



United Nations Food Systems Summit
Action Track 3: Boosting Nature Positive Production
Potential Game Changing and Systemic Solutions:
A Second Compilation

Submitted to the UN Food Systems Summit Secretariat, 20 May 2021

DISCLAIMER: This paper presents a second initial set of ideas submitted to the UN FSS Secretariat by Action Track 3 (i.e., the ‘wave 2’ of ideas). The ideas presented here are far from final: they will continue to be developed further and contextualised, through active stakeholder engagement. Note that while these ideas are emerging from an interactive and collaborative process, Action Track 3 is a diverse and broad group, containing varied perspectives and opinions: inclusion of a solution here should not be interpreted as an endorsement of that idea on behalf of all Action Track 3 members or their institutions.



Contents

A.	Introduction	4
B.	Action Track 3 process to generate game changing solutions.....	5
C.	Action Area Protect.....	10
1.	Deforestation-free and conversion-free food supply chains.....	10
Table 1.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	10
2.	Land-freshwater nexus	18
Table 2.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	18
3.	Agri-food support (including subsidies)	22
Table 3.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	22
D.	Action Area Manage	27
4.	Transformation through innovation for nature-positive production	27
Table 4.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	27
Solution 4.2	Write-up: The right to a healthy and safe environment.....	41
Solution 4.3	Write-up: Women's land tenure rights.....	44
Solution 4.4	Write-up: Food Systems Landscape Finance Innovation Hub	48
5.	Sustainable Livestock	52
Table 5.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	52
6.	Transformation through agroecology and regenerative agriculture	61
Table 6.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	61
Solution 6.3	Write-up: Fund to offer de-risking arrangements to finance investments in sustainable agriculture.....	91
Solution 6.4	Write-up: Accelerator Facility to support the transition to sustainable agriculture	94
7.	Agrobiodiversity	96
Table 7.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	96
8.	Blue Foods.....	101
Table 8.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	101
9.	Indigenous Peoples’ food production systems	104
Table 9.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	104
E.	Action Area Restore	108
10.	Grasslands and savannahs	108
Table 10.1	Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	108

Solution 10.2 Write-up: Considering the impact of human wildlife conflicts on sustainable food production and local communities, and make sure this is managed well.....	112
11. Monitoring and stakeholder engagement with evidence	115
Table 11.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	115
12. The Soils Hub.....	116
Table 12.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio	116
F. Wave 2 submissions proposed to be assigned to Solution Clusters in other Action Tracks.....	134
Action Track 2	134
Solution Write-up: Preventing zoonotic diseases emergence for sustainable food systems though a One Health approach : the One Health High-Level Expert Panel and the PREZODE initiative	134
Action Track 5	139
Solution Write-up: You can't manage what you don't measure: National food production inventories	139
Solution Write-up: Food and Land "Net Zero" Country Alliance	141
Solution Write-up: Banking for Impact on Climate in Agriculture	144

A. Introduction

Goals of Action Track 3

The food system is vital to the survival of our species. As the global population rapidly increased in the 20th century, agriculture innovations ensured food producers could keep pace. The food system is the biggest employer in the world - with over 1 billion people working in food - and farming creates opportunities to lift people out of poverty in the developing world.

Biodiversity and well-functioning ecosystems underpin sustainable food production and our ability to deliver on the Sustainable Development Goals, as well as the biodiversity and climate targets laid down in the Convention on Biological Diversity and the Paris Agreement respectively. Given the urgency and scale of change needed, a shift in food production must aim to enhance natural capital and its delivery of ecosystems services that support humanity.

The goal of Action Track 3 is therefore **to boost nature-positive production systems at scale to globally meet the fundamental human right to healthy and nutritious food, while operating within planetary boundaries.**

As the basis of our food production, the health and productivity of our land and water resources are critical for our future sustainability. But food production systems are currently the single biggest underlying cause of decline in nature, responsible for approximately 80% of deforestation, 70% of freshwater withdrawal, and up to 29% of all greenhouse gas emissions -- while livestock contributes over 14% of all anthropogenic GHG emissions, 44% of which is in the form of methane. Drivers linked to agriculture cause 70 per cent of terrestrial biodiversity loss and 50% of freshwater biodiversity loss. Direct exploitation (mainly fishing) for food, is the primary driver of the decline in health of the oceans. With aquaculture using 20% of all wild fish caught for feed, we are destabilizing the recovery potential for fish stocks. Croplands and grazing lands now cover more than one third of the Earth's land surface, with recent clearance of native habitats, including forests, being concentrated in some of the most species-rich ecosystems on the planet.

Nature-positive production

Nature-positive food systems are characterized by a regenerative, non-depleting and non-destructive use of natural resources. It is based on stewardship of the environment and biodiversity as the foundation of critical ecosystem services, including carbon sequestration and soil, water, and climate regulation. Nature Positive Food Systems refer to protection, sustainable management and restoration of productive system. Finally, nature positive food systems cover the growing demand for food in a sufficient way and include sustainable and healthy nutrition.

This document reflects 'second wave' of game-changing solutions emerging from the work of Action Track 3 as of 20 May 2021.

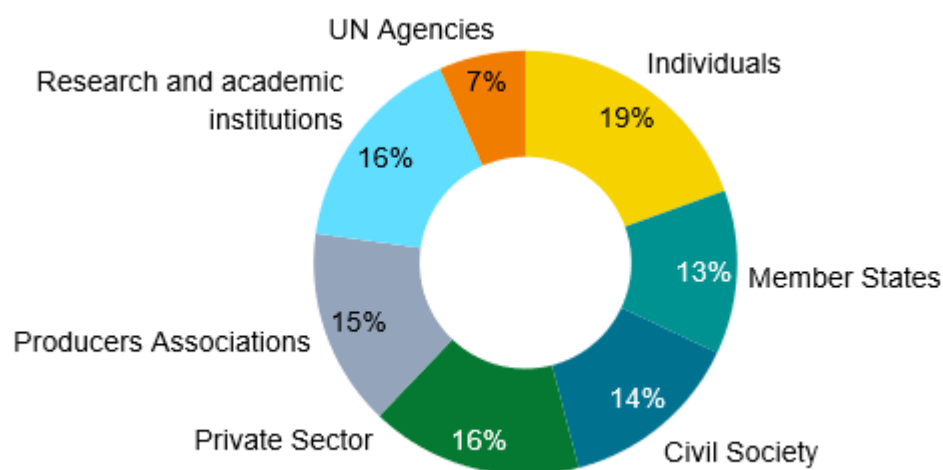
B. Action Track 3 process to generate game changing solutions

In February 2021, Action Track 3 shared a ‘first wave’ of solutions. While the development of the ‘first wave’ of solutions has been underway, many additional ones have been received through the public survey and as submissions through the UN agencies, Member States, civil society organizations and the private sector.

We have processed and reviewed this ‘Wave 2’ solutions to add to our Wave 1 solutions portfolio.

Action Track 3 received a total of 272 solutions in Wave 2, those received between 15th February and 1st May. These solutions came from both direct submissions to the AT3 Leadership Team as well as through the public survey. Submissions have been received from a diverse range of stakeholder groups as detailed in the below chart.

Source of Wave 2 submissions:



Building on Wave 1, Action Track 3 has created a number of ‘Solution Clusters’ to take forward our work. The Solution Clusters will be the nodes of action to create coalitions around specific themes, bringing together Member States, UN agencies, Financial Institutions, CSOs, private sector institutions, academia and existing initiatives.

We have mapped all input received in the Wave 2 against these Solution Clusters. Where there are synergies with the topic already proposed we will take Wave 2 ideas forward within the existing Solution Clusters, developing new topics only where this addresses a significant gap in our proposals.

We have mapped all input received in the Wave 2 against our existing ideas, organised into ‘Solution Clusters’. **This document outlines the ideas we have received in two ways:**

- a. ***Solutions that map directly into existing solutions: we have not requested a two-page summary, only a synopsis. These are displayed in tables along this document.***
- b. ***Solutions that do not map directly into existing propositions: we have requested a two page summary. These are displayed in full write-ups.***

Action Track 3 Action Areas

The Solution Clusters for Action Track 3 are organised under three 'Action Areas' building on the existing structure of Action Track 3:

1. **Protect** natural ecosystems against new conversions for food and feed production.
2. **Manage** existing food production systems sustainably, to the benefit of both nature and people.
3. **Restore** and rehabilitate degraded ecosystems and soil function for sustainable food production.

Within each Action Area, Action Track 3 has grouped related propositions from 'Wave 1' into a number of 'Solution Clusters'. These Solution Clusters will form the starting point of coalitions of action to develop and mobilize the actions needed up to the Summit and beyond.

Solution Clusters within Action Area "Protect"

a. Deforestation-free and conversion-free food supply chains

This Solution Cluster will aim to move towards eliminating the destruction and conversion of forests and other intact natural ecosystems for food production. As part of this work, we will consider the incentives to farmers for implementing timebound commitments to eliminate conversion in key commodity supply chains; transitioning smallholders to zero conversion production through preferential access to supply chains; robust monitoring and verification systems along supply chains to eliminate illegal deforestation and conversion; trade policy reform to minimize embedded conversion in supply chains.

b. Land-freshwater nexus

This Solution Cluster will aim to develop incentives that promote IWRM practices in food production to protect watersheds and conserve surface and groundwater resources e.g. mechanisms such as water funds, water harvesting, and payments for water services to better manage trade-offs and leverage synergies among conservation and development efforts for enhanced resilience in the agriculture and fisheries sectors.

c. Agri-food support (including subsidies)

This Solution Cluster will aim to redirect or repurpose support (incl. subsidies and incentives) to enable a just and inclusive transition towards sustainable agriculture, addressing food and nutrition security as well as climate and nature emergencies, e.g. towards preserving and enhancing ecosystem services on farmland, maximising agrobiodiversity, reducing inputs, precision farming, natural habitat management on farmland.

Solution clusters within Action Area “Manage”

d. Transformation through innovation for nature-positive production

This Solution Cluster will propose innovations to achieve net gains in biodiversity, fight climate change and increase farmers' resilience. This includes innovations to improve the nutritional value and resilience of crops and breeds, climate-smart agricultural techniques, digital innovations, and related metrics to measure progress against intended outcomes, among others. These innovations will leverage genetic diversity of plants, animals and micro-organisms, by applying the latest scientific advances and technologies in food systems.

e. Sustainable Livestock

This Solution Cluster will propose new approaches to make livestock nature-positive and more resilient to shocks, drawing from best practices across diverse geographies and landscapes, while securing the livelihoods of livestock producers, including pastoralists, around the world. The cluster will propose innovations to halt deforestation due to grazing and reduce emissions from livestock, thus mitigating climate change. It will also look into the policies and incentives needed to transform nature-negative livestock into sustainable livestock and other land-use alternatives. This solution cluster will also be involved in discussions on solutions related to AMR and elements of One Health.

f. Transformation through agroecology and regenerative agriculture

This Solution Cluster will propose a paradigm shift towards context-specific and locally adapted models of production that aim to deliver simultaneously on the economic, environmental, climate mitigation and adaptation, nutrition, health, social and cultural fronts, guided by the 13 principles of the [HLPE report](#) (2019). These models of production are characterized by a much greater diversity of varieties, breeds, species and sources of livelihoods to provide healthy, diverse diets and they will be knowledge intensive with co-innovation between farmers and scientists. They will call on all innovations and technologies that are compatible with the 13 principles, such as optimizing/reducing/replacing synthetic inputs while improving soil health, restoring degraded agricultural lands, improving ecosystem services and increasing wild biodiversity in agricultural landscapes. The cluster will propose policy changes and incentives to support the transformation. It also proposes that the FSS adopt a set of principles based on the 13 HLPE principles to guide future food system transformation.

g. Agrobiodiversity

This Solution Cluster aims to increase the number of plants and animals that humans rely on (currently, 12 plants and 5 animals make up 75% of our food calories), while improving nutrition and reducing pressures on natural ecosystems. This Solution Cluster will safeguard, conserve and manage what remains of the world's genetic diversity, including different varieties, local breeds and wild relatives of crops and animals, in gene banks and on the fields. It will also promote agricultural research to improve minor crops' production systems and suggest mechanisms to better connect smallholders to markets through public procurements, value-added products, market niches, and private sector partnerships. This cluster will work to foster integration of agrobiodiversity into agricultural policies, consumer marketing, and dietary guidelines. Finally, it will also focus on improving the enabling environment to scale up agrobiodiversity such as seed systems and regulatory frameworks.

h. Blue Foods

This Solution Cluster will work to reverse the decline in wild fisheries (from oceans and inland waters) and restore their abundance through good management practices, investments in capacity-building tools for blue foods' value chains, including aquaculture, and implementation of climate resilience strategies. It will also work with countries to strategically prioritize funding and make blue food-friendly policy decisions to support their maintenance and sustainable growth.

i. Indigenous Peoples' food production systems

This Solution Cluster will highlight and promote indigenous peoples' knowledge and food systems, which have allowed them to produce and harvest food sustainably while conserving their territories. This will entail: facilitating the transmission of traditional knowledge; fostering capacity development, especially of indigenous women; and securing Indigenous Peoples' collective and individual rights to access and use their traditional territories, natural resources and lands.

Solution Clusters within Action Area “Restore”

j. Grasslands and savannahs

This Solution Cluster will elevate the profile of grasslands and savannahs in the global efforts aimed to implement nature-positive production. This cluster will establish a multi-stakeholder platform on grasslands, shrublands and savannahs building on existing networks to raise awareness on their value, and advocate for their protection, sustainable use and restoration and develop a global data platform for assessing and tracking grassland health.

k. Monitoring and stakeholder engagement with evidence

This Solution Cluster will enable systematic monitoring to track progress of restoration actions and outcomes and bring together stakeholders at multiple scales to reflect on the evidence to make better decisions regarding restoration investments. While multiple forms of data and information exist that link broadly under the umbrella of a food system, too rarely are they brought together in an accessible format and within engagement processes where they can be interrogated, interpreted and applied to decision making contexts across scales. The proposed SHARED¹ process therefore get at the root of information, process, engagement and relationship gaps within a food system context, importantly establishing participatory buy-in for robust evidence, monitoring and how to apply actionable evidence.

l. The Soils Hub

This Solution Cluster aims to recognize soil as an environmental asset. This Cluster will bring all soil issues under a common platform (hub) with the following goals: restore soil health, promote adoption of regenerative agriculture, establish a mechanism to incentivize farmers by payments for ecosystem services, design financial mechanisms for rebuilding soil function and improving livelihoods of farmers through an equitable carbon financing. Agricultural soils have a large potential to sequester carbon (organic and inorganic), contributing to climate change mitigation, adaptation, resilience, as well as improved livelihoods. Restoring soil function requires a widespread adoption of regenerative agricultural practices, which create a positive soil/terrestrial carbon budget, strengthen coupled recycling of water with carbon and nitrogen along with other elements, and restore degraded soils and ecosystems for producing more from less, and returning some land and water etc. to nature.

¹ Stakeholder Approach to Risk Informed and Evidence Based Decision Making (SHARED)

C. Action Area Protect

1. Deforestation-free and conversion-free food supply chains

Table 1.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Academic Institution	P-Curiosity Lab Mohammed VI Polytechnic University	Detecting and mapping deforestation for an evidence base interventions	By leveraging high quality satellite imagery and high computing power, it is possible to create a state of the art model concerning deforestation detection, risk assessment of potential food scarcity, nutritious food availability and how to manage land use without degrading natural habitat. That is why our model aims to map deforestation in Africa.
Member State	Brazil	Produce, Conserve, Include Strategy: Providing Proof of Concept of the Jurisdictional Approach in Mato Grosso, Brazil	<p>Context and rationale: Despite public and private sector efforts, deforestation is rising. In 2018, about 30 million acres of tropical forest were lost. The global community needs innovative, collaborative solutions – such as the jurisdictional approach – to reduce deforestation at scale. The jurisdictional approach encourages companies, government, and local stakeholders to work together to reduce deforestation and create sustainable development at scale. Through collaboration and locally-led approaches, stakeholders within jurisdictions can drive towards sustainable growth while supporting climate mitigation and resilience.</p> <p>Overview of contribution: One jurisdictional initiative, the “Produce, Conserve, Include (PCI) strategy,” aims to increase productivity while maintaining native vegetation cover and including smallholders and indigenous and traditional populations across Mato Grosso, Brazil—which produces nearly 30% of Brazil’s soy and has the largest cattle herd in the country. Meeting these aggressive targets requires a multistakeholder effort that brings together government, civil society, producers, and companies. Stakeholders ensure that local laws, regional efforts, and corporate policies work in concert to catalyze reduced deforestation at scale. Achieving the PCI’s goals would prove that enhanced productivity and deforestation reduction are compatible, and position Mato Grosso as a sustainable development leader in the context of a</p>

			<p>federal government largely averse to sustainability initiatives. To get there, the PCI is supporting strong governance, leveraging financial mechanisms, and supporting corporate supply chain sustainability. The Climate Action Summit offers an excellent opportunity to showcase the PCI's success to date and future implementation plans, effectively bolstering sustainable development and encouraging other regions to follow Mato Grosso's lead.</p>
Member State	Brazil	Adopt a Park Program	<p>The Adopt a Park program was instituted in 2021 to invite individuals and companies, national and foreign, to adopt federal conservation units at the proposed value of R\$ 50 per hectare per year. The potential contribution (over R\$ 3 billion to the Amazon alone) will be directed to the hiring of fire brigades, monitoring services, restoration of degraded areas and other activities necessary to preserve national parks and forests in practice. Take into consideration the key role of ecosystem preservation to regulating climate and, thus, food production, this is an important initiative to make conservation units economically sustainable and improve their effective management.</p>
Member State	Brazil	Brazilian Forest Code & complementary mechanisms /instruments	<p>a) Problem addressed within food systems: sustainable land use and protection of natural ecosystems through private proprieties.</p> <p>b) What makes the solution to a "game changer": land use regulation is essential for sustainable agricultural production, environmental conservation, biodiversity preservation and climate change mitigation.</p> <p>c) Importance of addressing the problem for achieving the goal of AT3: contributes to sustainably using natural resources to the benefit of climate, environment and people.</p> <p>d) Is this a new concept? It is a successful practical experience in Brazil. Since the very first version of the Forest Code in Brazil, in 1934, the country has opted for a "land-sparing" approach to conservation, combining high yield farming together with sparing a percentage of private properties to biodiversity conservation. The regulation of land use by private owners of rural properties is considered an essential element for sustainable agricultural production, biodiversity conservation and climate change mitigation. Although the actual % of spared land has varied</p>

over the years, the “land sparing” approach has not. Therefore, today, the country has almost 90 years of “land-sparing” experience, summarized in: the highest percentage of native vegetation coverage (12% of the worlds’ total protected areas is located in the Brazil) and, at the same time, the fifth largest agricultural producing country. In this context, in 2012 the Brazilian government established the Forest Code, a law which establishes rules for the protection of native vegetation in private rural properties. According to this law, farmers are required to set aside part of their property area (20%, 35% or 80%, depending on the biome where it is located) for environmental conservation, without any remuneration. This policy guarantees that private landowners and agricultural producers also contribute to environmental conservation. Protection percentages can easily be adjusted to adapt to different types of biomes, production systems, etc. There is enough evidence to acknowledge the advantages of the “land sparing” approach to biodiversity conservation, allowing conservation targets to be met without compromising food security. We believe this model should be recognized as the very definition of “game changing solution” within Action Track 3 for a biodiversity-friendly food system approach. We therefore would recommend that the Summit recognize the value of national regulations sparing a compulsory percentage of private property to conservation targets, within nationally defined priority biomes. We need a higher level of ambition in order to improve sustainability of food systems worldwide. In this sense, we would recommend that the Summit recognize as a game changing solution the need of further protecting areas of key importance for ecosystems survival, such as riverbanks and springs, areas around natural lakes and lagoons, mangroves, sandbanks, wetlands, peatlands, hillsides and hilltops.

