3.10 Increasing agrobiodiversity for improved production and resilience

a. Background information

Agrobiodiversity is an essential component for sustainable food systems. These plants and animals, together with the associated knowledge, are the foundation of food and nutrition security as well as livelihoods for families and communities around the world, specifically for 500 Million smallholder farmers around the world. They are so important because, since their domestication, they have changed to remain adapted to changing climate conditions, new pests and diseases and different cultural and taste preferences of the communities that adopted a given crop. Human migration in different agroecologies, economic exchanges and wars offered additional opportunities of different crops and animals to evolve. Through a combination of natural and human selection we have an incredible heritage of agrobiodiversity at crop and genetic levels. In traditional farming systems, women and men farmers used to keep many types of different crops and livestock as a way to manage biotic and abiotic risks and changing market demands.

International, regional, and national genebanks and other agro biodiversity conservation initiatives, in national and international settings, were established to maintain the genetic diversity not only of the crops and livestock that were originally domesticated in surrounding areas, but also of other foods that have become important to the breeders, farmers, and citizens they serve. While genebanks and similar initiatives have largely succeeded in developing the technologies needed to adequately safeguard part of the food biodiversity, it does not address the loss from production systems. Moreover, conservation of food biodiversity in such repositories is not practical for all crop and livestock species and their wild relatives, and as such ex situ conservation has only a limited potential to safeguard karge part of neglected and underutilized species, trees important for nutrition and animals. In addition, ex situ conservation does not allow the continued evolution of these organisms and their associated cultural knowledge in their natural and agricultural habitats. Finally, the agrobiodiversity conserved in ex situ facilities cannot contribute to improve resilience, food and nutrition security of production systems.

b. What, in brief, is the solution?

The solution will tackle the 4 dimensions: the knowledge gap, the incentives for use agrobiodiversity in production systems, the policy necessary to enable more diverse systems and the required financial investment and incentives mechanisms. Actions need to be taken to:

- Recognize and celebrate the diversity of cultivated food crops and domesticated animals and their related wild relatives, of associated food knowledge, and of the myriad cuisines formed from this diversity. Much more information is needed for many species on their potential to contribute to one of the major crisis highlighted above. This will include productivity, nutrition, resistance to biotic and a-biotic stresses.
- Use of what remains of the world's heritage of food diversity in farmers' fields when they are contribute to enhance food and nutrition security and conserve in conservation facilities those that may be important for future generations:
- Ensure an enabling environment that provides incentives to access and sustainably use agrobiodiversity in production systems; and
- Develop a green investment plan in support of new business models and economic systems that enhance profitability of more biodiverse production systems to change food production, markets, and consumer preferences such that food systems enable both men and women farmers to gain a viable livelihood through the use of agrobiodiversity.

Crosscutting is the need to create awareness on the importance of agrobiodversity for improving nutrition and health and reduce the carbon footprint of agriculture. In addition, we foresee innovative finance to conserve agrobidiversity for future generations. The sub-set of potential solutions contemplated in this document are:

- Develop innovative finance mechanisms to ensure buy-in from the financial sector, food processing and seed corporations and foundations, civil society and men and women involved in the long-term conservation of agrobiodiversity. Potential instruments to be evaluated are green bonds, concessional loans, crop-based fundraising and crowd sourcing campaigns.
- Scale up the existing communication campaigns and tools to ensure adequate understanding and advocacy from a non-scientific audience in topics related to agrobiodiversity conservation and use, specifically farmers and consumers.
- Modernize the existing framework for distribution and access and benefit sharing of agrobiodiversity to ensure greater accessibility of the collections by gender differentiated end users and smallholder farmers and create a more important positive impact in the livelihoods of them all.
- Implement a strategy for conservation, improvement, use and consumption of Neglected and Under-Utilized Species (NUS), including women-led schemes to increase purchasing power by growing, household consumption and marketing of indigenous/under-utilised/neglected nutritious crops (*proposed by Action Track 1).
- Increase the gender-sensitive funding for the characterization and sequencing of the world's priority collections of food diversity to better understand the intrinsic value of species and varieties and their contribution to resilience, biotic and abiotic stresses resistance/tolerance, livelihood, nutrition.
- Strengthen the programmes around agrobiodiversity use in marginal ecosystems with significant food security problems, such as the desert or drought-vulnerable areas.

c. What was/were the source(s) from which this solution emerged?

