wild edible species. BFN partners Brazil, Kenya, Sri Lanka and Turkey have prioritized a rich diversity of neglected and underutilized species and varieties for healthier diets and improved nutrition, and used this knowledge to mainstream these species and

⁴ The Biodiversity for Food and Nutrition Project is a multi-country, multi-partner initiative led by Brazil, Kenya, Sri Lanka and Turkey and funded by the Global Environment Facility, the world’s largest public funder of international environmental projects. The initiative is coordinated by the Alliance of Bioversity International and CIAT, with implementation support from the United Nations Environment Programme and the Food and Agriculture Organization of the United Nations. National partners come from relevant ministries, the scientific community, non-government organizations, civil society and local communities (www.b4fn.org).

their diversity into production and consumption systems, including linking biodiversity to school meals and public food procurement, into food-based dietary guidelines, and into markets including sustainable gastronomy and tourism. These innovations and approaches are visionary in meeting the challenges of environmental sustainability, improved diet-related health and nutrition and improved livelihoods in the 2030 sustainable development context, as well as putting the conservation of biodiversity on a much stronger footing. In Brazil and Kenya, for example, the project's mainstreaming efforts resulted in the endorsement of national policy instruments that promote the conservation and sustainable use of food biodiversity (Hunter *et al.* 2019).

Not only does mainstreaming biodiversity in this way bring health and nutrition benefits, it contributes significantly to reducing the adverse environmental impacts of the food system as well as improving its resilience. Much of this food biodiversity is maintained by smallholder farmers, including indigenous peoples and local communities, using agroecological principles and practices, in diversified farming systems and landscapes, with limited external inputs of water and chemicals, and is locally adapted to climate variations. A food system transformed in this way contributes significantly to reducing biodiversity loss, greenhouse gas emissions, contamination and shortages of water, ecosystems pollution, and land degradation. In addition, it provides income generation benefits, especially for the youth, as a result of diversification options; it also contributes to empowerment of vulnerable groups including women and indigenous people and local communities.

Yet, players in the global food system are slow to respond to needed change. Harmful subsidies and perverse incentives are still employed, and structural barriers to diversification are still present in the system (The Food and Land Use Coalition 2019). The global food system remains locked into delivering largely cheap, unhealthy food with a huge environmental footprint and escalating public health budgets, at the cost of diversity on farms and in agricultural landscapes (IPES-Food 2016, TEEB 2018a), while the recent Growing Better report (Food and Land Use Coalition 2019) shows that producing healthy food sustainably is compatible with declining food prices. The IPES-Food "From Uniformity to Diversity" report (2016) focused its attention on the path dependency and lock-ins of the current food system, dominated primarily by concentrated corporate power and profit motivations above human and natural values. This, as well as the need for transformative change, was also highlighted in the Theory of Change section of the TEEB AgriFood Framework report (2018a).

Achieving the transformative change needed to achieve zero hunger within safe ecological limits while conserving globally important biodiversity requires certain key actions and pathways, including the diversification of food production and consumption, as proposed by FAO and others (FAO 2014, FAO 2018ab, FAO 2019b, IPES-Food 2016, Bioversity International 2017, Willett *et al.* 2019). A **first critical pathway** is to urgently safeguard and conserve the remaining globally important genetic diversity including varieties, landraces and breeds, and wild relatives of crops and livestock *in situ* (in protected areas under sustainable management and use, on farm and through other effective area-based conservation measures (OECMs)) and *ex situ* in order to halt and reverse biodiversity loss. The **second pathway** is to provide support for more comprehensive biodiversity mainstreaming innovations as well as investments in sustainable and diverse production landscapes and practices that value, conserve and creatively and sustainably use cultivated, semi-cultivated, and wild biodiversity at multiple levels (genetic, field/farm, and landscape). For instance, support for biodiversity-friendly management practices in crop, livestock, forestry and aquaculture production systems that make use of nutrient-rich species and varieties and breeds. This involves identifying innovations such as using the power of agricultural policies and subsidies, creating marketing opportunities and demand through public procurement and public food purchasing to drive diversification; linking smallholders to school markets to supply local foods derived from native biodiversity for healthier school meals; education and public awareness of consumers, leveraging peoples' attachment to food cultures, traditions, and the identity of terroir; the incorporation of food