Member State	Denmark	Deforestation - free value chains	<p>Policies and partnerships</p> <p>A general crosscutting element at the Food Systems Summit could be how policies can support deforestation-free agricultural commodity supply chains and incorporate standards that are in line with agreed policy objectives in the United Nations and other international bodies. Such objectives include climate change, conservation of critical ecosystems, energy usage and the protection of human rights and the rights of indigenous people.</p>
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Solutions should be developed in cooperation between countries, and the ongoing work with the Amsterdam Declarations Partnership is an example of an ambitious cooperation on the matter.

International trade policies

Another contribution to developing and promoting ambitious new and existing standards on deforestation could be through policies and instruments related to international trade flows and supply chains, including government trade policy. Making trade policy work to address deforestation requires that multilateral, regional, bilateral and unilateral trade instruments increasingly incorporate ambitious standards of sustainability including options for regulating deforestation-free commodity trade. Taking into account WTO obligations, this could build on existing references to standards in trade agreements. Inspiration may also be found in legislative measures such as the EU Timber Regulation and voluntary certification schemes such as the FSC Standard.

Public Procurement

In addition to this, public procurement policies can contribute to create a demand for responsible and deforestation-free value chains. At consumer level and food processing industries, awareness must be nourished and translated into choices. This requires that standards for food products and feed would need to be based on transparent criteria and third party verification.

Member State	GIZ	Deforestation-free supply chains of agricultural commodities	About 80% of deforestation in the tropics is driven by agriculture. As agriculture highly depends on many ecosystem services provided by forests, reducing commodity-driven deforestation would contribute strongly to sustainable food systems. A major share of commodities driving deforestation is exported to consumption markets, but most is consumed domestically. Many global companies have committed to zero-deforestation in their supply chains by 2020 – without achieving that goal. The EU Commission has announced to present in Q2 2021 a legislative proposal to avoid or minimise the placing of products associated with deforestation or forest degradation on the EU market. But more efforts are needed to achieve deforestation-free supply chains. Deforestation-free supply can be implemented in various ways: Through corporate engagement building on
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			instruments such as certification and many more, through landscape or jurisdictional approaches and – in the future – mandatory due diligence on deforestation-free supply chains when the announced legislative proposal by the EU will enter into force. Also, other consuming markets could create obligations and incentives to eliminate deforestation from their markets. Production and consumption countries should enter into partnerships to create enabling framework conditions for reducing commodity-driven deforestation while ensuring and improving notably smallscale farmer’s livelihoods. However, a legitimate basis by UN and WTO is needed to prepare the ground for demand side measures as there is no UN-agreement on forests yet.
NGO	Climate and Land Use Alliance	Better forest governance	Better ways for governing forests and land use would help the climate & give confidence the food we eat is not produced at the cost of tropical forests. Much land clearance for food commodities is a result of opaque land acquisition processes, sometimes illegal forest clearance. Reducing the corruption, land speculation, and increasing transparency and accountability of land governance would lead to less conflict, more sustainable forests & food production, a more stable and fairer world.
Private Sector	PROAmazonia	Transition to sustainable production and free of deforestation in the Amazonia: Ecuador, a model for the world	The Ecuadorian Amazonia, with an area four times the size of Belgium, is the home of 245,000 inhabitants of 10 indigenous nationalities, who represent a third of the population in this region. It also hosts 17 protected areas that cover approximately one fourth of the territory. In this region, sustainable cocoa, coffee and palm cultivation is gaining importance as a deforestation-free income generating activity for local farmers. The challenge is to find markets with better prices. This challenge is critical to allow families to be economically sustainable, which also fosters social and environmental sustainability since it prevents the expansion of the production area into the forest. This is also understood by the Ecuadorian authorities who have been working to outline a sustainable and free deforestation production policy.
Private Sector	QLBS	An online certification system that enables more small holders to participate in	Participation of Small Farmers in Global food supply essential to world prosperity: Of the 550 farms worldwide less than 2 million are certified for export. - Their way is blocked by capability and compliance.

		supplying the Global producers and suppliers.	<p>- GlobalG.A.P. (Certifier of Good Agricultural Practice) has developed a pathway from local to export certification</p> <p>- QLBS has developed a ‘cloud platform’ enabling farmers to work with consultants and certifiers to journey along the GLOBALG.A.P. pathway to export.</p> <p>- Certification will not only open up new markets but will drive farm practice improvement</p> <p>The program will build capability and reduce the cost of certification, opening the way for greater export participation.</p>
Producers Association	World Farmers Organization	Sustainable and innovative forest management	<p>In Finland, in response to climate change effect, efforts have been made to protect and conserve forests. It is a forest management plan that contributes to carbon dioxide sequestration, optimisation of water management and protection of biodiversity. In fact, the project ensures continuous growth of the trees, which are divided into different groups according to age. This creates a mosaic of trees in different growth stages and ensures that there are always trees growing and sequestering carbon from the atmosphere (Woodland and reforested areas serve as carbon sinks). After the final felling is performed, trees are planted to regain the growth of the forest as soon as possible. Moreover, to prevent pathogens and pests from spreading, farmers are always removing trees that have fallen or have been injured by abiotic or biotic factors. Thinning and utilization of residues from management practices also prevents uncontrolled forest fires.</p>
Research Institute	FTA/CIFOR	Protect forests and acknowledge their direct and indirect roles in sustainable food systems	<p>Forests are an important source of food for many communities all over the world. Not only do they provide wild fruits, leaves, nuts, and mushrooms – they also provide homes for game animals, insects, and fish that contribute key sources of nutrients for vulnerable populations. Their indirect role in food production is equally important; forests provide important ecosystem services for agriculture – pest control, pollination services, water regulation, flood prevention, and soil enrichment. These important benefits of forests need to be better understood and appreciated so that forests are no longer seen as barriers to food production, but as key components of sustainable food systems.</p>
UN Agency	FAO	Boosting country-led forest positive	<p>Fostering and upscaling implementation of agriculture elements already identified in the REDD+ strategies can boost forest-positive</p>

	production by implementing REDD+ strategies at scale: benefit for food systems, forests and climate	agricultural production in countries that produce commodities for global markets as well as in those that face greater pressures for subsistence production, whether for food, fuelwood or pasture. By taking advantage of the cross-sectoral buy-in, endorsement by a wide range of stakeholders at national and sub-national level, institutionalization, socio-environmental safeguards and solid monitoring protocols developed, the collaboration to the implementation of such actions can represent a “low hanging fruit” to boost a transformational change in the land-use sector, contributing to food security and the sustainability of the food system.
UNDP	The Integrated Supply Chain Approach to deforestation from agricultural commodities production	<p>The Challenge: Deforestation from agricultural commodities production -- The commercial production of agricultural commodities is a dominant economic force in many national and developing rural economies. Worldwide, the livelihoods of 2.5 billion people depend on agriculture. Moreover, growing global population, rising incomes and changing diets will continue to increase demand for agricultural commodities. However, these commodities are considered some of the biggest drivers of tropical deforestation today, leading to losses of habitats and biodiversity, rising carbon dioxide levels and the degradation of essential ecosystem services. For these reasons, it has never been more important to address the social, economic and environmental consequences of unsustainable agricultural practices linked to deforestation.</p> <p>The Game Changing solution: The Integrated Supply Chain Approach -- Attempts to curb deforestation from commodities production have so far mostly focused on siloed work on the production side (e.g. working on policies to support sustainable production practices away from High Conservation Value (HCV) and High Carbon Stock (HCS) areas; or building the capacity of farmers to shift to more sustainable practices), demand side (such as advocating for private sector commitments to sustainable sourcing and supporting the implementation of these commitments), or on the finance side (e.g. developing and promoting financial services supporting sustainable production and sourcing). In their silos, they have not resulted in systemic change for supply chains. We have found that it is important to work on production, demand and finance at the same time so that all key levers</p>

along commodity supply chains are pulled simultaneously to allow for more sustainable supply chains. This requires synchronizing the right policies and capabilities for sustainable production and supply chains, while incentivizing them through market demand, responsible finance and attractive financial products.

2. Land-freshwater nexus

Table 2.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Individual		Recuperar ecosistemas degradados Y establecer sistema productivos sostenibles	Para la seguridad alimentaria hay que establecer sistemas productivos de montañas que sean sostenible, sobre todo en países pobres donde la concentración de la tierras productivas se encuentra en mano de un porcentaje reducido de la población y la producción en montaña es la única posibilidad de los sectores mas empobrecidos.
Producers Association	World Farmers Organization	Smart and efficient use of water resources in Flanders	Drought in Flanders has become a major challenge for the agricultural sector. Among the solutions identified and adopted stand out the reuse of water and precision irrigation. Both are considered to be climate smart agriculture practices and make it possible to make efficient use of water resources and suffer less from the effects of drought. More specifically, the first solution involves the reuse of water of a vegetable processing plant for the irrigation of the vegetables nearby through a smart tubing network. Another technique is precision irrigation that is used in the fruit sector and makes sure only the necessary water is being added to the tree, immediately at the roots. Consequently, farmers' yields have become more stable, while using water efficiently.
Research Institute	IFPRI, IWMI	Nature Based Solutions to safeguard water sources and river flows	The Challenge -- Agriculture, a highly water dependent sector, is simultaneously a major contributor to the worsening global water crisis and vulnerable to increasing water risks brought on by growing competition and climate change. Worldwide, food production accounts for 70% of human water abstraction (i.e. 2,800 km ³ /yr), diminishes and degrades water sources, is a major contributor to water pollution and a foremost cause of aquatic biodiversity loss and ecosystem degradation. Globally, these impacts undermine human water use, including for food production, and have negative consequences for the livelihoods and wellbeing of many millions of people, in particular women and children.

The Solution -- Proactively protect surface and groundwater sources (e.g. lakes, rivers, reservoirs and aquifers) and the watersheds that supply them to ensure both quantity and quality of water resources. Determine and implement environmental flows in rivers to sustain freshwater and estuarine ecosystems (i.e. rivers, wetlands, lakes and floodplains) and the livelihoods and human wellbeing that depend on the ecosystem services they provide. Examples of measures include: (i) riparian management (banks and buffers); (ii) conservation agriculture (iii) terracing of hillslopes on steep farmland; (iv) rehabilitation of degraded lands; (v) grass strips in farmlands; (vi) mitigation measures for road erosion; and (viii) management of reservoirs not only for hydropower or irrigation but for a range of beneficial ecosystem services, locally and downstream.

Game changer -- Many of the challenges of agriculture are brought to the fore and manifest themselves through water but water resources garner little attention in food security strategies. Source protection is active in many countries (e.g. Ethiopia, Kenya, India, USA and Vietnam) but with mixed success. Environmental flows are an increasingly established water management paradigm that is dependent on source protection (e.g. Australia, South Africa, Tanzania and USA) but actual implementation remains contested and limited. SDG 6.4.2 (level of water stress) now incorporates environmental flow requirements and for the first time puts environmental flows onto the global policy stage. Mechanisms are needed to mainstream these practices and promote much greater implementation. Current and potential partners include IUCN, TNC, WWF, World Bank, FAO and many academic institutions.

Research Institute	IFPRI, IWMI	Manage groundwater resources more sustainably through social learning interventions	The Challenge -- As a result of technological innovations in the 1970s and 1980s (cheaper, individual motor pumps and new well drilling technologies), groundwater has become the water source of choice of an increasing share of irrigated food production areas, rapidly growing to around 40% of total irrigated production today; and has, as such, become a key contributor to food security as well as domestic water supply. Groundwater is one of
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the most challenging resources to govern, resulting in overuse and degradation of aquifers, as reflected through rapidly falling water tables in parts of Asia and increasingly in Africa as well as degradation through salinization, pesticide residue accumulation, etc.

The Solution -- The proposed solution is to use social learning interventions in the form of experimental games in groundwater-dependent communities to help communities internalize both risks and opportunities associated with groundwater use and improve sustainability of management. Proof-of-concept work and piloting work of social learning interventions took place in Andhra Pradesh, India, via a community-trusted NGO (Foundation for Ecological Security-FES). The social learning intervention was shown to significantly improve understanding and increase adoption of rules for groundwater management. In communities where the intervention—experimental games—took place, groundwater stewardship improved (MeinzenDick 2018; Meinzen-Dick et al. 2018). Based on the initial results and further piloting by FES in three Indian states, this tool is now being scaled to an additional 1,500 rural communities in six Indian states with the goal to manage water more sustainably. Based on the successes in India, the intervention is now also being piloted in Ethiopia and Ghana. Current and potential partners include -- Foundation for Ecological Security; CGIAR; Government of India; World Bank; African Minister’s Council on Water (AMCOW) under the African Union Commission (AUC)

UN Agency	FAO West Africa	Water control and management to boost sustainable food production and conserve natural capital	<p>In 2016, FAO produced an interesting technical document titled “Strengthening agricultural water efficiency and productivity on the African and global level”. This document should be an inspiration to adopt and scale up some of technique of water control developed. The document clarify among others, the concept of water buffering. The idea behind water buffering is to store water when it is plentiful and in turn, to make it available when it is scarce. Storage is thus the central element. By integrating small storage structures across the landscape in a planned and systematized</p>
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manner, it is possible to create a water buffer that helps dealing with water seasonality and drought.

Three categories of storage can be distinguished:

1. Groundwater storage
2. Soil moisture storage
3. Surface storage

All solutions can be used as stand-alone measures, but to create an improved water buffer they work at best when integrated with each other with high density and at landscape scale.

3. Agri-food support (including subsidies)

Table 3.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Individual		Reward regenerative farming practices for environmental services provided	Considering the regenerative potential of natural positive systems, as agricultural practices that provide natural processes, they must be recognized and promoted as a primary strategy to support the continuous provision of ecosystem services - ES. The institutionalized “provider-receiver” principle through payment for environmental service - PES, where they receive incentives or financial supporting as compensation to guarantee the supply of ES, may be the way to convince local actors in adopting agriculture regenerative.
Member State	Brazil	Forest+ program	The Forest+ program, instituted in 2020, aims to create a market for environmental services, in which a party pays an environmental service provider, such as preventing and fighting forest fires, restoring native vegetation, monitoring and protecting springs. The scope of the Forest+program goes beyond conservation units, reaching all land categories. Among the important results of the program are the national recognition of emissions compensation combined with conservation, the creation of a new regular economic activity in the country (conservation of native forests), the use of USD 96 million from the Green Climate Fund for payment for environmental services, and the sanction of a Federal Law for Payment for Environmental Services.
Member State	New Zealand	Eliminating environmentally harmful subsidies	Agricultural and fisheries subsidies can have considerable negative environmental impacts. New Zealand is working across multiple international fora to secure outcomes that result in the elimination, reduction or reforming of both trade- and production-distorting agriculture subsidies and fisheries subsidies. Trade- and production-distorting agriculture subsidies are the most economically disruptive, as well as the most environmentally harmful agriculture subsidies. Directly supporting farmers to produce (at times contrary to global market signals) can encourage over-production or inefficient

production resulting in increased waste and overuse of inputs such as fertiliser, water, pesticides, and energy.

Studies reviewed by the OECD indicate that domestic support measures, which incentivise increased agricultural production (such as market price support and payments based on commodity output), can lead to increased use of inputs and agricultural land expansion, and thus, increased negative impacts on water quality, greenhouse gas emissions and biodiversity. Payments based on the use of inputs, such as fertiliser and pesticides may affect land allocation by favouring crops that require a higher level of subsidised inputs, and they may expand agricultural land area by increasing the profitability of agriculture relative to alternative land uses. Such trade- and production-distorting subsidies can also work against future-proofing agriculture systems globally, as they may suppress incentives to invest in capability and innovation. Further, when major players with deep pockets

subsidise their producers, it suppresses commodity prices and skews the playing field in favour of richer, subsidising countries. This disproportionately impacts producers that are unable to match these levels of subsidisation, particularly in smaller and often developing countries (who are generally more reliant on agriculture trade), as farming can become unviable due to artificially depressed global prices and exposure to price shocks. This can then have adverse impacts on food security outcomes.

More work needs to be done to build consensus around how we categorise and prioritise responding to the environmental impacts of different types of agriculture subsidies. New Zealand encourages UN Members to work with the OECD and other organisations to develop an appropriate method for categorisation, which would then facilitate more informed policy decisions around the elimination, reduction or reform of these subsidies.