This game-changing solution is inspired by the Sustainable Development Goals, namely Target 2.5. A precursor of this solution in the communications space is the Food Forever campaign, launched by the Crop Trust, FAO and the governments of Germany, Netherlands, Norway and Switzerland in 2017 and which will finalize in mid-2021. For the particular case of food crops, an important basis for the conservation angle lies in the Crop Trust's crop conservation strategies and the key collections identified by FAO's International Plant Treaty. In the livestock sector, the main resources can be found in the Global Agenda for Sustainable Livestock (GASL), a high level group hosted also by FAO. The solution also takes inspiration in the CBD Framework, namely Aichi Target 13 and the One Planet, One Health approach. Finally, the seeds for needs program, implemented by the Alliance in 15 countries around the world and other agrobiodiversity initiatives related to NUS and use of genetic diversity to manage biotic and abiotic stresses represents a good example to operationalize the implementation of the proposed solutions

d. What problem is it trying to address within food systems?

Agrobiodiversity is threatened by unsustainable production systems. Agricultural production and markets tend to become more uniform, leading to an erosion of diversity from production systems. Traditional knowledge about the husbandry and use of diverse foods is in turn disappearing. And the ongoing efforts to conserve food biodiversity have not succeeded in fully stemming the tide of these losses. Such loss of agrobiodiversity has significant impact on the resilience of production systems, their ouputs, in terms of food and nutrition security, the quality of the environment in terms of land degradation and provision of ecosystem services. Out of the major crisis that we are facing, the climate change, the triple budrden of malnutrition, land degradation and biodiversity loss, agrobiodiversity can be an important component of the solution.

e. Why is addressing that problem important for achieving the goal of your ACAI?

The long-term conservation and availability of food diversity is crucial to ensure the long-term resilience of the food system, especially amidst the increasing climate variability, growing population and significant land degradation. Agrobiodiversity provides options to breeders and farmers in the future to ensure the sustainability of their livelihoods and to supply consumers with nutritious, delicious food, forever. However, the entire incentive systems is not conducive to greater use of agrobiodiversity in production systems, hence the need to deeply transform those incentive system to achieve the goal. Eventually, this will improve biodiversity by reducing the use of external inputs in production systems and creating a better environment for insects and birds among others.

f. How can this solution address that problem?

A bigger ownership from a broader range of stakeholders in food diversity conservation and use initiatives will ensure sufficient funding to protect this resource, as well as sufficient exposure to ensure political buy-in for improvements in the regulatory framework for access and benefit sharing.
Actors that need to be involved in this solution, besides this Working Group, include:

- Research centres, including hosts of international key collections (such as the CGIAR), as well as national centres working to support agrobiodiversity. This sector already has high stakes in the solution and therefore sufficient buy in. This group needs to improve its distribution of the collection to better impact on smallholder farmers and ensure more agrobiodiversity is injected in production system. In addition, they need to close the knowledge gap by characterizing better the collection they have to identify desired traits that would improve e.g. resilience and nutrition.
- Regulatory framework agencies, including the International Plant Treaty and the CBD. Outreach and engagement activities should be done at the Secretariat and country-level. It will be important to ensure the seed laws and laws to implement major treaties such as ITPGRFA, CBD and Nagoya protocol are implemented in ways that will incentives greater use of agrobiodiversity
- The indigenous groups and smallholder farmers as custodians of an important part of the world's food diversity as well as its associated traditional knowledge. Some groups including those behind in situ conservation projects like the Parque de la Papa in Peru are already strongly involved with these topics and aligned with this solution proposal. They will be the user of agrobiodiversity and will be part of the research agenda aiming at closing the knowledge gap.
- The financial sector, which already has shown an initial interest in raising catalyst funds for global common goods (see the case of the HSBC and Clarence House-led project, Terra Carta). The financial sector will be crucial in the design of instruments to catalyse greater, sustainable funding in the long run. This will be in line with green and circular economy and support the establishment of SMEs in local communities that will generate income and jobs for women and youth.
- The food processing and seed sectors, given that they have the foremost influence in ensuring the diversification of food trough product development, as well as the optimization of the value chains. Certain networks of companies have already shown interest in these topics, namely the One Planet Business for Biodiversity (OP2B). There is a need to transform markets from uniformity to diversity.
- The main actors behind ensuring a greater awareness of the importance of agrobiodiversity, include the media and the civil society. A particular strength in this regard lies in **the convening and communicational power of chefs**, which have strong ties with individuals (particularly in the developed world), which use agrobiodiversity on a daily basis and which are already associated in several networks such as the Chefs' Manifesto.

In short, there is already significant buy in to the topics from different stakeholders, but a more consolidated strategy needs to be implemented to ensure the advocacy and support is adequately directed to tackle the main problems of insufficient funding for agrobiodiversity conservation and use

activities, as well as the existing restrictions to provide access to farmers and breeders of the material hosted in the international system.

g. Why does this solution align to the definition and criteria for a 'game changing solution' developed by the Summit?

The solution is disruptive in several sense:

- It can significantly change the way we address the conservation of our food diversity and therefore leave a lasting impact in the way our food systems operate in the future. The solution is achievable, because the necessary resources are significantly lower than those required to cover other priorities within SDG2 (e.g. safeguarding all the world's crop diversity only requires around US$850-1,000 million). The solution impacts the work in other action tracks, including tackling food insecurity, promoting nature-based solutions, and supporting farmers' livelihoods.
- It will transform production systems from monoculture to more greater sustsinability through better use of agrobiodiversity. This will require significant changes in laws and policies to provide the necessary investment from public and private funds
- It will stimulate the development of local economies based on circular and green economy as well as on corporate social responsibilities. This will give opportunity for job employments for women and youth. This will also require public and private investment in support the creation of startups.
- Finally, it will have a positive impact on consumers who will have more choices for healthy food. This will require the willingness of food processors, distributors, retialers to accept more diversified food sources and shift in value chains.

h. What is the existing evidence supporting the argument that this solution will work, or at least that it will achieve the initial outcomes described above?

Agrobiodiversity - the wealth of plants, animals and microorganisms used for food and agriculture[1] - plays a key role in the transition towards more sustainable and resilient food systems. There is a large amount of research and evidence suggesting that maintaining and increasing diversity in agricultural settings is key to boosting nature-positive production at scale.[2] In agricultural production, agrobiodiversity supports long-term productivity, and resilience, boosting yields in quality and quantity, increasing soil and water quality, contributing to pest and disease mitigation, and reducing the need for synthetic fertilizers.[3] [4] Agricultural biodiversity also keeps open options for unknown future needs, if conserved in gene banks and on farms.[5] Agrobiodiversity is also the foundation of agroecology, which is recognized as a successful approach to shift towards more sustainable and resilient food systems. Not only it increases resource-use efficiency and minimize waste and pollution (through a virtuous cycle in which all the natural elements are both inputs and outputs of the production process), it also addresses the need for equitable food systems where people can choose what they eat and how it is produced.[6] [7] Increasing the use of agrobiodiversity in production can mitigate agricultural risk and stabilize men and women farmers' income. Broadening the type of cultivated plants and diversifying production reduces risks of losses due