biodiversity and traditional knowledge into food-based dietary guidelines; and additional market opportunities. The **final pathway** in this transformative change is the promotion of healthy diets produced sustainably, empowering consumers to improve the healthiness and biodiversity of their diets, and thus creating greater demand and desirability for food biodiversity.

It is with this rationale in mind that we propose the minor revisions to the specified goals, targets and indicators of the Zero Draft of the Post-2020 Global Biodiversity Framework which can help secure and promote more sustainable and nutritious food systems based on biodiversity. These revisions would actively promote the sustainable management and use of biodiversity, incorporating measures that conserve biodiversity for food and agriculture to ensure and strengthen the resilience and adaptive capacity of food production. This would simultaneously contribute to diversified, healthy and culturally-relevant nutrition for today's and future generations, thus contributing to the achievement of the Agenda 2030 for Sustainable Development.

Finally, these revisions focus on mainstreaming currently underutilized food biodiversity that holds significant potential for improving diets and nutrition while making food systems resilient and protecting ecosystem services. Doing so will help food systems move beyond producing just more food towards finding solutions that nourish people and protect the planet in ways that can be sustained environmentally, economically and culturally.

Implementation approaches

The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) together with key partners such as UNEP, FAO and other UN organizations, country governments, civil society, local communities and industry, including other CGIAR centres, would be well placed, if invited by the CBD, to lead, coordinate and provide technical support to the implementation, monitoring and reporting of work aimed at achieving the relevant highlighted goals and targets in the Zero Draft and which are the focus of this paper.

Together with key partners, the Alliance delivers solutions that harness agricultural biodiversity and sustainably transform food systems to improve people's lives. It brings in-depth expertise in the generation and dissemination of relevant knowledge, including support of policy dialogue to ensure evidence-based decisions and impact. For example, the Alliance is a managing partner of the CGIAR Research Program on Agriculture for Nutrition and Health, working on issues of nutrition-sensitive food systems with country partners across Latin America, Asia, and Africa. It is also a managing partner of the CGIAR Research Program on Water Land and Ecosystems, working on issues of environmentally-sensitive food transitioning agriculture from degradative to regenerative while meeting food and nutritional security goals. The Alliance, with EAT and other partners, carries out research and communications on how to make food and nutrition policies, programs, and investments more effective to improve diets and nutrition. The Alliance has worked with the UN Rome-based agencies (FAO, World Food Programme, International Fund for Agricultural development, FAO Committee on World Food Security, and United Nations System Standing Committee on Nutrition) to mainstream nutrition-sensitive agriculture into their work, and is joining with the CGIAR Research Program on Climate Change, Agriculture and Food Security in its support of its partnership with the Rome-based agencies.

The Alliance has led the CGIAR contribution to IPBES (FAO/UNEP/ENDP/UNESCO) including author contributions to nearly all regional assessments, as well as to the Global Assessment on Biodiversity and Ecosystem Services. The Alliance, with EAT, proposed that the first IPBES nexus assessment be on Biodiversity, Food, Health and Environment which was received and considered by IPBES with support by several countries. The core elements of this proposal form the basis for the first IPBES Nexus Assessment on Biodiversity, Food, Health and Water which is currently in its

scoping phase. The Alliance has created an IPBES rapid response team comprised of 30 scientists prepared to contribute to scoping and assessment activities.