The latest FAO report on the State of World Fisheries and Aquaculture states that the proportion of global fish stocks that are over-fished is continuing to increase and now

			stands at 34.2% while 65.8% of stocks are being fished at their biologically maximum rates of sustainable exploitation, leaving only 6.2% of stocks that are “underfished.” Subsidies that incentivise fishing by reducing capital and operating costs are contributing to that increasingly poor outlook. SDG Target 14.6 requires that the WTO reach an agreement on a multilateral discipline “to prohibit certain subsidies that contribute to overcapacity and overfishing”. Eliminating such subsidies would result in reductions in fishing effort that is only profitable because of subsidies. A reduction in fishing effort on fully exploited and over-exploited stocks will improve stock sustainability and also improve the economic resilience of the sector over time. Likewise, eliminating harmful agricultural subsidies would be a major win for global environmental outcomes, as well as enabling accelerated progress towards Sustainable Development Goal 2: Zero Hunger.
NGO	Compassion in World Farming, UN Food Systems Champion	Redirection of subsidies towards regenerative farming and reducing demand for industrially produced meat.	The opportunities for greening food production are enormous. Take subsidies: globally, governments provide \$700 billion a year in farm subsidies, more than \$1m per minute, much of which currently drives the climate crisis and destruction of wildlife. That money could be far better spent redirecting it toward regenerative farming and reducing demand for meat. The tax system could be employed to power the transition away from diets heavy in industrially produced meat. Taxes could be levied on factory farmed meat. Tax revenue could then offset the cost of healthy, sustainable foods, making them more affordable for all.
NGO	Farm Africa	East African government subsidies for lime not chemical fertiliser	In East Africa, national governments spend millions of dollars on fertiliser subsidy programmes to make chemical fertilisers such as DAP and CAN cheaper to farmers. This distorts the private sector agricultural input market and often these fertilisers do not reach to the smallholder farmers most in need. Furthermore, these fertilisers (while not used as the scale of Asian, South American levels) have a negative impact on the soil. Meanwhile, soil enhancing inputs such as calcitic lime remain unavailable and underutilised by smallholder farmers for soil corrections. Why? Calcitic lime is cheap (\$3-4

			<p>per 50KG in Kenya), logistically challenging (requirements of up to 1mT per acre), and not well understood by smallholders. Agro-input dealers have no incentive to purchase and store lime when the price and space required for storage compares so unfavourably to chemical fertilisers.</p> <p>The idea is to support and incentivise national governments to replace their market-distorting fertiliser subsidy programmes with a subsidy programme promotes the use of lime and other nature-positive inputs, without which do not have a viable route to market for smallholder farmers.</p>
Private Sector	Confederation of Indian Industry Leading Climate Change & Nature Portfolios	Smart Market for Nature-positive production	<p>Sustainable and organic farming is now increasing in most of agri based countries as result of increasing consumer demand and awareness on health life and increasing traceability in agri processing companies. But this is happening at slower pace, confined to small areas due to limited market availability. The producer are facing challenges as there is competition with chemical based agri products resulting in slow adaptation. Developing dedicated policies and market for nature-positive agri products will be any important areas to promote adaptation of sustainable production system</p>
Research Institute	CoSAI	Paying for nature and society: Investment in equitable financial instruments for incentivizing farmers and food system actors to protect nature and biodiversity	<p>PROBLEM: The majority of farmers and other actors in the food system require external economic incentives to take measures to protect and restore natural and semi-natural ecosystems (Pineiro et al 2020). Protection and restoration require investment of farmers' time and resources that may be unprofitable or may only return financial benefits after a number of years. Several financial instruments (e.g. Payment for Ecosystem Services, taxes, grants and subsidies) have been used for this purpose, but in the agricultural sphere, success has been mixed and there have been unintended social trade-offs, in particular the exclusion of poor and marginalised women and men from such schemes (Yang et al 2018, Wang and Wolf 2019). At the same time, there has been a vast global increase in potential funding for support to farmers in low income countries for a variety of social objectives, ranging from climate change mitigation and adaptation to halting deforestation, as well as general social</p>

impact investments (Council on Smallholder Agricultural Finance, Blended Finance Initiative, Global Impact Investment Initiative, Climate Smart Lending Platform and many others). *Many of these funds are actively looking for reliable instruments* for financing their diverse objectives. While there is ongoing innovation in this space, many new instruments concentrate on a specific area, for example carbon financing. That leaves much scope for increased investment, cross-learning and a more holistic approach to innovation to support a range of social and broader environmental goals.

GAME-CHANGER: investment in the development and piloting of equitable financial instruments is a potentially game-changing, global solution. In the near term, it would help match the increasing amounts of global funds from impact investors to the huge latent demand at farmer level, especially in low- and middle-income countries, to tackle a range of critical environmental problems while addressing poverty and inequity. In the long term, funding of environmental and social functions of agriculture is likely to increasingly be seen as a function of government, as is already the case in some countries.

WHO IS INVOLVED: As a first step, the Commission for Sustainable Agriculture Intensification plans to work with partners to carry out a Delphi study with experts to review recent developments in this space and discuss options for more concerted development of financial instruments. This may lead to a hub or network, or build on an existing platform such as Taskforce 20x20.

UN Agency	UNDP	Assist tobacco farmers switch to sustainable health-promoting food crops.	Assist governments in supporting tobacco farmers transition to economically viable alternative activities in line with the World Health Organization Framework Convention for Tobacco Control Article 17. Encourage tobacco farmers to switch to sustainable and health-promoting crops by eliminating all tobacco subsidies and offering subsidies for alternative food crops that are both local and health-promoting.
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D. Action Area Manage

4. Transformation through innovation for nature-positive production

Table 4.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Academic Institution	DEMETER Communications Coordinator Walton Institute	DEMETER - Building an Interoperable, Data-Driven, Innovative and Sustainable European Agri-Food Sector.	DEMETER is a Horizon 2020 project which aims to lead the digital transformation of Europe's agri-food sector through the rapid adoption of advanced Internet of Things (IoT) technologies, data science and smart farming, ensuring its resilience and sustainability. Twenty real-world pilot projects, grouped into five pilot clusters, are running within DEMETER to demonstrate and evaluate how agricultural innovations and extended capabilities benefit farmers, agricultural providers, and society as a whole. The topics, scope and size of the pilots are diverse, from saving resources, such as water and energy, to a more environmentally compatible crop management with reduced application of fertilisers and pesticides, to improved animal welfare and the tracing of complete supply chains. One of the key aspects in all activities is to put farmers in control of their data and to support easy but secure data sharing, e.g. for benchmarking or reporting purposes. As part of the project outcome, DEMETER will create a Stakeholders Open Collaboration Space (SOCS) which is an online platform dedicated to all stakeholders (farmers, advisors, and suppliers) where they can collaborate, share best practices and participate in co-creation processes. This will result in suppliers delivering a final solution that is optimal to the farmer's existing context and expressed needs.
Individual		Adoption and use of symbiotic agricultural systems and sustainable practices using the principles of aquaponics /aerponics /hydroponics.	This idea which my social business start-up in Bangladesh "Ponchagro" looks to facilitate, involves promoting urban farms by providing customized and modular food production systems and designs to urban agriculture enthusiasts or would-be farmers as well as retailers. Profits from such activity would be distributed among employees as well as channelled to rural regions in the form of educational facilities looking to train and teach innovative and resource efficient agricultural techniques to rural at-risk farming communities who mostly bear the brunt of climate change. In doing so, the scope for land reclamation by

			nature presents itself, as well as the fact that it reduces transportation emissions due to the proximity of farms to plates. It further promotes greater availability of nutritious, organic food at more frequent intervals than traditional farms. All the while, educating all sectors of the benefits of sustainable practices and organic farming.
Individual		Boost adoption of existing/ proven precision agriculture technologies.	Auto-steer, section control, variable rate, telematics and precision irrigation tools have been around for several years and have proven environmental and production benefits. However, the North American adoption of these advanced technologies range from below 10% to 60%. Serious gains can be achieved with greater adoption.
Member State	Argentina	Promote local developments of innovation and technology in the field of genetic improvement of species to increase their resilience, thus increasing production in order to comply with the SDGs.	The challenge for the coming years is to increase food production to feed the growing world population (the world population is expected to increase by 2 billion people in the next 30 years, from the current 7.7 billion to 9.700 billion in 2050) In this sense, respect and care for the environment is fundamental and was agreed by the countries in the 2030 Agenda for Sustainable Development to achieve the Sustainable Development Goals. In this sense, innovation and technology applied to the genetic improvement of agricultural species in order to increase resilience and resistance to diseases and adaptation to climate change is key to increasing production and using productive resources more efficiently. (water, soil, etc.) Modern biotechnology is a fundamental tool that contributes to these ends.
Member State	Brazil	National Plan for Biological Inputs	<p>a) Problem addressed within the food systems: To enhance the use of biological pesticides and fertilizer.</p> <p>b) What makes the solution to a "game changer": biological inputs have the potential to reduce fossil fuel-based fertilizer and pesticide consumption and to promote a renewable inputs agriculture.</p> <p>c) Importance of addressing the problem for achieving the goal of AT3: Biological inputs have an important role in sustainably enhancing food production systems to the benefit of both nature and people, reducing or offsetting GHG emissions from agriculture.</p> <p>d) Is this a new concept? It is a successful practical experience in Brazil. The promotion of a biological agriculture is a key element for sustainable development. Currently, biological inputs are used</p>

			<p>in pest control activities in about 10 million hectares in Brazil. In 2019, the use of biological nitrogen fixation in soybean production alone generated an economic gain of approximately USD 14 billion due to savings from eliminating the need for nitrogen fertilizer use in soybean production. This economic gain, which is accompanied by substantial environmental benefits, can also be obtained in other agricultural activities, such as the production of rice, edible beans, wheat, pea and sugarcane. Brazil is expanding its investments in the generation and use of biological pesticides and fertilizers through several initiatives and policies, including the National Plan for Biological Inputs. The objective of the Plan is to promote research and development of bioinputs, as well as their increased production and use. The activities of the Plan include development of norms and regulations for the operation of bio-input production units (bio-factories) in different regions of the country, with priority to small and medium bio-factories; and the creation of a favorable enabling environment for infrastructure financing.</p>
Member State	Brazil	Investment in agricultural research and innovation	<p>a) Problem addressed within food systems: Science and innovation are key to sustainably meeting the growing global demand for food and enhancing the contribution of food systems towards achieving the SDGs and the Paris Agreement.</p> <p>b) What makes the solution to a "game changer": it is essential to invest in agricultural research and innovation in order to sustainably expand food systems and continue to increase productivity.</p> <p>c) Importance of addressing the problem for achieving the goal of AT3: contributes to sustainably manage food production systems to the benefit of both nature and people.</p> <p>d) Is this a new concept? It is a successful practical experience in Brazil. A fundamental pillar of food systems in general is investment in agricultural research and innovation. Over the last half century, Brazil has built a strong public agricultural research system firmly anchored on the creation of the Brazilian Agricultural Research Corporation (EMBRAPA), in 1972. The technological assets generated by EMBRAPA have contributed significantly to the sustainable development and performance of Brazilian agriculture. In the last 40 years Brazil increased grain production by 425%,</p>

while planted area has grown by only 33%. Without this productivity gain, an additional 126 million hectares would be needed to reach Brazil's current levels of food production. Brazil is convinced of the importance of boosting agricultural and food production in a sustainable manner, based on science, technology, and innovation. It is also conscious of the need to support small- and medium-holders in getting access to technology. In this context, the government also implements policies such as the Family Agriculture Strengthening Program (PRONAF), MODERFROTA PROGER, the Guaranteed Minimum Price Policy for Socio-biodiversity Products (PGPM-Bio), the National Policy for Technical Assistance and Rural Extension (PNATER) and others, that have been crucial to promote a larger use of technology by those producers.

Member State	UAE	The Agriculture Innovation Mission (AIM)	The Agriculture Innovation Mission (AIM) for Climate is an initiative spearheaded by the United Arab Emirates, United States, Australia, Brazil, Denmark, Israel, Singapore, the United Kingdom COP Presidency, and Uruguay to significantly increase public spending on agricultural R&D and innovation within 5 years, both to mitigate and adapt to climate change, while conserving nature and biodiversity. The initiative also will help to coordinate prioritization of spending, particularly through enhanced links among basic research programs, applied innovation and R&D for development (eg CGIAR) actors, and national agricultural research extension services.
NGO	Grow Asia	The Viet Nam Partnership for Sustainable Agriculture (PSAV) - a flagship of the Food Action Alliance -	Multi-stakeholder partnership platforms are critical for the delivery of the SDGs because of their role as a neutral platform for partners to come together in a pre-competitive space and deliver results at the sector- and field-level. In Viet Nam, PSAV contributes to building a modern and hi-tech agriculture sector with international linkages and competition. It promotes sustainable agricultural standards by developing and supporting policies and best farming practices in Viet Nam. Specific areas of work include helping PSAV members close production links in the value chain of global agricultural products; raise incomes and improve the livelihoods of smallholder farmers; and promote environmental and ecological protection to improve adaptive capacity to climate change and disaster prevention and mitigation.

NGO	RealFoodSystems.org (youth network)	CSA or agroforestry framework, template which could be adapted per geographic specifics.	There are many great ag solutions known or in place already. Scale-up is needed, and farmer-to-farmer training and sharing. Perhaps a framework/template/process/guidelines document could be prepared in the FSS and this could help in all ATs, since local CSA food production can help ALL aspects.
Private Sector	Association of Equipment Manufacturers	Promotion of the adoption and use of precision agriculture machinery.	Many modern application, harvesting, and animal management technologies provide reduced inputs with an increase number of outputs. This results in more food with less emissions, water use, land use, and other inputs that are potentially detrimental to the environment. This coupled with sustainable farming practices will help the environment and allow US agriculture to not just reach carbon neutral, but to take more carbon out of the atmosphere than is put in. All of this while producing more food to feed the world's growing population.
Private Sector	BASF	Use of stabilized fertilizers to protect against climate change	Agriculture is responsible for 10% of the global greenhouse gas emissions. Application of Nitrogen fertilizers on the field results in Nitrous Oxide emissions. Nitrous oxide has an atmospheric lifetime of >100 years and is 265x higher climate warming potential than CO2. Stabilized nitrogen fertilizers contain additives (nitrification inhibitors, urease inhibitors) that reduce emissions from fertilizers and increase nutrient plant uptake. The technology has been invented 40 years ago already and is well researched and referenced. The adoption is ~10% world-wide. Farmers use it mainly of the increase yield benefit, but are unaware about the climate protection benefits. The technology of urease and nitrification inhibitors is an ideal tool for policy makers to achieve their environmental targets, as it can be easily implemented and monitored on an industrial fertilizer manufacturing level. Germany has implemented a law that regulates the use of urea which favors the use of urease inhibitors.
Private sector	Infarm	Infarm creates an innovative, sustainable, and self-sufficient urban food production system	Introduction to the vertical farming technology -- Providing fresh, nutritious food for everyone in an energy and resource efficient manner is one of the greatest challenges of today. Arable land to grow crops is becoming scarce with a third of usable land lost solely in the last four decades due to soil degradation. Vertical farming, whereby crops are grown indoors in stacked trays and under controlled environments, evolves into a viable large-scale alternative to the traditional agricultural practices. The global market for vertical farming is expected to

grow quickly to approximately USD 15 billion by 2025. Vertical farming gives growers the ability to fully control all the factors which determine the production of healthy, nutritious plants, such as water, heat, temperature, humidity, and light. Thus, the systems can be customized for year-round production and, yet use significantly less resources than traditional agriculture.

Overview of Infarm's vertical farming technology -- Infarm is the world's fastest growing vertical farming network, founded in Berlin in 2013. At Infarm, we are restructuring the way our food is produced, tackling the tremendous amounts of GHG emitted by the conventional agrifood sector and helping cities become self-sufficient in their food production. Our 1,200+ vertical farming units (which are currently available in ten different countries) are cloud-connected and remotely controlled from a central farming platform that gathers 50,000 data points over a plant's lifetime to constantly optimize growing conditions and improve our yield. Our new, fully automated large-scale farming unit is the most advanced and largest vertical farming system in the world. In a 215 sq ft footprint, we can grow up to 600,000 plants. Compared to soil-based agriculture, our transport emissions are reduced by 90%, as we farm 'hyperlocally' in urban centers, and we use 95% less water, 75% less fertilizer and zero chemical pesticides. So while our intervention with nature is minimal, our tailored climate systems still allow us to produce more than 100 different types of crops 365 days a year. We are also the first vertical farming company to be granted the GLOBAL GAP certificate, which testifies that we are working according to good agricultural practices.

Private Sector	Project X Global	Scaling adoption of alternative ingredients in feed - FeedX	<p>FEED-X is an innovation platform that connects major buyers with producers of sustainable feed from alternative sources (insect, alga, grain, biofermentation, etc). Following our proprietary 9-step derisking process, we support innovators as the grow and incumbents to adopt novel approaches. Our solution is directly contributes to Action Track 3 by scaling alternatives to soy and grain-based feeds, which are major drivers for land use change and deforestation. FEED-X is a project by ProjectX. ProjectX is built on the 10 in 10, a research piece carried out by WWF-UK and S&P Trucost that identifies leverage points for sustainability in the value chains of the 10 most impactful industries globally. Our mission is to shift 10% of global procurement to sustainability by 2030, thereby diverting \$1.3tn in investments.</p>
Private Sector	Puricare	Puricare nature-based water treatment technology add-on to agricultural irrigation systems	<p>Puricare is a cost-effective nature-based water treatment system that harnesses the power of dissolved oxygen to make every drop of water and every measure of nutrient count, increasing food production while simultaneously decreasing negative environmental impact – all aligned with the need to realise Regenerative Agriculture at scale. By optimizing water, the specialised Puricare Advanced Oxidation Process (P-AOP) creates favourable conditions for soil microbial activity and other aerobic soil organisms essential to soil health. This also enables optimal nutrient cycling, which reduces nutrient loss and pollution from run-off while increasing the efficient use of water in agriculture. It also helps to break down hazardous chemicals in water, thereby improving water quality. The P-AOP has been scientifically researched and has also been practically proven where it matters most: on over 300 operational farms in more than 10 countries on four continents. This breaks down to around 50,000 hectares of land more than 400 billion litres of water per year. Consistent results are achieved on all water, soil and crop types, and climatic conditions, with the very best results in areas with poor/damaged soils and reduced water quality. The technology does not sterilize water, leaves no harmful residues, and has the additional benefit of cleaning irrigation systems, thereby reducing maintenance costs.</p> <p>The solution is easily incorporated into existing irrigation systems and - through the provision of a blueprint and online training for installation and support - is ready to scale and roll out rapidly. Case studies and scientific documentation available.</p>

Producers Association	World Farmers Organization	Klimrek, a smart agriculture, remote-sensing Belgian project, is aimed at providing farmers with tools that help them run their farm in a more climate-friendly way.	Klimrek is a project started in September 2019 and is backed by the Flemish Agency for Innovation and Entrepreneurship (VLAIO), the Flanders Research Institute for Agriculture, Fisheries and Food (ILVO) and the Flemish Institute for Technological Research (VITO). Klimrek project consist in climate consultants supporting farmers with specific tools to help them in switching to more climate-friendly and climate-protective business management, whereby the convenience for the farmer and the economic feasibility are also taken into account. Data about the farmer are collected and assessed with a tool based on a life cycle analysis (LCA), and then farmers and consultant discuss possible measures to be taken with calculated scenarios. At the same time, a cost-benefit analysis is made to estimate the economic feasibility. Attention is also paid to the practical feasibility, with the consultant providing further support and guidance in applying the climate measures on the farm. The participating farmers are followed up every year in order to take several climate measures and to map out their personal evolution. They also learn from their colleagues through learning networks. The development of the climate pathway happens in co-creation with various stakeholders (such as public authorities, sector associations, the manufacturing industry, nature associations, etc.) in order to make the pathway as correct, user-friendly and supported as possible.
Producers Association		Development of Vertical Farming Technologies in Urban Areas	We at the Association for Vertical Farming are working in different regions to expand the knowledge and awareness about the potentials of controlled environment agriculture. We believe more development of these technologies will help the effort to secure fresh and safe food access for city dwellers and also reduce the impact of agriculture on our planet. Therefore, we are proposing building vertical farming living labs in universities, schools and other urban communities to showcase this alternative food production technology and educate the next generation of farmers.
Research Institute	AATF	The use of agricultural biotechnology has potential to boost production, quality of good and resilience	Biotechnology can help achieve a major food system transformation by providing multiple ways to achieve sustainability and nature-positive production in agriculture. The technology can produce new varieties of crops that have higher yields, are resistant to pests and resilient to environmental stresses without the need of more inputs. This can be done in a safe and responsible

of food systems to adverse impacts of climate change

way such as AATF's work can demonstrate. AATF worked with partners in Nigeria to develop Bt Cowpea variety that is resistant to Pod Borer Maruca Vitrata. Cowpea is a major cash and food crop for farmers in Central and West Africa. In West Africa approximately 200 million people consume Cowpea on a daily basis. However, the production of Cowpea is challenged by insect pests - Maruca Vitrata - which are capable of causing up to 80% in yield reduction. AATF worked with Cowpea Research scientists from a number of African countries including Nigeria and found a biotechnology-based solution for the challenge of Maruca Vitrata. The result of this collaboration was the development of a new variety, the Pod Borer Resistant Cowpea, which can withstand Maruca Vitrata and has been released commercially in Nigeria. Maruca is not the only insect that affects Cowpea production but on its own, this insect can typically ruin 70 to 80 percent of infested cowpea fields. In comparison with the conventional variety, the Pod Borer Resistant Bt Cowpea yields 2 tons per hectare while the traditional variety yields only about 0.35 tons per hectare, which is about 6 times higher than the conventional varieties.