[1] FAO. 2004. "What is agrobiodiversity?". Available at: http://www.fao.org/tempref/docrep/fao/007/y5609e/y5609e00.pdf
[2] Leclère, D., Obersteiner, M., Barrett, M. *et al.* Bending the curve of terrestrial biodiversity needs an integrated strategy. *Nature* 585**,** 551–556 (2020). https://doi.org/10.1038/s41586-020-2705-y
[3] Bioversity International, 2017. Mainstreaming Agrobiodiversity in Sustainable Food Systems: Scientic Foundations for an Agrobiodiversity Index. Bioversity International, Rome, Italy.
[4] Wood, Stephen & Baudron, Frédéric. (2018). Soil organic matter underlies crop nutritional quality and productivity in smallholder agriculture. Agriculture Ecosystems & Environment. 266. 100-108. 10.1016/j.agee.2018.07.025.
[5] Bioversity International, 2017. Mainstreaming Agrobiodiversity in Sustainable Food Systems: Scientic Foundations for an Agrobiodiversity Index. Bioversity International, Rome, Italy.
[6] Gliessman, Steve. (2016). Transforming food systems with agroecology. Agroecology and Sustainable Food Systems. 40. 187-189. 10.1080/21683565.2015.1130765.
[7] HLPE. 2019. Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

to climate change, pest and diseases. It also benefits the environment by increasing the abundance of pollinators and beneficial soil organisms.[8]

i. What is the current and/or likely political support for this idea?

The topic of agrobiodiversity is already being addressed within other Action Tracks, including AT1 (promotion of projects for NUS), AT3 (spearheaded by WWF and specifically tackled by one of the working groups focused on agrobiodiversity led by the Crop Trust and Bioversity), AT4 (mainly through the advocacy of IFAD), and AT5. Several governments with important leverage in the topics have already contributed significantly to activities of agrobiodiversity conservation and use. This include (but are not limited to) the US, most of Western Europe, South Korea, Japan, Australia and New Zealand. Most of the agrobiodiversity lies in collections in the developing world, which could ensure a multipolar support to the solution. This solution has been shared with the International Plant Treaty's Secretariat, one of the fundamental regulatory institutions working on these topics, with positive feedback. The private sector and financial sector have also shown initial interest as explained above, particularly through the OP2B network which is heavily involved in the Summit and which hosts most of the Forbes 500 food processing companies globally. Indigenous and farmers association show interests in this solution. Consumers in some parts of the world are aware of the importance of healthy food, there is a growing trend for eating healthier and more diverse, so a buy-in from a larger audience could be easily achievable provided the adequate outreach mechanisms are set in motion.

j. Are there certain contexts for which this solution is particularly well suited, or, conversely, contexts for which it is not well-suited at all?

There are a number of tools developed in the past few years that allow to monitor the progresses in foiod systems, some of which also consider agrobiodiversity. Among others, the Food System Dashborad , the economist intelligence unit global food security index, the Alliance of Bioversity and CIAT Agrobiodiversity index. None of them indicates any places where this solution is not suitable. However, if we use dietary deficiencies as an indicator for poor use of agrobiodiversity, it is more urgent to adopt this solution in the global south.

k. Who are the key stakeholders to be further involved in the process of developing and refining the solution idea?

Key stakeholders include national and international research system, international organizations (FAO, Global Crop Trust, ITPGRFA, CBD, IFAD, WFP), international NGOs (WWF, IUCN), National Government, private sector (seed companies, food processors, distributors, retailers), Action Track 1 and Action Track 4.

[8] Bioversity International, 2017. Mainstreaming Agrobiodiversity in Sustainable Food Systems: Scientic Foundations for an Agrobiodiversity Index. Bioversity International, Rome, Italy. Available at: https://www.bioversityinternational.org/fileadmin/user_upload/online_library/Mainstreaming_Agrobiodiversity/Mainstreaming_Agrobiodiversity_Sustainable_Food_Systems_WEB.pdf