The Alliance, UNEP and key partners could therefore mobilize global, regional and national coalitions for action for effective implementation of the proposed goals and targets and could collectively facilitate an integrated approach across agricultural and other sectors and countries, to promote good practices, collect data, continue to develop metrics and indicators and report on progress, as well as promote capacity development, sharing of knowledge and cross-fertilization of ideas. The Alliance, UNEP and key partners recognize the importance of biodiversity mainstreaming for safeguarding diversity and promoting nutrition and have considerable experience and expertise supporting the implementation of the CBD's Programme of Work on Agricultural Biodiversity. Often leading global implementation of multi-country projects, they have worked with countries to mainstream biodiversity in production landscapes (Mijatovic *et al.* 2018). UNEP, in partnership with former Bioversity International (now the Alliance) and Rome-based UN Agencies has been providing continuous leadership and technical support to Parties of the Convention and its Protocols in development and implementation of large scale GEF supported portfolio of projects on mainstreaming biodiversity across sectors and production landscapes. Thematic focus of the portfolio includes: agro-ecosystem resilience in the context of climate change, food security, improved health and nutrition, conservation and sustainable use of biological diversity and the fair and equitable sharing of benefits (ABS). These activities are closely aligned with recent CBD decisions on health and biodiversity, which highlight mainstreaming biodiversity in the health sector as essential for halting biodiversity loss and promoting human health and well-being.

Such an implementation partnership, with the support of key food system actors and national and sub-national governments as well as organizations involved with sales and marketing, would bring together a significant portfolio of biodiversity mainstreaming experiences including research expertise, partnerships and networks, relevant voluntary guidelines and other instruments including mainstreaming guidelines and toolkits. These organizations have extensive expertise in knowledge management, policy analysis, conservation actions, value chain development and system-wide capacity development that empowers people and strengthens organizations and institutions. The CBD's Cross Cutting Initiative on Biodiversity for Food and Nutrition could provide a suitable space to coordinate and implement relevant actions. The Alliance, UNEP and other key partners of the *Interagency Liaison Group on Biodiversity and Health*, which oversees the growing programme of work on health and biodiversity within both the CBD and WHO, which includes nutrition and diets, also bring considerable capacity to mobilize short and long-term resources for the implementation of the proposed revised goals and targets.

UNEP provides the secretariat of the One Planet Network that brings together actors from all regions and sectors to bring together expertise, resources, innovation and commitment towards a shift to more sustainable modes of production and consumption. UNEP is also one of the members of the Multi-stakeholder Advisory Committee of the One Planet Sustainable Food Systems Programme under the One Planet Network and as such promotes food system governance models that promote sustainable, balanced and biodiverse diets.

The Alliance occupies the scientific/technical chair on the Multi-stakeholder Advisory Committee of the One Planet Sustainable Food Systems Programme convened by the UN System. Through this position, the Alliance actively engages in the development and implementation of food system frameworks and interventions across multiple geographies as well as assisting in the convening and organization of global events on the topic of sustainable food systems.

In collaboration with a broad set of partners, and building on the UNEP-implemented GEF-supported portfolio of projects on mainstreaming agricultural biodiversity, the IT Diversity Assessment Tool for Agrobiodiversity and Resilience (DATAR) is being developed to assess and integrate intra-

specific diversity of crop varieties, livestock breeds and aquatic farmed-types into decision-making plans of local and national development organizations to improve agricultural productivity for smallholder farmers, herders and fisher folk.

Furthermore, the Agrobiodiversity Index (ABD Index), developed by the Alliance, is an essential tool to measure agrobiodiversity and identify concrete actions to achieve diverse and sustainable food systems. The ABD Index can meaningfully contribute measures and indicators to monitor progress on the relevant proposed goals and targets of the Zero Draft. It can measure to what extent and how companies, countries and projects contribute to ensuring food biodiversity for healthy diets, using agrobiodiversity for sustainable production, and safeguarding diverse genetic resources for current and future options. With informed measurements, governments, investors and companies can compare strategies and select those that will deliver more sustainable, more nutritious food systems, built on agrobiodiversity. The ABD Index can also track how agrobiodiversity contributes to meeting the many interconnected global targets to which countries have committed themselves.

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