AATF has been working with partners in Nigeria to develop a genetically improved African rice varieties with enhanced agronomic traits, specifically nitrogen-use efficiency (NUE), water use efficiency (WUE) and salt tolerance (ST) through the NEWEST Rice Project. The core objective is to deliver seed technology innovations to smallholder farmers through commercial partners using a range of market channels. The results of the trials have been positive and soon application for commercial release will be made.

The NEWEST rice will reduce cost on farmers through its reduced requirements due to its efficient use of nitrogen nutrients, and water and its tolerance to salt. Additionally, the rice variety has enhanced aroma, cookability, grain size and ability to mature in less than 90 days. In Burkina Faso, the banned Bt Cotton while producing longer fibre than the traditional variety, also only required an eighth of the amount of pesticides.

Amidst alarming predictions that hotter, drier weather caused by climate change could devastate African maize production, AATF and partners are developing Water Efficient Maize for Africa or WEMA. Using conventional and transgenic approaches WEMA varieties are being endowed

			<p>with water-conserving and insect protection traits that are capable of boosting harvests by 20 to 35 percent under moderate drought conditions. Once these enhanced crops reach the market, they can produce crosscutting benefits within Nigeria’s food system by a) boosting nature-positive productivity; b) effectively reducing negative environmental impacts by decreasing inputs; and c) positively influencing the economic situations of farmers. However, overly complex, and harsh regulatory processes have been one of the main challenges that have kept many products of biotechnology off the market and curtailed investment in research.</p>
Research Institute	CoSAI	Principles and metrics for orienting innovation	<p>The Commission on Sustainable Agriculture Intensification (CoSAI) is forming and convening a Taskforce with the objective of developing and recommending a set of principles and metrics for guiding and monitoring innovation in Sustainable Agriculture Intensification (SAI) . The Taskforce will steer the process, supported by a small Expert Group.</p> <p>The proposed users of the principles and metrics are:</p> <ul style="list-style-type: none"> - Public and private direct investors in innovation in agriculture and agricultural systems who need to ensure that their funds are appropriately used to support their sustainability goals - Managers and implementers of R&D and innovation programs, both public and private, who need to plan their work and track progress against sustainability outcomes - Policymakers at all levels who need to verify that their own policy and institutional innovations in the agriculture sector are promoting sustainability - Certification and benchmarking organizations for the private sector 6 , as well as civil society organizations, who are interested in holding public and private innovators to account and directing investment towards more sustainable and socially-positive and equitable innovations
Research Institute	Flagship on Climate Services and Safety Nets, CCAFS	Digital climate advisory services can transform the lives of vulnerable smallholder farmers by fostering food security, resilience and	<p>Many developing countries remain predominantly rural, with a large percentage of populations reliant on rainfed agriculture. In this context, climate variability and change cause major disruptions to smallholder farmers and to the economy at large. The risk associated with climate also inhibits investment, trapping families in poverty for generations. By reducing uncertainty, digital advisory climate services (DCAS) have the potential to build resilience and spur economic growth. Climate risk is a function of hazard, vulnerability and</p>

		economic growth.	<p>exposure. Greenhouse gas emissions have increased the frequency and intensity of climate-related hazards, while population growth has forced smallholder communities into increasingly exposed environments. But while hazard and exposure are very difficult to change, climate information can help smallholder farmers to make decisions that reduce their own vulnerability both year-to-year and on a more long-term basis.</p> <p>With the rapid development and reach of digital technologies, ICT solutions offer a major opportunity to support agricultural advisory services at scale. Digital climate advisory services (DCAS) in agriculture integrate climate services, agricultural advisory services, and digital innovation, with the aim of supporting farmers to better manage climate variability and risks and adopt climate-smart practices. Many DCAS also utilize co-production of climate information, including through participatory processes.</p>
Research Institute	Open Farm & Field Data Exchange	Creating a global Data Sharing Platform to monitor field-specific farming practices and enable rewards mechanisms for virtuous farmers	<p>We have created a new corporate agritech venture which will host a digital platform whose goal is to foster collaboration across the ag-food supply chain by facilitating the exchange of field-specific data. Farm & field data is spread across multiple data sources often not inter-operable and this fragmentation hinders progress towards nature-positive and climate-smart farming. Understanding the drivers and key data points required to objectively rank and compare farms and fields based on their environmental performance is a fundamental step to enable access to "green investors'" capital by farmers willing to change their practices and achieve higher productivity with less resources. Sharing field data will also allow greater transparency and predictability of field output, therefore facilitating traceability services for food and fiber industries and better risk-management for farmers.</p> <p>As a first step towards the vision of digitally connecting all farms and fields, Yara is inviting leading players and stakeholders from the global agri-food industry to collaborate on the definition of a global standard for field identification, the pillar of any effective data sharing and standardization approach.</p> <p>During 2021 Yara and its partners wish to demonstrate through proof-of-concept pilots in different country/crop systems how the infrastructure of global field identifiers can be</p>

leveraged to achieve the overall goals of sustainable, transparent and resilient farming.

UN Agency	Sustainable Food Systems Division UNIDO	The Accelerator for Agriculture and Agroindustry Development and Innovation Plus (3ADI+). Please consider this as a joint submission by UNIDO and FAO	<p>3ADI+ is a joint value chain and market systems development programme spearheaded by the United Nations Industrial Development Organization (UNIDO) and the Food and Agriculture Organization of the United Nations (FAO). 3ADI+ aims to develop inclusive and sustainable value chains by ensuring that investments in agricultural industrialization protect natural ecosystems and secure the rights of local communities, especially the most vulnerable. 3ADI+ creates business opportunities and facilitates access to markets and value addition for women and men, while guaranteeing environmental sustainability and ensuring conditions for respect of fundamental labor rights.</p> <p>3ADI+ promotes SDG-aligned investments through a variety of financial instruments and sustainable technical assistance, which in turn contribute to generating substantial economic, social and environmental impacts, and increase overall resilience to shocks:</p> <ul style="list-style-type: none"> ● Economic results: effectively link small and medium agricultural producers and processors to end markets through value addition, thereby acting as an effective basis for industrialization and the generation of decent employment, in particular for rural women and youth ● Social results: supply higher-value, nutritious and differentiated food, fibre, feed and fuel products to consumers to improve diets and nutrition ● Environmental results: utilize natural resources in a sustainable manner, including through climate change adaptation and mitigation measures ● Resilience results: improve storage capacity, strengthen adaptive capacities, increase linkages to input and output markets, and so on, in order absorb and recover from shocks more easily. <p>By facilitating technical, organizational and institutional innovation and through catalytic interventions 3ADI+ aims to i) adopt inclusive and sustainable solutions for the conservation, restoration and use of ecosystems and natural</p>
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			<p>resources, and ii) ensure sustainable economic opportunities are equitably accessible to women, youth, and indigenous communities</p> <p>3ADI+ approach was tested and validated through three proof-of-concept pilots conducted with the pineapple value chain in Suriname, the palm oil value chain in Tanzania, and the beef and dairy value chains in Bangladesh.</p> <p>In Suriname, for instance, 3ADI+ reduces pressure on primary and secondary forests thanks to a shift to permanent organic farming systems. In Tanzania, the Accelerator will introduce an oil-palm-based agroforestry system, which will result in various environmental benefits, including improved soil fertility, agrobiodiversity, and carbon sequestration. Renewable energy solutions will also be promoted using oil palm and other crops residues for industrial and domestic uses</p>
UN Agency	UNDP	Farmers Support System Toolkit and Scorecard	<p>The purpose of the FS Toolkit and Scorecard is to provide guidance to sustainable commodity production practitioners from government, civil society and business on how to collaboratively assess and strengthen farmer support systems in order to achieve the broader goal of improving the lives of commodities producers and their communities, while protecting high value forest and important vulnerable ecosystems.</p> <p>They are intended to:</p> <ul style="list-style-type: none"> • Facilitate multi-stakeholder collaboration for systemic change leading to joint diagnosis, investigation and agreement on systemic solutions to strengthening existing farmer support systems; • Support the elaboration of updated collective vision, strategies and implementation plans for national and sub-national farmer support systems
UN Agency	WFP	Connecting women smallholders with nature-positive production and digital inclusion	<p>Nearly 500 million small scale food producers, who often work in fragile and vulnerable ecosystems, are central to advancing equitable livelihoods in food systems. Their production methods, technologies, resource management, and market links to value chains determine not only the sustainability and resilience of their livelihoods and their capacity to overcome poverty and food insecurity, but also the diversity of food available to their communities and to consumers and the prices they will pay. Context-specific smallholder farming solutions increase cultivation efficiencies, minimize externalities, and improve yields, whilst maximizing biodiversity and ecosystem functions, improving livelihoods, and enhancing resilience to climate change.</p>

Against this backdrop, the role of women in smallholder agriculture is central. In most LDCs and MICs, women manage the majority of agricultural activities. Efforts are made to strengthen women's capacities in the entire agricultural value chain and several good practices are emerging from such initiatives globally. At a time when food systems are facing significant challenges in sustaining food production practices that are nature-positive and sustainable, many countries are turning towards women to harness their collective power for food systems transformation. Employing an integrated approach, WFP in partnership with other UN agencies, civil society and private sector institutions is implementing a range of projects in different countries that empower women smallholder groups with tailored packages of support and strengthen female-led cooperatives to connect with nature-positive production methods and access to the digital economy.

As institutional demand for food and food system services can be a direct and indirect driving force for building sustainable and inclusive food systems, WFP as a major institutional buyer of food is intensifying local, pro-smallholder procurement to strengthen local value chain actors. This also helps to improve availability, quality and safety of food for local communities.

1.1 What, in brief, is the solution?

The solution is the global recognition and implementation of the human right to live in a safe, clean, healthy and sustainable environment. This right has the potential to serve as a catalyst for the implementation of effective and equitable solutions to the systemic unsustainability of today's industrial food systems.

1.2 What problem is it trying to address within food systems?

Food systems are major contributors to the global environmental crisis, producing 33% of the greenhouse gas emissions that fuel the climate emergency, enormous volumes of toxic emissions and effluent that pollute air, water and soil, and activities that are the leading cause of the catastrophic decline in the abundance and diversity of life on Earth. Industrial agriculture, the illegal wildlife trade, and intensive livestock operations are also significant contributors to the increasing risk of emerging infectious diseases of zoonotic origin, such as COVID—19. These enormous environmental impacts have catastrophic consequences for human rights, including the rights to life, health, food, water, and a healthy environment, as well as Indigenous rights and the rights of the child.

1.3 How can this solution address that problem?

The right to a healthy environment has evolved over close to five decades and is now understood to include the following substantive elements: healthy and sustainable food, clean air, safe and sufficient water, a safe climate, healthy ecosystems and biodiversity, and non-toxic environments where people can live work, study, and play. Collectively these elements can address all of the adverse environmental and human rights impacts being inflicted by today's industrial food systems. All actors have roles to play in implementing this vital right, but it is particularly important for populations that are often vulnerable or marginalized. These populations, including women and youth, can use the related procedural rights of access to information, participation in decision-making and access to justice to advance their roles and their substantive rights.

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

By serving as a catalyst for stronger environmental laws and policies, improved implementation and enforcement of those laws and policies, increased public participation and better environmental outcomes, the right to a healthy environment can contribute to the urgently needed transformations of how we produce and consume food. For example, in France this right has contributed to new laws promoting agroecology, prohibiting the use of bee-killing neonicotinoid pesticides, and banning the export of pesticides not permitted for use in France. In Costa Rica, this right has contributed to reversing deforestation and enabling payment for ecosystem service programs that support Indigenous people and farmers. The right to a healthy environment supports equitable and sustainable livelihoods by sparking the transition to agroecology, agroforestry, regenerative and restorative agriculture, climate-smart agriculture, pastoralists, and small-scale fisheries. The rights-based approach provides multiple means of accountability, through mechanisms such as national human rights institutions, specialized environmental tribunals and courts. The right to a healthy environment is an enduring solution that is also strongly aligned with the other Food

System Summit Action Tracks and more broadly across the full spectrum of Sustainable Development Goals.

1.5 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?

Evidence demonstrates that the implementation of this right has positive implications for deforestation, agrochemical use, intensive livestock operations, water pollution and other environmental problems caused by certain types of industrial agriculture, fishing and aquaculture. The body of evidence is described in detail in a series of UN reports available [here](#), as well as in a number of academic research publications.²

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

The right to a healthy environment already enjoys legal recognition in 156 UN member states through constitutions, legislation and regional human rights treaties ([A/HRC/43/53](#)). Additional States, primarily Small Island Developing States, also support global recognition of this right. A proposed UN Human Rights Council resolution on this right is supported by more than 1,100 civil society [organizations](#) and 15 UN [agencies](#).

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

The recognition and implementation of the right to a healthy environment is unlikely to have significant effects in States where the rule of law is weak, whether this weakness is due to ongoing conflict, authoritarian government, extreme poverty or other factors. However, this is likely to be true for most if not all proposed solutions due to corruption, weak institutions, lack of capacity and other factors.

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

The beauty of focusing on the right to a healthy environment is three-fold. One, it emphasizes that everyone has a stake in food systems that produce healthy and sustainable food. Two, it empowers everyone through the associated procedural rights of access to information, participation in decision-making and access to justice with effective remedies. Three, it clarifies State obligations and business responsibilities and provides mechanisms to ensure accountability. The United Nations needs to recognize this right in formal resolutions from the Human Rights Council and the General Assembly, as it did with the rights to water and sanitation in 2010. These resolutions serve as a catalyst for all nations to strengthen constitutions, laws, regulations, budgets and policies to diminish the adverse environmental and human rights impacts of today's food systems. Eleven years of evidence with the resolutions on the right to water demonstrate that this is precisely what

² C. Jeffords, 2021, "On the relationship between constitutional environmental rights and sustainable development outcomes," *Ecological Economics*, <https://doi.org/10.1016/j.ecolecon.2021.107049>. See also D.R. Boyd. 2012. *The Environmental Rights Revolution: Constitutions, Human Rights and the Environment*. University of British Columbia Press. J.R. May and E. Daly. 2015. *Global Environmental Constitutionalism*. Cambridge University Press. J.H. Knox and R. Pejan, eds. 2018. *The Human Right to a Healthy Environment*. Cambridge University Press.

happens—constitutional changes to recognize this right (e.g. Costa Rica, Fiji, Mexico and Slovenia), legislative improvements (e.g. France), policy changes (e.g. Canada and Colombia), and most importantly, on the ground [progress](#).

Solution 4.3 Write-up: Women's land tenure rights

Wanjiku Chiuri, Action Track 3 Gender Lead

Background information

Land is the common ground that we stand and rely on in order to create wealth, sustainably manage our ecosystems, build peaceful and just societies. Food systems, climate change, sustainable development, landscape improvements are dependent on land and people's ability to invest in activities that improve food systems, address climate change and lead to land restoration is dependent on their access to ownership and claims to land. It is therefore impossible to think about improving food systems without addressing the issue of land as a basis for healthy soils, sustainable and healthy forests, healthy plants and animals. Evidence shows that whoever controls the land or the water bodies where these foods emanate from, has the power to use, misuse, rehabilitate and sustainably manage the resource. Land access, ownership and rights therefore play critical roles in nature-positive food production at scale. Ownership and control of land is gendered with women having much lower access to and control over land, whether through formal or customary rights. Increasing women's control and rights to land is therefore a game changing solution for Action Track 3 in boosting nature-positive production at scale.

1.1 What, in brief, is the solution?

The solution is to secure the ownership and rights to land, through formal registration and customary and other rights for women. This will entail the following:

- Support the domestication, implementation and accountability of the Voluntary Guidelines on the Responsible Governance of Tenure of Lands, Fisheries and Forests in the Context of National Food Security and the gender technical guidelines³ as well regional guidelines such as the Framework and Guidelines on Land Policy in Africa, adopted by the African Union in 2009, which contains provisions on strengthening the land rights of women⁴.
- Form a global women's movement to advocate for women's rights through strategic alliances including civil society, governments and the private sector that will focus on addressing the disconnect between law provisions & their enforcement in countries where laws on women's land rights exist, changing and ensuring customary laws provide for women's rights to land, address the gender and social norms that constrain land inheritance for women, and build capacity of women, male champions and rights holders to advocate for women's rights to land and other resources.
- Ensure international convention and treaty obligations related to gender and food systems are enshrined in national legal frameworks and that mechanisms for application of the law or dispute settlement are functioning, accountable and accessible to women and build capacities and provide tools to enable the implementation of relevant policies by national actors and their implementation by sub-national actors.
- Remove barriers to women's ownership of and control of land and other productive assets through rights-based approaches and other instruments such as social and environmental standards and responsible investment frameworks – and demand accountability from all partners on progress towards the realization of these rights.

³ FAO, *Governing Land for Women and Men: A Technical Guide to Support the Achievement of Gender-equitable Governance of Land Tenure*, Governance of Tenure Technical Guide No. 1 (Rome, 2013). Available from www.fao.org/docrep/017/i3114e/i3114e.pdf

⁴ The Land Policy Initiative (a joint programme of the tripartite consortium constituted by the African Union Commission, the United Nations Economic Commission for Africa and the African Development Bank) is now moving towards assisting African Union member States in developing or reviewing their land policies as well as in implementing and evaluating these policies.

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

The Gender Team lead for UN food systems Summit; ACAI public consultations; AU documents and declarations, other land tenure sources and Women and land publications.

1.3 What problem is it trying to address within food systems?

This solution addresses the low access to, ownership and rights to land by women that has been reported across regions. According to FAO, gaps in men and women's ownership of land exist in many countries. For example, in Nigeria, while 84% of land is registered in the name of men, only 5% is registered in the name of women, and 8% is jointly registered. In Niger, the data shows 64% of land is registered to men, 8% to women and 28% is registered jointly. And this is not only a problem in Africa. In Vietnam, only 16% of land is registered to women while 72% is registered to men. In Bangladesh, only 11% of land is registered to women, and in Tajikistan, only 14% of land is registered to women. And even when women own land, they tend to own less land than men. In the nine countries in sub-Saharan Africa and Asia for which data are available, women own a significantly smaller amount of agricultural land. This is even true in countries, such as Malawi, where women constitute a larger share of all landowners.

There are two imperatives for increasing women's ownership of and rights to land. One is an issue of justice. That women, as a matter of rights and justice should have the same access to and ownership of resources such as land and rights to the use of natural resources as men do.

The second, is that when women own and have rights to land, there is improvements in their investments on natural resource management and longterm improvements on the land. Women's access to land has shown very positive results in land rehabilitation. As Samandari (2017) pointed out, "A review of Ethiopia's recent land certification programme confirmed past findings that ownership increases investments in, and outputs from, the land". Insecurity of land tenure, poor access to credit and technology are some of the major constraints preventing women from rehabilitating soils and boosting nature-positive food production strategies.

While land use rights are needed to adopt any agricultural production technologies, control rights and security of tenure may affect the adoption of longer-term investments, particularly Natural Resources Management practices. In Rwanda, women with formalized land rights were 19 percent more likely to engage in soil conservation, compared to 10 percent among men. In rural Benin, women were historically less likely than men to invest in soil fertility by leaving their land fallow, but this gender gap disappeared in communities where female-headed households mapped and documented their parcel boundaries. In Ghana the intensity of investments on different plots cultivated by a given individual corresponds to that individual's security of tenure over those specific plots and, in turn, to the individual's position in the political hierarchy relevant to those specific plots.

Land registration programs in Rwanda, Benin, and Ethiopia that have emphasized women's land rights have had impact on technology adoption. In Rwanda, program participants were twice as likely as control households to invest in or maintain bunds, terraces, and check dams for soil conservation, and female headed households whose lands were regularized were the most likely to undertake such long-term investments. In Zambia, women in two districts were more likely than men to say that complex tenure is a barrier to short term soil conservation (mulching, inorganic fertilizers) and longer term tree planting; and in communities where widows inherit, households are more likely to invest through fertilizer use and fallowing.

1.4 How can this solution address that problem?

By ensuring that a critical mass of women own land in all the food systems (agriculture, Livestock, fishing) we can be assured of nature-positive food production.

1.5 Why does this solution align to the definition and criteria for a ‘game changing solution’ developed by the Summit?

Women’s land tenure is a game changing solution because boosting nature-positive food production can only be done by those in control of land and other means of production. This is because, secure rights to land are a critical, but often overlooked. Most documents from international organizations, governments, research institutions and Non-governmental institutions address the role of women in the food systems, how they are major players in food production, processes and distribution. They correctly mention how equal access and control of means of production would make a difference. Therefore, Women’s right to own land is a basic factor in achieving household food security and improved nutritional status, efficient and sustainable management of the environment. “Secure land rights refer to rights that are clearly defined, long-term, enforceable, appropriately transferrable, and socially and legally legitimate” (Landesa, 2012). These secure land rights lead to increased household agricultural productivity by:

- Providing incentives to invest in improvements to the land and its resources;
- Increasing opportunities to access financial services, technologies and other support programs;
- “Creating the space needed—one without constant risk of losing land—for more optimal land use” (Landesa 2012).

1.6 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?

There is evidence from multiple countries (including those cited above) showing that women’s ownership and rights to land has been shown to increase their investments in natural resource management. Other examples include studies from Uganda that show that Ugandan women farmers who did not have independent and secure rights to the land they farmed, many did not allow the land to lie fallow during the most beneficial periods. Because they feared that not using the land would affect their ability to gain future access, the land was overused and less productive (R. Giovarelli and B. Wamalwa, 2005). Most recently, in Rwanda and Ethiopia where women are being included for secure tenure to land, reports indicate better management of land resources are accompanying secure tenure rights (Ali et al, 2014).

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

Globally, the idea is ripe for political support. In India, China, Latin America and Africa, governments have piloted giving women land titles and the results are very encouraging. In Africa, AU gender strategy and the vision has aimed at achieving full gender equality (AU Goal 17), the implementation plan recommends that 20% of rural women have access to and control of land by 2023. The Committee on World Food Security has Voluntary Guidelines Responsible Governance of Tenure of Lands, Fisheries and Forests in the Context of National Food Security.

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

Women’s land ownership is suited in all contexts although it is more critical in Africa, Asia and Latin America.

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

The Africa Union, The Committee on World Food Security, Civil Society organizations such as CARE, Landesa, Oxfam, The UNECA Land Policy Centre, national organizations that have Land Alliances, UN Women amongst others. We expect that most member states with policies that support gender

equality, and those with Feminist International Policies such as Canada and Sweden and others would be part of this coalition.

References

Ali, D.A, K. Deininger, M. Goldstein (2014), “ Environmental and gender impacts of land tenure regularization in Africa: Pilot evidence from Rwanda” in *Journal of Development Economics* 110 (2014) 20-275. World Bank, USA.

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R. Giovarelli and B. Wamalwa, *Issue Brief – Land Tenure, Property Rights, and Gender: Challenges and Approaches for Strengthening Women’s Land Tenure and Property Rights 2* (USAID 2011) (citing K. Mason and H. Carlsson, *The Development Impact of Gender Equality in Land Rights*, in *human rights and development: towards mutual reinforcement* (p. Alston and M. Robinson, eds., Oxford U. Press 2005).

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Background information on group and process

EcoAgriculture Partners and partners of the 1000 Landscapes for 1 Billion People, EIT Climate-KIC, Landscape Finance Lab. Other coalition partners will leverage their direct engagement with hundreds of long-term, locally-led landscape¹ partnerships and initiatives.

1.1 What is the solution?

The solution is to develop a global initiative for cross-cutting finance innovation to support food systems transformation across all five components of UNFSS Action. A collaborative virtual Hub will develop, demonstrate, and mainstream innovative approaches, tools, and mechanisms to finance inclusive, multi-asset, integrated place-based investment in the whole food system. The solution has four components: i) development of a food systems finance hub with experts from the financial and insurance sector, across the capital continuum, along with scientific and food system/landscape experts; ii) testing of financial innovations in existing and developing landscape/territorial partnerships and platforms, which include national, sub-national, civic and private sector stakeholders; iii) convening of a community of practice from diverse international, national, and partner financial actors to apply standard protocols to financial innovations to ensure rigorous analysis, as well as to facilitate adoption and dissemination; iv) development of a scaling strategy through networks of partners in the community of practice.

Financial mechanisms will be co-designed, co-implemented, and co-evaluated by financiers and landscape actors to fund investments of the collaborative action plans developed by stakeholders to reflect their transformative landscape vision. The Food Systems Landscape Finance Hub will support systemic analysis to identify main barriers and leverage points of the intended transformation, and support local partnerships in financial assessments and design, integrating the four key elements (value, risk, trust, finance instruments). Financial mechanisms will be structured to realize synergies among different public, private and civic investments; to achieve holistic de-risking; and to capture large flows of finance for disaggregated landscape projects. Co-designed interventions will focus on local as well as national and international financial mechanisms, to ensure inclusion of women and indigenous and other marginalized groups in the landscape. The Hub will build a learning, sensemaking and dissemination layer.

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

The solution emerged from the Landscape Finance Solutions team of the 1000 Landscapes for 1 Billion People initiative (www.landscapes.global). They have been developing action-based research with key actors in the financial system across the capital continuum to understand the obstacles and barriers to investments which support sustainable landscape visions at scale. Six key barriers were identified that this solution seeks to address: i) Inadequate institutions in landscapes to develop a pipeline of investable, landscape-regenerating projects; ii) Most finance institutions lack an integrated food systems landscape orientation; iii) Internal institutional barriers limit scope for integrated investment; iv) government finance policies and strategies do not support landscape investment; v) Instruments for landscape finance and risk management are inadequate vi) large-scale finance can undermine local vision and control.

1.3 What problem is it trying to address within food systems?

Current financial paradigms are an obstacle to the needs of local communities, human rights and food systems transformation due to the current valuation of risk/return and the lack of financial innovation/engineering design for food systems and landscape finance. In particular, the lack of integrated place-based landscape understanding from the finance system, which is a prerequisite to operationalize scalable, innovative financial mechanisms that can reach the scale needed for systemic transformation.

1.4 Why is addressing that problem important for achieving the goal of your working group?

Without transforming the finance system and current access to capital through a shift in financial/risk valuations for investments in food systems, we will not achieve the scale needed for transformation. To support systems transformation, a broader and more holistic risk-sharing and valuation perspective needs to emerge to enable financing integrated portfolios that can support food systems transformation. This must include a scaling mechanism that enables knowledge sharing, synthesis and dissemination components across global networks to support global scale through a mix of public, private and civic sector support.

1.5 How can this solution address that problem?

Scaling finance flows for sustainable food systems investments across landscapes requires four key elements: (i) creation of economic value, and its equitable capture and distribution; (ii) risk management, through holistic de-risking & risk-sharing for all; (iii) pro-active generation of trust among actors, through the landscape MSP and specific instruments; (iv) design of financial mechanisms targeted to meet the specific needs of the stakeholders involved. The proposed Food Systems Landscape Finance Hub will:

- Develop and implement integrated finance support plans to address critical (systemic) barriers to local partnerships' food system and landscape action plans;
- Design and implement innovative financial mechanisms (including raising, structuring, and deploying capital). Financial mechanisms will be tested and validated in different contexts;
- Knowledge and experience of members of the community of practice will be strengthened.
- Lessons learned will be shared across diverse contexts to ensure that new knowledge, financial blueprints, planning and assessment tools, and models for finance and de-risking.
- Results will demonstrate how integrated food systems investment portfolios can generate more value.

1.6 Why does this solution align to the definition and criteria for a 'game changing solution'?

The solution seeks to test innovations and prove that investment risk can be reduced through coordinated and synergistic investments that support people and nature through food systems. The Hub will support food systems transformation by working on transforming the risk and valuation perspective of the finance systems through a place-based landscape lens. There are already existing initiatives and innovative work occurring across landscapes worldwide. However, the coordination, learnings, analysis and dissemination from across different organizations is missing. The Hub can adapt lessons from the scaling of finance for the renewable energy sector, providing a "one-stop-shop" for testing, understanding, and sharing the innovative combination and deployment of financial and risk tools, mechanisms; including rigorous analysis would be game-changing as it has not been done before for food systems.

Evidence is needed on financial solutions to address issues and assumptions critical for landscape and food systems transformation, including: creating synergies between production and conservation; creating synergies between public and private finance; combining local and international financial flows; transitioning from grants to investments; ensuring holistic de-risking, nurturing justice and inclusion in financial transactions; ensuring that assets in a landscape investment portfolio are synergistic, amplifying value, reducing risks, and aligning well with non-financial interventions (e.g., policy, regulation); linking finance for greenhouse gas emissions reduction/sequestration to livelihood benefits, among others²

1.7 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?

The Hub will strive to demonstrate that real-world landscape investment portfolios could become a new asset class to support landscape transformation. It will build on and integrate landscape finance efforts of Coalition partners, e.g., Climate- KIC's Transformation Capital Initiative; EcoAgriculture's work on Integrated Landscape Finance Models and the Landscape Investment Finance Toolkit (LIFT); the Landscape Finance Lab's fund and bond designs; and the 1000 Landscapes Finance design team. The obstacles and recommendations targeted by our solution are also consistent with recent UN Food Systems Dialogues "High Level Dialogue on Finance at CFS 47 - Finance & Investment"³; "Agri-SME finance at the FSS"; "Role of PDBs in financing transition for FS transformation", "Catalyzing finance for women entrepreneurs" and, particularly, "how to enable finance as a game-changing food systems solution" which was co-convened by UNEP, Rabobank, the CGIAR Program on Climate Change, Agriculture and Food Security (CAAFS) and the Min. of Foreign Affairs of the Netherlands on "Risk sharing between governments, financial institutions and companies at the heart of solution". This builds on a growing evidence from: Blended Finance Taskforce⁴, Environmental Defense Fund⁵, the World Bank Group, Clarmondial⁶, CIFOR⁷, The Paulson Institute, Convergence/SAFIN⁸, among many others.

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

There is rapidly growing political support for strengthening place-based partnerships to achieve multiple goals for land and resources and associated economy, with food systems at the center of most in developing economies. Govts of the Netherlands, Germany, UK and USA have been strong supporters. The Global Environment Facility, UNDP, FAO, World Bank have large and growing portfolios of integrated landscape projects, and the Green Climate Fund, IFAD, Global Adaptation Fund and others are incorporating a landscape framework for investing. The UN CBD, UNFCCC, CCD, the Bonn Challenge, and High-Level Political Forum of the SDGs have all formally endorsed landscape and territorial approaches. UN Decade for Ecosystem Restoration has a strong integrated landscape approach. There is a strong need for knowledge and learning synthesis & information sensemaking to support these global initiatives. Likely support from: i) European Commission's published rules for implementing a sustainable finance taxonomy and put the target of 55% reduction by 2030 into law. ii) new NDC target commitments, including US commitments of 50% reduction of emissions by 2030 with a US Climate International Finance Plan iii) TNFD/TCFD/TSVCM iii) Multiple net-zero alliances across the financial sector iv) NGFS reviews of biodiversity and climate risks to financial stability v) launch of the "Agriculture Innovation Mission for Climate" by the .S. and United Arab Emirates, with endorsement from COP 26 and other member countries.

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

Financing for food system transformation is widely needed and adaptable. This solution supports all Action Tracks.

References:

1. We use the term 'landscape' here to refer to inter-connected place and people, at the scale where communities, agricultural production and ecosystems converge. Related terms include territories, jurisdictions, bioregions, watersheds, green growth corridors, and numerous others.
2. IMF Building Back Better: How big are green spending multipliers?: <https://www.imf.org/en/Publications/WP/Issues/2021/03/19/BuildingBack-Better-How-Big-Are-Green-Spending-Multipliers-50264>
3. Agri-Food Network (IAFN) and the Private Sector Mechanism of the Committee on World Food Security convened: <https://summitdialogues.org/dialogue/2880/official-feedback-2880-en.pdf?t=1613643864>
4. Blended Finance Taskforce: Better Finance, Better Food: <https://www.blendedfinance.earth/s/Better-Finance-Better-FoodInvesting-in-the-new-food-and-land-use-economy-pc86.pdf>
5. Environmental Defense Fund, Catalytic Capital in Agriculture: <https://www.edf.org/sites/default/files/content/Catalytic-Capitaland-Agriculture-2020.pdf>
6. Clarmondial, Blended Finance for Agriculture, constraints and possibilities of combining financial instruments: https://www.clarmondial.com/blended_finance_for_agriculture_paper_blog/
7. CIFOR Innovative Finance for Sustainable Landscapes: <https://www.cifor.org/knowledge/publication/7852>
8. Convergence/SAFIN: Deploying Blended Finance to Mobilize Investment at Scale in Food and Agriculture: https://www.convergence.finance/resource/5ecd4fe4-53ca-4b56-a3ca5510e8fb8df5/view?utm_source=LinkedIn&utm_medium=social%20media&utm_campaign=SAFIN-Convergence-2021

5. Sustainable Livestock

Table 5.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Academic Institution	BFH-HAFL	Highlight and promote the benefits of mixed crop-livestock systems, such as the VAC system in Vietnam	Crop-livestock mixed systems dominate agricultural production worldwide, but tend to be intensified unsustainably and replaced by monocropping systems, using chemical fertilizers and with minimal crop rotations. Such systems have been criticized for being inefficient in terms of labor use, and for the fact they do not allow economies of scale. The multiple benefits of mixed systems, e.g. the crop-livestock synergies and the impact on the soil ecosystem, their importance to farmers to mitigate risks, to access nutritious and varied food should be promoted.
Member State	Argentina	Sustainable Livestock, a contribution to the sustainable development of the livestock sector	<p>it is important to acknowledge the role of livestock as an economic activity that creates jobs and helps rooting the rural population.</p> <p>Possible actions:</p> <ul style="list-style-type: none"> - New communication proposals to disseminate the role of livestock and its relationship with climate change. Main livestock producer countries promote the sustainable intensification of livestock production from the increase in efficiency and productivity to ensure the supply of proteins and the reduction of the intensity of GHG emissions, (kg CO₂ eq./kg meat produced). - There are many meat production systems that work with best livestock practices, in harmony with the environment and under conditions of animal welfare. - The activity must also be valued considering the positive impact on ecosystem services and the socioeconomic benefits it generates, mainly in Latin American countries, where production is mainly extensive in grasslands or native and/or implanted natural forests (silvo- pastoralists), coexisting with the biodiversity of flora and natural fauna. - Livestock systems can be improved; It is not a matter of restricting meat production but rather of seeking the best production alternatives so that livestock can coexist harmoniously with the three dimensions of economic, social and environmental sustainability. - Pressure on the environment is reduced by simultaneously increasing productivity and

efficiency. To improve the contribution of the livestock sector, it is necessary to address complex interactions with a close look at the productive, economic and social realities of the producing countries.

- In many important regions of the world, the soil-climate combination limits agricultural production to only rustic pastures, a resource that can only be used by ruminants. In these regions, the replacement of livestock as a food-producing activity is practically impossible.

- The reduction of livestock, especially in these regions, would imply a drastic reduction in world food production, thereby undermining food security.

- In addition, if in such regions with edapho-climatic limitations an attempt to replace rustic pastures with vegetable production with the idea of replacing the meat with the production of food of vegetable origin were made, such management would only achieve an increase in desertification, given the fragility of these environments, as has already happened in the past in important regions of the world.

- Work is being done on the training of human resources, awareness of the processes and their impacts, the adoption of ad hoc technologies. This is a process of continuous improvement that implies the design of State policies that encompass its development.

- Joint action between the State and the private sector is essential for the improvement of livestock systems. Many experiences show Argentina's commitment to sustainable livestock.

NGO	ILRI	Accelerating transformation of smallholder based livestock value chains by bundling innovation in integrated interventions	The smallholder based livestock sector in LIMC has lagged behind other agricultural sectors in getting access to and taking up farm and market level innovation that can transform livestock value chains to supply more higher quality, lower cost animal source food to local consumers and improve community and national level nutritional security. The constraint appears to be the interdependent nature of livestock innovation as demonstrated from repeated failure to introduce high-producing breeds that fail to achieve their potential because there is insufficient feed, overwhelming health challenges or their keepers do not know how to manage them appropriately. The obvious
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solution, but which has rarely been attempted because of our tendency to work in technical siloes, is to promote an interdisciplinary approach that tasks research and development actors to design livestock interventions that bundle together the full range of technical and organizational innovation to enable their uptake and success. This means both designing the intervention together to ensure these interdependencies are taken properly into account in tailoring packages for specific contexts, and paying attention to establishing the fabric of support services needed to sustain adoption of the innovation package. While this approach has been evident in the development sector in the form of integrated rural development projects, the research sector has rarely worked effectively to operationalize its research results within this type of model. The solution will therefore focus on establishing a new livestock-research-for-development model that establishes interdisciplinary research teams to intentionally design transformative, practical, integrated interventions targeting specific value chains in specific contexts.

NGO	World Animal Protection	Fairer financing of food systems using the FARMS guidelines	Financial institutions have the ability to transform food systems by investing responsibly by using a guideline such as FARMS (farm animal responsible minimum standards).
Private Sector	American Feed Industry Association	Encourage and support the use of natural positive co-products.	In the production of food for animals the original product can be utilized in more than one way for more than one animal species, by making co-products. Co-products take the original product and decrease its negative impact on the environment by moving toward its full utilization of the nutrients products. In essences making more efficient use of the crop produced to feed animals to create high value nutritious food for human consumption.
Private Sector	BASF Nutrition & Health	Formulating animal feed for sustainability	Feed contributes 50-80+% of the environmental impacts of the livestock value chain. BASF has developed an industry-first solution for formulating animal feed for sustainability that is directly integrated with feed formulation software systems. Currently, the global standard is to formulate diets for livestock on a least-cost formulation basis without regard to environmental outcomes. With BASF's AgBalance Livestock solution, at the touch of a button,

			<p>those empowered to influence the feed formulation most directly, including animal nutritionists, formulators and farm advisors, will now be able to compare the sustainability attributes of feed formulation rations as well as the critical aspects of the diet's influence on animal growth and excretion. The launch of the solution is set for late March and next stage developments are being planned, including digital capabilities for sustainability optimization that will allow not only least-cost analysis but also least-impact design within feed formulation. We have already made a first partnership on feed formulation software and are seeking broader collaborations as an industry ecosystem evolves to help deliver on this paradigm shift for rethinking global feed formulation practices to enable significant environmental impact reduction in the animal protein value chain.</p>
Producers Association	Global Dairy Platform	Expansion of the integration of animal agriculture in importance of converting marginal assets into high quality necessities of Human diets.	<p>Full picture, scientific based integrated plans to fully utilize available feedstuffs in animal ag enabling the conversion of low quality into high quality foods for Human diets. This "recycling" reduces waste, unused foods in feeding ruminants, while diverting that waste from landfills (which emits as much or more methane as cattle). The cattle waste being administered as fertilizer will capture carbon in the soil and make it healthier. Improvements in cattle and animal care has reduced emission intensity by 10% from 2005 to 2015 and is improving to date. Animal agriculture, when appropriately managed, improves the local environment, the local nutrition, and the local economies wherever located in the world. Activist pushes for the abandonment of animal ag are counter to science and our goals of improving the environment while properly feeding a hungry world.</p>
Producers Association	International Dairy Federation	The Net Zero, Pathways to Low-Carbon Dairy initiative	<p>The initiative systematically introduces and/or enhances climate action in all dairy systems, recognising that different regions and systems require different 'pathways', with varying levels of ambition, different starting points and different time scales. All systems can, however, commit to whatever climate action is appropriate and feasible to reduce their net emissions and adapt to climate change. In doing so it is essential that the broader sustainability of dairy systems is enhanced: harnessing synergies and managing</p>

trade-offs with other environmental issues such as water, soil, nutrient use and biodiversity, as well as the sustainability objectives of food and nutrition security; livelihoods and economic growth; and animal health and welfare 4 . Multiple indicators need to be monitored, for example as is done in the Dairy Sustainability Framework 5, to ensure that all dimensions of sustainability are addressed. The first goal of the initiative is to stimulate commitments from various stakeholders in the global dairy sector, to create a movement for continuous improvement: pathways to low-carbon dairy. The second goal is to develop methodologies, tools and pathways to transform commitments into actions. The Net Zero, Pathways to Low-Carbon Dairy initiative is aligned with the Race to Zero campaign 6 , which mobilises non-government actors to join the Climate Ambition Alliance7 ; an initiative from the UN Secretary General to build momentum around the shift to a decarbonised economy. The initiative also builds on and aligns with established international processes such as the United Nations Framework Convention on Climate change (UNFCCC) reporting on Nationally Determined Contributions (NDCs) and the Koronivia Joint Work on Agriculture (KJWA).

Producers Association	National Cattlemen's Beef Association Environmental Counsel	Ensure availability of feed additives to decrease methane emissions from livestock.	Feed additives are an important tool to curb emissions of livestock in feeding environments. Used effectively, feed additives assist in reducing both an animal's direct and indirect environmental impact by lessening enteric fermentation emissions in addition to water, fertilizer, and feed use. Generally, livestock feeding is a valuable step in the beef supply chain and is key to reducing lifecycle methane emissions. Technology like feed additives that can only be effectively utilized in the feeding environment allow livestock producers to produce the same amount of beef today that we were producing in the 1970's with 33 percent fewer animals.
Producers Association	World Farmers Organization	Boosting animal health and welfare through better management of livestock production while increasing	An example of the proposed action come from "Torloisk farm" based in Scotland: The main focus on the farm to adapt to climate change is to selectively breed for animals suited to specific environment and climate and which are therefore more capable of dealing with the challenges thanks to their superior genetic potential, as well as to adjust health management and feeding regime in response to

adaptation to
and mitigation
of climate
change

changing weather patterns in order to ensure that animal health and welfare is not compromised. The main focus of Torloisk farm to try to mitigate the effects of climate change is to work with traditional breeds best suited to the farm type and able to thrive on minimum external inputs in order to be as self-sufficient as possible and keep any purchased inputs to a minimum. This helps to significantly reduce GHG emissions associated with the manufacturing and processing of these inputs and the associated travel incurred for the delivery of those goods to the farm. Another focus is to increase and improve efficiencies via genetic trait improvement to produce more output per unit of input, and to manage the grassland in such a way that it does not require high levels of fertiliser input and is able to sequester carbon. Practices implemented on the farm:

- 1) Genetic trait selection and performance recording: focus on working with animals that have very specific genetic traits that allow them to thrive within the challenging environment on the farm by recording farm activities and hold a profile for each individual animal.
 - 2) Adjusting health management: adapt the farming system in response to the increase in parasitic activity by administering additional/more precise and effective health treatments to the livestock.
 - 3) Grassland management; for example, the erection of more fences to create a more complex field system and rotate grazing animals as much as possible between these fields in an attempt to imitate the traditional grazing pattern of wild herbivores browsing on an area and then moving onto the next.
 - 4) Changing the feeding management: for example by carefully manage the feed availability on the farm by trying to allow areas across the farm to grow enough throughout the summer without it being grazed down in order to have sufficient deferred grazing available during the winter.
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Producers Association	World Farmers Organization	Adopt mitigation and adaptation practices on pig farming	<p>Example of the solution proposed above comes from farmers in Denmark, implementing the following set of solutions:</p> <ul style="list-style-type: none"> - Frequent evacuation: it implies transferring manure from the pigsty to a manure tank more quickly. Instead of evacuating the manure every five to six weeks, it is evacuated once a week. Since the temperature of the manure tank is lower than that of the pigsty, methane emissions are lower, significantly reducing greenhouses gas emissions. It is estimated that methane emissions from pork production could be reduced by 22% by applying the frequent evacuation method in 90 % of pigsties. - Renovation of existing buildings: to help minimize the use of materials and creating functional state-of-the-art stables. For example renovation of old, out of use, poultry buildings into pig stables to ensure a proper recycling of materials and waste prevention through repaired or upgraded investments. - Efficient and short transportation of farm animals to lessen livestock emission and ensure animal welfare.
Research Institute	ILRI	Innovative application of information and communication and genomic technologies to support production models and access to more productive and resilient crossbred heifers through transformative private-public sector partnerships,	<p>The potential of dairy to contribute to sustainable development goals is not unleashed due to lack of high yielding adaptable genetics. Semen, bulls, and heifers were imported as a strategy to deliver improved genetics. The artificial insemination (AI) service is dominantly public. The inefficiency in the AI service, lack of incentives for AI technicians and low private sector investment have limited the availability of improved genotypes and limited participation of smallholder farmers, women, and youths. The African dairy genetic gain (ADGG) program has been implementing a sustainable breeding program and identified top ranked elite bulls and cows. However, with the existing inefficiency to deliver improved genetics, the progress will be slow and will affect the selection of elite bulls and cows.</p>

Research Institute	Innovation Center for U.S. Dairy	U.S. Dairy Net Zero Initiative	<p>The Net Zero Initiative (NZI) launched in 2020 as an industry-wide effort to accelerate voluntary action on farm to reduce environmental impacts by making sustainable practices and technologies more accessible and affordable to U.S. dairy farms of all sizes and geographies. This is achievable through research, on-farm pilots, development of manure-based products and ecosystem markets, and other farmer technical support and opportunities. The work of NZI is focused in four areas: feed production, cow care, energy efficiency and manure management – which together represent the total footprint of a farm. The primary expected outcomes include 1) the collective U.S. dairy industry advances to net zero carbon emissions and significant improvements in water use and quality, 2) in addition to nutrient-dense foods and beverages, dairy farms provide products and services that enable other industries and communities to be more sustainable, and 3) farmers are able to realize the untapped value on-farm, making the system of continuous improvement self-sustaining.</p>
UN Agency	FAO	Low carbon livestock: Using insects as livestock feed	<p>Insects can make use of organic waste materials from agriculture, food industries and other sectors and bring valuable ingredients back into the food chain. By converting low-quality biomass into high-quality proteins, they can provide a sustainable and valuable alternative to conventional protein sources such as fishmeal, soybeans and several other grains.</p> <p>Using insects as alternative ingredients in livestock feed can decrease the sector’s use of the world’s natural resources (e.g. land and freshwater) and contribution to greenhouse gases (GHG) emissions as well as reduce feed-food competition. It can play a key role in enabling the sustainable transformation of the livestock sector and in enhancing its contribution to the attainment of the Sustainable Development Goals.</p>

UN Agency	FAO-NSA	Net Zero, Pathways to Low Carbon Dairy	<p>This initiative will systematically introduce and enhance climate action in dairy systems, globally, recognising that different regions and systems will require different ‘pathways’, with different levels of ambition and different time scales. All systems can, however, commit to take whatever climate action is appropriate and feasible, harnessing synergies and managing trade-offs with other environmental issues such water, soil and biodiversity, as well as food and nutrition security; livelihoods and economic growth; and animal health and welfare. Cattle and buffalo dairy systems, the initial focus, are immensely diverse worldwide and each system will present different opportunities to reduce net emissions in the context of other sustainability objectives. Taking account of this diversity, the initiative will develop and promote low carbon development pathways that include technical, policy and institutional measures to reduce, avoid and offset dairy emissions.</p>
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6. Transformation through agroecology and regenerative agriculture

Table 6.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Academic Institution	Agriculture and Forestry University, Nepal	Sole - Crop Rotation: Dynamic food production system for Resilient Food Production	Sole or Mono Cropping is bittersweet system of farming. As mechanized farming is feasible in this system of cultivation which holds the key for sufficing quantitative food demand of the world, but it also comes with the price of pest and diseases. By globalized approach of performing sole cropping of a particular crops for particular period of time in agroecologically defined domain and replacing the crops after the period so that crop diseases and pests cannot exceed economic threshold level, the health and quantity of production can be attained to maintain food security. Now the replaced crop for the domain can be established in new domain where there are no/less presence of particular disease and pests.
Individual		People-agriculture-forest nexus	Unsustainable farming practices that lead to clearing of new land or expansion for production is one of the main causes of deforestation and degradation of the fragile Miombo landscape/(Trans Frontier Conservation Areas (TFCA). With the increasing populations, and food demand, the environmental health is heavily burdened by land degradation, wildlife exploitation, resource extraction and climate change. Uniting people, food production systems and environmental health has potential to increase resilience of smallholder farming systems in the Miombo landscapes/TFCA. There is need to work on the people-agriculture-forest nexus to break the vicious cycle which has driven more and more communities into poverty despite gains in other economic areas. If the people-agriculture-forest nexus is properly addressed, farmers and other actors can shift towards productive and regenerative agriculture, sustainable management of forests, ecosystems restoration and avoided land expansion and nature-compatible consumption. The nexus is imperative as it can be a win-win for people and nature and foster sustainable food systems in smallholder farming systems of Africa.

Individual

Rent-a-goat and electric wood chipper for regenerative agriculture

I am a young start-up farmer and just bought 3 hectares of not well-maintained land that I want to turn into a CO2 friendly, regenerative and diverse farm that increases the food-sovereignty of me and my region. My biggest current challenge? How can I clean up my land from a blackberry-invasion and vicious vitalba vine overgrowth in a sustainable way? And can I do something better with the thousands of branches that I am pruning off of my trees than burning them? I don't have the money to buy a tractor or other utensils and definitely do not want to use herbicides. The soils are degenerated and compacted from previous tractor use and monocultures and fruit trees, olive trees and other crops are suffocated below invasive weeds. I need two simple things that could solve all of those problems at once! A goat and a wood chipper! Goats mow the grass, eat the blackberry bushes and control weeds. And they do all of this while fertilizing my land. Wood chips are also a great way to build soil. I can't buy neither a wood chipper nor animals for my farm for various reasons (lack of time, finances, stables, knowledge of keeping them, don't want to give up on my freedom to leave the farm at times for longer periods). So all I need is somebody who rents me his goats and wood chippers. I have already talked to three other neighbours who would be interested in having goats for weed control or chip their wood instead of burning it, but there is no one in my region renting out his/her goats or machines and no incentive to do so. Imagine if there were incentives for existing goat farmers and wood chipper owners to rent out their goats and machines. It would help them and(!) people like me to have a CO2 friendly, natural alternative and make regenerative farming more accessible.

Individual

Communities design/build/manage full cycle, climate resilient, eco-logical food hubs

The concept is to work with communities to design/build and maintain full cycle climate controlled and resilient growing spaces, sustainable processing and packaging facilities, optimal use of food waste for energy and compost using new and old technologies such as aquaponics and bio-energy generation. These hubs would provide education, jobs, social enterprises, organic food security, community ownership/engagement and help regenerate soil while reducing ghgs and the eco-impacts of food system activities.

Individual

For the humid tropics, the low-cost, proven organic, regenerative program of Inga Alley Cropping with the Inga tree Model has proven results with vast potential for food security, saving rainforests, protecting water sources, providing jobs, AND giving smallholder farmers the means to survive the worst climate shocks so they are not forced to become climate refugees.

For generations, slash-and-burn agriculture has been a way of life for millions of subsistence farming families in the tropics. Families clear cut and burn patches of rainforest to create plots of fertile soil on which to grow their basic food crops; the soil fertility, however, does not last. Crop failure and subsequent erosion forces families who depend on slash-and-burn to keep clearing new patches of rainforest every few years just to survive, with more than 200,000 acres destroyed every day. Based on 20 years of research, the Inga Foundation pioneers a revolutionary alternative agricultural system-Inga Alley Cropping. Planted less than 2 feet apart along contours in hedgerows with crops in-between, the resilient, fast-growing Inga trees are pruned to chest-high in 18 months, the leaves stripped and applied as mulch, with the branches providing valuable fuelwood which lasts a year. The Inga regrow & the cycle repeats. Climate shocks are withstood—families have grown bean and corn crops with no irrigation or a drop of rain—the thick mulch keeps the ground cool and retains water and Inga alleys survive 7 months of drought. This organic, low-input, debt-free, and bottom-up approach is readily available now and gives families the means to achieve “land for life,” implementing sustainable agricultural practices. The Inga Tree Model positively addresses 11 of the 17 United Nations SDGs with NO NEGATIVE IMPACT whatsoever on the remaining 6

Individual

The role of smallholder farmers and indigenous people's knowledge, skills and experiences in boosting nature positive production to ensure safe, nutritious food and conservation of our biodiversity for a sustainable food system.

Indigenous knowledge, skills and experiences play a vital key role in the diversification and inclusiveness of a sustainable food system. We need to customize our tailor made solutions and technologies suitable for our smallholder farmers and indigenous people's adoption. We need to explore their knowledge of ways to reduce the risks associated with food production and upscale it. We're to empower the disadvantaged and underserved communities as well as the vulnerable population of women and youth that do most of the bulk food production in creating a sustainable food system. Indigenous people, fishermen, farmers are closer to mother nature and are more capable in the interpretation and preferring solutions to various threats and challenges posed by climate change on both crops, fish, aquatics and our environment.

Individual	Agriculture extension of small farmers on good agricultural practices	In order to obtain good food, we must focus on agricultural technologies that allow us to produce in a sustainable manner and with the lowest percentage of greenhouse gas production (biological agriculture, ecological farming, production of extracted organic materials from waste by farmers). This type of production would help farmers to provide a healthy product at lower prices
Individual	Enabling decentralization of food supply chains to give power back to farmers/local communities via CSA-like platforms for equitable distribution, and in effect, enabling more local farms to grow and prosper.	Food distribution systems rely on the monopolization of supply chains that are easy to break down (as we've seen during the Covid-19 pandemic and the Suez Canal blockage), both of which become costly for all parties involved. Farmers are currently expected to grow a certain amount of food (else, lose money) and consumers are faced with increasing costs as the cost of distribution systems continues to climb during economic inflationary periods. The pressure for farmers to grow a certain amount of food to feed nationwide demands also depletes resources from the land, as it usually results in monocropping, higher pesticide usage, and degradation of lands, which cause longterm losses of yield and higher risks of pathogenic attacks that contribute to loss of farm jobs, and once again, high costs of final products that low-income people cannot afford. If we enabled more local distribution systems of food to exist, like Farm Link Hawai'i, farmers are at more liberty to grow different crops that serve the community and enjoy the fruits of their own labor for many generations to come. The surrounding ecosystems will also benefit from lower pathogen pressures, and maintain healthier soils and crops. Neighborhoods and people will also be free from pesticide drift, which will show higher health rewards and lower expenses at hospitals due to immune health. The cost of distribution may also be kept low, as there will not be high transportation costs. Overall, the cost of starting such a system will be more sustainable over time and this idea scales and more neighborhoods adopt local and decentralized food distribution.

Individual		Odienya Village Permaculture Institute	We would like to transform our farm in Odienya-Rongo, Kenya into a permaculture training institute. We would like to provide regenerative, agriculture training to local farmers, school programs, orphanages and refuges. We will expand this idea out with our students to create training farmers in every rural area in Kenya and Africa that we can.
Individual		Agroecological farming for food system resilience	Environmental friendly production at landscape and farm level
Individual		Transformation into resources circular food production systems	Establishing a carbon-neutral roadmap for agriculture sector, Settlement of optional direct payment for public benefit, and Strengthening the carbon absorption base using forests and oceans
Member State	European Economic and Social Commission	Enhance the potential of short food supply chains and agroecology	<p>The EESC has acknowledged the increasing number of initiatives being implemented at regional and local level to support alternative food systems. These initiatives establish closer links between producers and consumers, create opportunities for local businesses and new jobs, and reconnect communities with their food. The EESC also highlights the role of cities in developing more integrated food policies. A comprehensive food policy should build upon, stimulate and develop common governance at all levels – local, regional, national and European. This would create an enabling framework for these initiatives to flourish, whatever their scale.</p> <p>Short circuits enhance the added value and profitability of small farms, enabling them to sell identified products that “have a story to tell” to consumers, who are then prepared to pay more, and generate community activity and social links in rural areas. Improvements in food production quality and marketing channels give consumers responsibility in relation to the value of food and to waste, and therefore contribute to a reduction in the impact of food on climate change.</p> <p>The EESC considers that agroecology is the horizon towards which European agriculture should work: farming inherently depends on conserving natural resources for its development. Building on fully developed models such as organic farming (avoiding a number of negative trends in the organic “industry”), permaculture and other traditional small farming systems, commitments to moving towards fewer inputs,</p>

revitalising soils, introducing a variety of crops and protecting diversity must be encouraged and highlighted.

The internet is proving to be a new area of exploration and innovation for short supply chains. The way it has spread over the past decade or so has been reflected in the proliferation of short food supply chains. Offering a wider market than the traditional producers' market, it also helps to improve and streamline trade. Numerous on-line ordering platforms have emerged in the last five years. These "food hubs" allow producers and consumers to interact directly, particularly in the case of products that can only be found locally.

There is a wealth of short supply chain initiatives based on social, organisational and regional innovation, which are still in the process of being set up. Many studies highlight the local dimension and collective identity as key factors in long-term sustainability. The challenge is therefore to empower operators to create local food systems based on local governance which is representative of these operators.

Member State	France	Enhanced coordination through the "GGW accelerator" to support Agroecology deployment in the Sahel	<p>The GGW is an ambitious undertaking within an extremely vast geography that requires coordination between 11 countries, involves multiple levels of governance and covers millions of hectares. One of the ambitions for the GGW initiative is to scale rehabilitation and restoration activities over the coming decade with a view of reaching the Sustainable Development Goals (SDGs): Restoration of 100 million hectares of degraded land by 2030, sequester carbon, boost food security and support local communities to adapt to climate change. So far, a total of 17.8 Mha land is under restoration or has been rehabilitated in the GGW Member States. To reach a total area of 100Mha by 2030, it would be necessary to substantially increase the current pace of land restoration from 1.9 Mha/year on average to 8.2 Mha annually.</p> <p>The Green Great Wall Accelerator is a facilitation and coordination mechanism to provide assistance at the regional level, fostering cross-border information and knowledge exchange, in order to scale up rehabilitation and restoration activities. The GGW Accelerator will build on and</p>
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support the existing Great Green Wall institutions, entities and processes and involves all GGW partners (Countries, Development banks, CSOs, regional and international organizations, private sector).

Based on an organizational framework and build on 5 pillars, the GGW accelerator will support and foster transformational approaches in accelerating the implementation of restorations actions and the resilience of populations and ecosystems in the GWW countries. The GWW accelerator is based notably on agroecology practices/approaches, which play an important role in making food systems more sustainable and resilient while facing global changes such as climate change.

The GGW accelerator five pillars are the following: (i) Investment in small and medium-sized farms and strengthening of value chains, local markets, organization of exports; (ii) Land restoration and sustainable management of ecosystems, (iii) Climate resilient infrastructures and access to renewable energy; (iv) Favourable economic and institutional framework for effective governance, sustainability, stability and security; (v) Capacity building.

Thus, the GGW accelerator is designed to: Develop, protect and restore arable lands, one of the most precious goods offered by nature; develop economic opportunities for youth in the Sahel countries, one of world most dynamic areas demographically; develop food security in one of the region the most affected by malnutrition; develop and strengthen resilience in one of the world most vulnerable regions to the consequences of global warming.

At the OPS in January 2021, international donors pledged an amount of 16 bn USD in support of the GGW-A initiative, including 600 M euros from the French development Agency (AFD).

Member State	GIZ	Agroecological blocks: a nature based-solution to enhance local food system's resilience	An agroecological block is a complex multilevel ecological system which increases the agricultural productivity as well as agrobiodiversity and farmers' resilience towards droughts and erosion. In an agroecological block, several common agroecological techniques are closely intertwined. For example, hedges of shrubs or trees are associated with intercropping of one or several
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cover crops, which can be leguminous crops like beans or peas, cereals, vegetables or grass species. The permanent cover of the arable land is the best protection against water and wind erosion. Moreover, due to the diversity and density of vegetation, soil fertility and water retention are improved and a beneficial microclimate forms on the agroecological blocks. Thus, the landscape evolves and becomes greener. The use of species which are adapted to local conditions also has positive impacts in terms of food availability and nutrition for the farmers as well as animal feeding at the farm level. Therefore, farmers become more resilient against shocks affecting agricultural and food systems, like droughts or pandemics.

Member State	GIZ	Sustainable Rice-fish culture, that is the growing of fish in rice paddies	<p>Should we farm fish or grow rice? For some farmers, this question does not arise, they produce both at the same time. Rice-fish culture makes it possible to integrate fish farming into existing rice cultivation. Once the rice seedlings are planted, (typically carp) fingerlings can be released into the flooded fields. Since the use of chemical fertilizers and pesticides is prohibited, the fish encounter a healthy habitat where they find sufficient food such as phytoplankton, zooplankton, snails, insects and other small animals. For the rice farmers this investment pays off twofold: On average it enables them to harvest 50 kilogram of fish in addition to their rice crop. In addition, the presence of the carp benefits rice cultivation: they churn up the silt at the bottom of the pond and thus boosting rice yields by as much as 10 per cent.</p> <p>Sustainable, resource efficient fish farming and higher yields: it's a winning combination. Particularly in countries, where rice is a staple and rice cultivation is practiced by a large percentage of the population, rice-fish culture can provide an additional source of income and employment and supply rural populations with fish. Fish is a vital source of protein and other essential nutrients and can contribute, as such, to a healthy and balanced diet. Usually it is exclusively available in coastal regions and in large urban centers, while in Madagascar, 80 % of the population lives in rural areas. Poverty, combined with limited availability of protein and nutritious food leads to problems of undernourishment and malnutrition, especially among children. Here, rice-fish culture</p>
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has shown its remarkable potential to combat malnutrition in rural regions through a sustainable, nature-positive approach.

The Project on Sustainable Aquaculture in Madagascar (PADM), which is a country component of the Global Program "Sustainable Aquaculture and Fisheries", financed by the German Federal Ministry for Economic Cooperation and Development (BMZ) under the Special Initiative ONE WORLD No hunger and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) promotes rice-fish farming in the Highlands of Madagascar.

Member State	GIZ, Green Innovation Centre for the Food and Agriculture Sector - Ethiopia	EhelWuha - educational game	<p>The such-called EHELWUHA Game uses interactive experiences, playful design to address human related bottlenecks in the Agricultural sector. An amharic phrase ‘ኣህል ውህ’ made from two words ‘Ehel’ meaning food and ‘Wuha’ meaning Water and is used to signify the source of everything. As stated in the Ethiopia’s Agricultural Extension Strategy five of the nine pillars for improving this sector have to do with human elements that are affecting the sector in communication, collaboration and knowledge management. The main aim of this innovation is to understand and to provide solution to the human elements being faced by the sector (using Game Thinking and Participatory Design) specifically with regards to</p> <ul style="list-style-type: none"> • Providing a tool for creating a common understanding within and across stakeholders • Equipping Development Agents with the right tools for creating a two-way efficient communication channel with farmers • Providing tools for improving knowledge and skill gaps of Development Agents
NGO	World Vision Australia	Farmer Managed Natural Regeneration (FMNR)	<p>Deforestation and severe land degradation have contributed to considerable poverty and hunger around the world. FMNR is a low-cost, simple, sustainable land regeneration practice that communities can use to restore their land, increase their productivity and build resilience relatively quickly and efficiently. FMNR is equally a tree management practice, involving selection, pruning, protection and maintenance of natural tree regrowth, and a community empowerment practice, re-greening both community mindsets and people’s relationships to nature and their landscape.</p> <p>The central principles of FMNR are:</p>

1. The selection and systematic pruning and management of existing indigenous trees and shrubs by the land user. 2. An overall increase in tree/shrub coverage and biomass across the landscape. 3. An improvement in the ecological functionality and therefore human well-being (economically and socially) in the landscape being managed with FMNR. FMNR is a biophysical natural resource management practice and a foundation for sustainable development interventions, including disaster risk reduction; water, hygiene and sanitation; climate change mitigation and adaptation.

NGO	Action Against Hunger UK	Promoting Agroecology	<p>Agroecology is often reduced to a set of agricultural practices but in fact, it should be applied to the whole food system. Agroecology proposes a vision based on a better integration between cities and the countryside, consumers and food producers, a virtuous cycle of food and nutrients from the fork to the plate and back to the field. Agroecology proposes solutions all along the food chain:</p> <p>optimum management of soil organic matter for better fertility and reduced erosion, production of sufficient, safe and nutritious food, distribution through shorter value chains —both in terms of distance travelled by food items or the number of intermediaries between the producer and the final consumer, and therefore more inclusive and equitable—, better income for farmers, better food at a better price for consumers, improved waste management and composting of organic residues, among others.</p> <p>These new food systems, designed to be adapted to local conditions and particularities, would be elaborated with a truly rights based approach. Indeed, the rights to adequate food, the rights to land and resources and gender equity are fundamental in food and nutrition issues</p>
NGO	Biovision Foundation	Investing in agroecological SMEs for food system transformation	<p>Agroecological SMEs along the value chain play a major role in scaling up nature-positive production and marketing, but find it difficult to access catalytic, patient capital that suits their needs. While a wide range of financial services recently emerged that cater to agribusinesses that fulfil common due diligence criteria (collateral, track record, ticket size), the large group of SMEs that are not yet at this stage are mostly left out. In order to close this “missing middle” the Transformational Investing in Food Systems Initiative (TIFS) together with Biovision,</p>

the Global Alliance for the Future of Food, the Agroecology Fund and UNEP are exploring ways to blend public and philanthropic capital. A side-event to the FSS is under preparation (supported by Switzerland) to discuss challenges and opportunities with a wider group of interested stakeholders. Biovision, the Agroecology Fund and UNEP are also teaming up to develop a regional Agroecology Accelerator facility for East Africa that provides patient capital and technical assistance to “agroecopreneurs”.

NGO	Biovision Foundation	Scaling up agroecological vegetable and fruit systems	Vegetables and fruits play a key role in improving nutrition but also in increasing incomes of smallholders. However, vegetables and fruit production currently involves high amounts of synthetic pesticides and fertilizers. In many developing countries, indiscriminate use of often highly hazardous pesticides puts farm workers, consumers and the environment at risk. Growing consumer awareness and demand for safe vegetables and fruits provides opportunities for smallholder producers using smart farming system design and biocontrol options, catering to local and urban markets. Biovision is collaborating with leading research institutions (WorldVeg, icipe, FiBL etc.) and local CSOs to further develop and upscale agroecological vegetable and fruit production and marketing systems in Sub-Sahara Africa. Similar initiatives could be clustered into a global regional or even global program to make use of synergies and to coordinate and enhance support.
NGO	CABI	Biological solutions to produce safer food	It is by now widely acknowledged that biological solutions in agriculture can be effective, low-risk, economical as well as environmentally compatible (climate smart) and reduce the human health impact due to chemical (pesticide and mycotoxin) residues in food. However, without awareness, availability and affordability there will continue to be insufficient uptake of biological solutions by smallholder farmers in developing countries, and continued contamination of locally sourced food. Therefore, biological solutions in agriculture are proposed as game-changers that deserve significant support for large-scale awareness raising and replicating successes, to enhance the sustainability of food production as well as safety of food systems whilst contributing to the protection of biodiversity within and beyond agricultural ecosystems.

NGO	Compassion in World Farming, UN Food Systems Champion	A global transition from industrial agriculture to regenerative, agroecological agriculture	<p>Industrial agriculture is a major driver of wildlife declines, of deforestation and soil degradation. It is the biggest cause of animal cruelty on the planet. And now it is recognised as a serious pandemic risk too: factory farms creating the perfect breeding ground for new and dangerous strains of disease.</p> <p>Far from sparing land for nature, the reality of intensive farming is that farmland continues to expand, encroaching on the world’s last remaining wild lands. Vast acreages of precious arable land have to be devoted to growing feed for confined farmed animals.</p> <p>How to change is increasingly seen as reconnecting food production and nature through regenerative, agroecological farming combined with more balanced diets. Eating more plants and less and better meat from nature-friendly farms where, as sentient beings, animals can move freely and experience the joy of life. Where they can be mixed in rotation with crops grown using natural predators and disease control instead of chemicals and drugs. Where manures fertilise the soil.</p>
NGO	One Planet network	Value-chain approach for sustainable food systems	<p>The Value-Chain Approach is a methodology for catalysing science-based policy action on sustainable consumption and production. Its purpose is to identify key points of intervention within economic systems to reduce natural-resource use and environmental impacts caused by production and consumption, and to define a common agenda for action.</p> <p>The Value-Chain Approach considers the entire value chain of economic activities, by understanding what is happening at different stages of the value chain as well as how the value chain operates as part of a system.</p> <p>Through consultation and collaboration, the Value-Chain Approach defines a common agenda for concerted actions that can transform the system.</p> <p>As an action-oriented approach, its key outcomes are:</p> <ul style="list-style-type: none"> - identifying where the greatest opportunity for improvement occurs; - which actions need to be promoted to take advantage of these opportunities; - what enabling conditions are needed; and - which stakeholders should lead such actions. <p>Link to the report of the Task Group on catalysing science-policy action on sustainable consumption</p>

and production that developed the approach and applied it to the food sector is available here: <https://www.oneplanetnetwork.org/resource/catalysing-science-based-policy-action-sustainable-consumption-and-production-value-chain>

NGO	Organic Food System Program	Organic practices	<p>Organic practices are known to reduce biodiversity losses, resources used i.e chemical fertilizers, herbicides and pesticides, pollution, water use, soil degradation and green house gas emissions for plant productions and to support small holder farmers and SMEs</p> <p>More than 50 years of experience of growing organic production and consumption supported by science shows the efficiency and feasibility of the game-changing idea and also operating within the Planetary Boundaries and contributing to the 17 SDGs and especially no 2, 12,14 and 15</p>
NGO	Rainforest Alliance	Climate Smart Agriculture	<p>With the world’s population estimated to hit 9.8 billion by 2050, our current food production systems face an enormous challenge, made even more daunting by climate change. Experts say agriculture must increase its output by a startling 50% in the next 30 years – while halving its carbon footprint. To address the world’s ballooning food needs amid a worsening climate crisis, we must scale up climate-smart agriculture (CSA), an approach to food production that can improve productivity, increase resilience to climate change and reduce greenhouse gas emissions. CSA which is already implemented is facing several barriers which need to be identified and workable solutions need to be found, through scaling up measures like farmer typology, contextualization, tailored investment opportunities that should be taken by governments and supply chain actors to meet the food security challenges and build climate resilience.</p>
NGO	Private sector	Climate smart agriculture	<p>As seen in our graphic "Strategies to Enable Agricultural Solutions to SDGs" (view at bit.ly/sfl-csa), the "climate smart agriculture" (CSA) approach to agricultural land management focuses on three overlapping CSA pillars: productivity, adaptation & resiliency, and greenhouse gas reduction. It is important to note that this model does not prioritize any one of the pillars and represents the simultaneous co-benefits that accrue. The foundation of this model is built upon an all-encompassing need to adopt a “many pathways” and “all tools in the</p>

toolbox” approach to managing working lands that a) recognizes the tremendous diversity of agricultural landscapes and ecosystems; and b) enables producers to utilize the systems and practices that best support their own unique situations and circumstances. It also requires a recalibration of what and how we expect the land to produce.

NGO	Sustainable Food Trust	Creating a harmonised framework for measuring Food & Farming Sustainability at farm level	<p>Create an internationally common metric for measuring on-farm sustainability which could be adopted by farmers, food companies, investors and governments to drive progress towards regenerative agriculture.</p> <p>We stand at a critical moment in history for food and farming. Concerns about accelerating climate change, the impact of industrial agriculture and growing public awareness about the connection between the way we produce food and our health, nature and future prosperity presents a moment of reset to build a more sustainable farming future.</p> <p>We believe an internationally harmonised framework for measuring farm and food system sustainability could be a game changer in speeding up the much-needed transition to more sustainable food and agriculture, giving power to farmers, consumers, governments and businesses to make the right choices.</p> <p>This metric has been developed by farmers over the last 5 years, but is now being driven forward by a dynamic coalition of stakeholders including the UK government, National Farmers Union, Tesco, Sainsbury’s, Waitrose, Morrisons, McDonalds, Arla, NatWest Bank, WWF, the Ellen MacArthur Foundation and others.</p>
NGO	The Nature Conservancy	Regenerative Foodscapes can produce multiple benefits, across climate, biodiversity and lands resilience, while helping to ensure long term production and incomes.	Regenerative Foodscapes can make agriculture a force for good and part of the solution on multiple fronts. Using nature-driven methods, they can increase soil carbon capture while improving field resilience. Less will be needed in the way of chemical additives and harmful runoff will be much less. While up-scaling will require policy support and adjustments, regenerative approaches can support long term production as well as incomes.

Private Sector	Rabobank	Further stimulating the mainstreaming of incorporating a sustainability feature (in the form of sustainability KPIs) in all loans given out to corporates in the F&A sector.	Further stimulating the mainstreaming of incorporating a sustainability feature (in the form of sustainability KPIs) in all loans given out to corporates in the F&A sector. These KPIs need to measure the performance of companies on the most urgent sustainability issues in F&A: carbon emissions, food waste, water usage, female empowerment, sustainable agricultural production methods, etc. Formatting progress in a dashboard.
Private Sector	BASF	“Ardena” – Our Land: Transforming Small-Scale Producer Communities and Building Resilient Food Systems with Hyperlocal Advice	We would like to scale-up an existing free crop disease prediction and disease alert service currently available for horticultural SSPs in Egypt to other North African countries in an effort to also engage with women farmers and women in farming communities. Although often neglected, women play an important role in agriculture (40-50% in North Africa), including crop sorting and preparation, weeding, harvesting and planting crops. To holistically address farmers’ challenges, especially women in farming communities, we want to broaden the free crop disease alert platform to include additional content on health, nutrition, commodity pricing and support women’s access to information. COVID-19 has made us all dependent on digital technology and this project helps to ensure that the world's poorest are not left behind.
Private Sector	CropLife International	Integrated Pest Management	Integrated Pest Management (IPM) is an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides. FAO promotes IPM as the preferred approach to crop protection and regards it as a pillar of both sustainable intensification of crop production and pesticide risk reduction. As such, IPM is being mainstreamed in FAO activities involving crop production and protection.

Private Sector

PlantwisePlus for promoting nature-positive food production at scale

The aim of PlantwisePlus will be to comprehensively support countries and farmers to grow the quantity of food required as well as improve the quality of food grown. PlantwisePlus will help countries to predict, prepare themselves for and prevent plant health threats in a changing climate - reducing crop losses and empowering farmers through a more resilient plant health system.

PlantwisePlus responds to 3 inter-related key challenges that need addressing to achieve nature-positive food production at scale in low-medium income countries, namely: 1. Public and private actors in extension do not have sufficient capacity to accurately diagnose smallholder farmer crop health problems or up-date their knowledge to provide good advice on sustainable solutions; 2. There is still insufficient awareness of the hazards associated with inappropriate pesticide use among farmers, advisory service providers and consumers, and highly hazardous pesticides are still impacting nature as well as human health; 3. There is no consistent or coordinated mechanism for plant health problem surveillance, rapid detection and response, or providing technical support to identify these problems in smallholder farmer fields and to deliver effective solutions.

PlantwisePlus consists of four components of work, focused on: (a) strengthening detection and response to pest outbreaks, building on lessons learned in the partnership programme Action on Invasives (www.invasive-species.org), (b) enhancing digital advisory tools to boost nature-positive plant health practices and make smallholders more resilient to external shocks, building on lessons learned in the game-changing Plantwise (www.plantwise.org) approach, that has strengthened extension services and has reached 54 million smallholder farmers, (c) enhancing the availability of low-risk plant protection products to reduce reliance on highly hazardous, “nature-negative” farm inputs and (d) increasing the supply of and demand for safer, higher quality and locally produced food in domestic markets, so that local food systems improve.

Private Sector

Systemiq

RACE to scale
Nature Positive
Farming

A system change acceleration platform with the ambition to ensure that by 2030, over 50% of the world's agricultural land is farmed in a way that is nature positive. RACE will establish the architecture of outcome based targets for agricultural land stewardship that can unify and galvanise collective action in the same way that net zero and NDCs are doing for climate.

The platform will also bring together critical mass clusters of pioneering organisations from across the system to accelerate interventions in targeted areas that have the potential for exponential impact, including, but not limited to:

- Developing an outcome based Nature Positive Farming Framework to galvanise collective action, and that can underpin multiple enablers of system change including policy, corporate sourcing targets, financing mechanisms, product differentiation, and consumer demand
- A framework of field level metrics and indicators and measurement / data collection protocol capable of supporting policy and finance interventions and unlocking new income streams for farmers linked to land stewardship
- Developing 2030 transition pathways for each region and key commodity, based on % land delivering Nature Positive outcomes.
- Establishing a network of pioneer Nature Positive lighthouse farms around the world that can inform the framework and provide inspiration to other farmers to transition
- Delivering at scale 'proof of concept' projects in specific commodity/region landscape contexts as the basis for transforming value chains
- Developing financing mechanisms that derisk farmer transition and enable farmers to be rewarded for ecosystem outcomes

The RACE platform concept has been developed through a collaboration between SYSTEMIQ, WBCSD, IUCN, OP2B, IMAGINE and Future Stewards. We have shared the concept with a number of leading corporates from across the food and agriculture value chain who are interested in participating and who have validated that the platform could play an important role in accelerating transition.

Producers Association	World Farmers Organization	<p>Within the F.R.A.N.Z.-project, environmentalists and farmers are working together to trial conservation measures to promote biodiversity, but at the same time be practicable and economically viable for the farm.</p>	<p>Biological diversity is a critical factor for intact ecosystems and thus for agriculture. However, attempts to meet the growing global demand for agricultural products often conflict with biodiversity conservation objectives. This is where the dialogue and demonstration project F.R.A.N.Z. (Future Resources, Agriculture & Nature Conservation) comes in, by developing effective nature protection measures that can be integrated into normal farming practice. Within F.R.A.N.Z., environmentalists and farmers are working together to trial conservation measures on ten representative (demonstration) farms in Germany. These measures should promote biodiversity, but at the same time be practicable and economically viable for the farm. Successful measures will be communicated and promoted within the farming community, with the intention to increase implementation on a national scale. Another focus of F.R.A.N.Z. is providing policy recommendations to improve regulatory and publicly funded instruments to the benefit of biodiversity and farmers.</p>
Producers Association	National Milk Producers Federation	<p>An on-farm social responsibility program with science-driven standards and best practices to provide a transparent and resilient sustainable food system to supply safe and affordable food to all people in support of United Nations Sustainable Development Goals.</p>	<p>To address these needs and demonstrate our devotion to a sustainable food system, in 2009 the U.S. dairy industry formed the National Dairy Farmers Assuring Responsible Management (FARM)[™] Program, which commits U.S. dairy farmers to high-quality on-farm management practices for safe, sustainable dairy production. The FARM Program is U.S. dairy's industrywide, on-farm social responsibility program that provides assurances that U.S. dairy farmers are global leaders in animal care (UN SDG 9 and 12), antibiotic stewardship (UN SDG 9 and 12), biosecurity (UN SDG 9 and 12), environmental stewardship (UND SDG 13, 14, and 15), and workforce development (UN SDG 8 and 12), all as part of a One Health approach. FARM's transparency provides consumers with confidence that their U.S. dairy products are produced in keeping with the highest level of science-based metrics and best practices. The FARM Program demonstrates key learnings and models implementation possibilities for the other agricultural food systems around the globe.</p>

Producers Association	U.S. Soybean Export Council	The U.S. soy industry is committed to boosting nature positive production through a commitment to its continuous improvement goals, an industry led effort that is increasing the efficiency and effectiveness of the production system to achieve positive environmental, social, and economic outcomes.	<p>Since originally establishing its continuous improvement goals in 2014, the U.S. soy industry and its value-chain have made significant progress toward advancing their sustainability targets. With 2000 as a baseline, before 2025 U.S. soy is committed to: reducing land use impacts by 10 percent; reducing soil erosion by 25 percent; increasing energy efficiency by 10 percent; and reducing total greenhouse gas emissions by 10 percent.</p> <p>In developing these goals, U.S. soybean farmers have aimed to establish a common point of focus around sustainability and establish national goals that are implemented through local partnerships, public/private cooperation, and multi-stakeholder initiatives. From the outset, U.S. soy's continuous improvement goals have viewed agriculture as a system in which cooperation is key and has sought to center the conversation around the important role that technology and innovation plays in promoting positive environmental outcomes. So far, many groups and stakeholders across the U.S.'s thirty soybean producing states have agreed to learn and share best practices that help protect, manage, and restore nature. We believe that this kind of model, focused on public and private sector innovation, cooperation, and common goal setting, is an important action task for reducing environmental impacts and improving sustainability.</p>
Producers Association	World Farmers Organization	Reduction losses of nutrients to air and water from livestock and crop production	<p>In Sweden, a project called 'Greppa näringen' or 'Focus on Nutrients' has been launched to tackle climate change, which is changing the seasons and increasing the incidence of fungi and bacteria.</p> <p>Focus on Nutrients is a joint venture between The Swedish Board of Agriculture, The County Administration Boards, The Federation of Swedish Farmers and a number of companies in the farming business.</p> <p>The purpose of the project is to:</p> <ul style="list-style-type: none"> • Reduce losses of the greenhouse gases: nitrous oxide, methane and carbon dioxide; • Reduce losses of nitrate from farmland; • Reduce ammonia emissions from manure; • Reduce losses of phosphorus from farmland; • Avoid losses of pesticides into surface and groundwater; • Increase energy efficiency on farms. <p>In order to fulfil these objectives, the project focuses on increasing nutrient management</p>

efficiency by increasing awareness and knowledge.

Producers Association	World Farmers Organization	Adopt a no-till system on farms with the addition of inter-seeding cover-crops and planting after the harvest of row crops	An example of the solution proposed comes from “Stoney Creek” farm based in the USA. On Stoney Creek farm, farmers operate a 100% no-till system with the addition of inter-seeding cover-crops and planting after the harvest of row crops. Cattle are raised on pasture and on these cover-crops and are no longer kept in confinement. With increased water infiltration and increased soil organic matter on pastures and in cropping fields, the health of crops and animals in Stoney Creek has improved immensely. Increased soil health has allowed farmers to decrease the rate of use of synthetic fertilizers and they now use much less pesticides than before. They also now have soil structure which allows them to be on the fields after rain events without leaving tracks or ruts with increased profitability due to the fact that they can return on fields earlier. They no longer need treated seed technologies because the system has become healed. They also no longer spray any insecticide or fungicide on any part of the farm because the health of plants has been restored through improved soil health.
Producers Association	World Farmers Organization	Diversify and sustainably manage farms to enhance resilience of farmers to critic conditions.	An example of the solution named above comes from farmers in Belize. In order to cope up with the challenge of adapting to and mitigating climate change, several practices are being implemented in Belize by farmers, sometimes in cooperation with the National government: <ul style="list-style-type: none"> - Study on how the potential of rivers and watersheds is used (government of Belize along with farmers and other user groups) for irrigation purposes; - Development of agro-silvopastoral systems, consisting in a combination of timber, plants or fruit trees and production of vegetables used by farmers; - Rearing of exotic animals under hunting threat creating an integrated farming system; - Cover structures to combat flies and decrease use of pesticides; - Transforming agro-waste into animal feed or composting material (i.e chicken manure used for the sugar and banana production); - Production of biofertilizers; - Processing produce in order to be less dependent from imports and gain additional value added from their production;

Producers Association	World Farmers Organization	Promotion of sustainability practices on farm	<ul style="list-style-type: none"> - Organic production with self-certification; - Water catchment/storage of water/water harvesting; - Back gardening; - Turn farms in agro-tourism/agro-ecotourism. <p>In Canada, the impacts of climate change have worsened the vulnerabilities faced by farmers. For this reason, this solution promotes</p> <ul style="list-style-type: none"> • Agricultural Nitrous Oxide Emission Reductions: Managing applied nitrogen (N) sources in a more comprehensive and sophisticated way to reduce nitrous oxide (N₂O) emissions associated with nitrogen fertilizer application. • Conservation Cropping and intercropping: practices aimed at preserving and improving soil health by reducing tillage or adopting cultivation processes that increase carbon sequestration. • Winter Cover Crop: The process of growing crops post-harvest to ensure that croplands are not bare throughout the winter. Winter crop cover reduces soil erosion and maintains soil organic matter, increasing the cropland's ability to sequester and store carbon. • Biofuel Production and Usage: Feedstock for biofuel may be produced from a number of agri-food processes, such as crushing of oilseeds and refining of vegetable oils. • Energy Generation from the Combustion of Biomass Waste: The use of biomass to generate thermal energy and/or power can reduce greenhouse gas (GHG) emissions when the biomass energy is used to displace energy derived from fossil fuel combustion. Agricultural residues from manure and animal bedding can serve as biomass sources. • Reducing emissions through the adoption of good livestock management practices: These practices correspond, for example, to reducing the harvesting age of beef cattle or reducing GHG emissions from fed livestock. • Selection for Low Residual Feed Intake Markers in Beef Cattle: Selective breeding of cattle using a genetic marker for low residual feed intake (RFI) can result in cattle that are more efficient in their feed utilization compared to other cattle. • Carbon sequestration and soil erosion prevention through woodland conservation: Involves the use of woodland to protect agricultural land from the erosive effects
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			of water and wind (riparian buffers, windbreaks and Shelterbelts)
Producers Association	World Farmers Organization	Sustainable Management of Land	<p>Finland is increasingly affected by climate change effects i.e. droughts, heavy rains. The Central Union of Agricultural Producers and Forest Owners (MTK) is implementing a program, the MTK's Climate Programme, based on 4 pillars:</p> <ul style="list-style-type: none"> - Reducing emissions - Increasing sequestration - Increasing use of renewables - Increasing adaptation <p>The programme is based on the role of productive plant growth and photosynthesis as essential to sequestering carbon dioxide. Also, it aims at showing the key role of farmers and forest owners in tackling climate change challenges by among others:</p> <ul style="list-style-type: none"> - Crop rotation by perennial grasses to sequester carbon and increase soils' adaptation - Forest management to increase mitigation - Sustainably manage lands to keep green cover and renew growth after the harvesting to increase both mitigation and adaptation.
Producers Association	World Farmers Organization	Promote certifications of low carbon projects implemented on farms	<p>One example comes from France, where in order to certify emission reductions on farm and the additional carbon storage, the French livestock institute (IDELE), the interprofession of meat and milk (Interbev and CNIEL) and farmers associations (CNE) developed the "CARBON AGRI" methodology, which is labelled by the new "Low Carbon Label (Bas -Carbone)" created by the French Ministry of Ecology. The Carbon-Agri association, created by breeders' representatives, facilitates the implementation of agricultural projects to reduce GHG emissions in France. The objective is to involve and support farmers and their technical partners in their low carbon initiatives and create the link with the actors – communities, companies – who want to support financially and transparently innovative projects for the climate. Many economic players (Paris City Hall, BNP Paribas, La Poste, J.O. Paris 2024, Metropole of Nancy, etc.) testified their desire to achieve carbon neutrality and support the low carbon transition. The Label "Bas-Carbone" provides a certified framework for the development of local voluntary compensation projects. This is a low carbon voluntary policy creating a training phenomenon involving all stakeholders. On September 30, 2019, the Ministry of Ecological</p>

and Solidarity Transition approved the CARBON AGRI methodology. This approval makes operational the certification of low carbon projects implemented on farms. In this context, the CARBON AGRI association was created to ensure project engineering and thus provide support to regional or national project sponsors. A call for projects was opened and the project holders and / or farmers could apply.

Producers Association	World Farmers Organization	Farm resilience to climate change in Saint Kitts	<p>St Kitts and Nevis was hit by a major drought that caused the loss of much of the harvest and increased the presence of pests and diseased. This created the need to design a range of responses to climate variability and change. The farmers have promoted a series of initiatives to mitigate the effects of climate change. These can be summarised as follows:</p> <ul style="list-style-type: none"> • Own production of fertilisers not to be reliant from providers; • Production of organic fertilizers and pesticides customized on the different plantations; • Investments in water tanks; • Free range chickens that help fertilize the soil; • Diversification of income (i.e making oil out of nuts produced on the farm).
Producers Association	World Farmers Organization	Promotion of organic agricultural practices	<ul style="list-style-type: none"> • Seed treatment: i.e utilization of organic methods for treatment of seeds such as hot water treatments, disinfectants, herbal treatments, treatments with trichoderma, usage of salt for rice seeds etc. • Soil treatment: i.e application of well-decomposed farm yield manure, vermicompost, and compost. • Weed management: i.e manual or mechanical control of weeds; no use of weedicide on farm. • Fertilizer management: i.e well-decomposed farm yield manure applied in order to prevent diseases; organic fertilizers, such as compost, used as per recommended doses for crops; several types of beneficial microorganisms, such as trichoderma and rhizobium incorporated in the soil. • Pesticides and insecticides management: i.e Integrated pest management practices; biopesticides used for the management of pest; several beneficial microorganisms like <i>Bacillus thuringiensis</i>, egg parasite <i>Trichogramma</i>, <i>Beauveria bassiana</i> used to manage whiteflies, thrips, aphids and weevils; <i>Lecanicillium</i> spp. deployed against white flies, thrips and aphids; <i>Metarhizium</i> spp. used against

pests including beetles, locusts and other grasshoppers, hemiptera, and spider mites. *Paecilomyces fumosoroseus* used against white flies, thrips and aphids.

- Diseases control: i.e Beneficial microorganisms such as *Bacillus subtilis* and *Trichoderma viridae* used to control plant pathogens; crop rotation, intercropping has practiced in the field to control diseases; home-made bio-fungicides, bio-bactericides used to control diseases

Producers Association	World Farmers Organization	Partnership between farmers and industry to boost the three dimensions of sustainability	The project introduces a new model of regional development based on a collaboration between agriculture and the innovation industry and that gives practical application to the concepts of circular economy and innovation, at the same time providing additional sources of income for farmers and increasing vitality of rural areas. It is focused on the exploitation of the cardoon, a naturally occurring specie, grown on abandoned and uncultivated lands, that spontaneously grows in a large area of the Sardinia region (Italy); it does not need water irrigation, provides an anti-erosion effect and it has a good adaptability to harsh territories, if compared to other productions. This input – together with other agricultural waste – is sold by farmers to the Matrica bio refineries, which transform these elements into biochemical, bases for bio-lubricants, monomers for bioplastics and bio-additives for rubber. The core idea is to create an agricultural value chain that respects the territory, valorises abandoned non-irrigated areas and introduces a bio-refinery deeply integrated into the territory in synergy with the food supply chain and aimed at producing high added-value products exploiting local raw materials.
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Producers Association	World Farmers' Organisation	Producing wine in a changing climate	These are a series of solutions adopted by a French young farmer, Samuel Masse which help him to adapt his vineyard to the effect of a changing climate as follows: <ul style="list-style-type: none"> • Adoption of a network of drips to irrigate the vines; • Rebuilding of old stone walls to border the vines plots to avoid erosion during heavy rains as well as host insects; • Planting of hedgerows to host birds and bats who are key to regulate the presence of insects; • Planting of vine varieties that are naturally resistant to the effects of dryness.
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Producers Association	World Farmers' Organisation	Direct selling and soil health to enhance consumers' awareness about production and promote climate - friendly farming practices.	<ul style="list-style-type: none"> • Production of vegetables for direct sale that enable consumers, who are increasingly aware of how food is produced, to establish a connection with farmers and their products, and farmers to gain more added value through this direct relationship. • Raising awareness among consumers on climate - friendly production: for example, tomatoes grown in greenhouses under controlled conditions using drip irrigation. • In order to improve soil quality and health: <ul style="list-style-type: none"> o adoption of a diversified crop rotation system on farms, moving away from the previously implemented three-year rotation; o alternation of summer and winter crops; o use of cover crops and a reduction in tillage.
NGO	Biovision Foundation	Agroecology and all related practices	Agroecology (AE) initiatives can substantially contribute to transforming agriculture and food systems in a way that they deliver multiple positive impacts for people and planet. Entrepreneurial farmers, cooperatives, food processing groups, companies and marketing initiatives at various levels are key in scaling up agroecological approaches. Agroecological businesses need skills, investments and an enabling environment to thrive.
Research Institute	FTA/CIFOR	Promote agroecological transformation	Agroecological approaches can make a key contribution to transitioning to sustainable food systems but have been underinvested in. They are based on the principles of: input reduction, renewable inputs, better use of ecological processes and the biodiversity underpinning them, preservation of plant, animal and soil health, diversification, synergy, co-creation of knowledge, social values, better connectivity between farmers and consumers, equitable governance and participation.
Research Institute	Future of Food	Create enabling environments for agroecological and regenerative approaches where investments can flourish and benefit all.	Create enabling environments for agroecological and regenerative approaches where investments can flourish and benefit all. Ensure a whole-systems approach that supports the advancement of ecological and regenerative approaches, including a strong role for local institutions and communities, the protection and expansion of rights, public investment in parallel infrastructure (roads, schools, markets), policy coherence, coordinated governance, True Cost Accounting, and a greater role for smallholder farmers, Indigenous Peoples, and women. Investing in agroecology involves supporting holistic strategies that do not have to reconcile

productivity with other environmental or social benefits, but rather aim to achieve both (Chapelle et al., 2018). An investment is sound when it takes into account the whole system, creating an enabling environment where it can flourish. Financial and other support to agroecology will pay off best with policy coherence, coordinated governance, and True Cost Accounting, and when harmful policies and practices are actively reoriented to support, rather than block, the advancement of agroecology.

This entails a strong role for local institutions and communities, the protection and expansion of rights – including collective, customary, and biocultural rights to land, territory, waters, seeds, and productive resources. It necessitates public investment in parallel infrastructure (roads, schools, market infrastructure), and it relocates food systems through circular and solidarity economies, short-chain loops, and localized markets and food systems. Finally, while the quality of investment for “true” agroecology is critical, greater quantity of investment is also needed to affect systems-wide change.

Investment and support to agroecology are most effective when guided by a theory of transformation based on the principles of agroecology and food sovereignty. While an incremental transition to a regenerative and more environmentally sensitive agriculture may be a component of this change strategy, it cannot deliver fundamental change by itself – and in some cases, may lead to a diversion, misdirection, or cooptation of efforts for structural change. Investments in agroecology and regenerative approaches therefore require a different bottom line: they must be responsive to, and aligned with, efforts to deliver larger societal goals.

Research Institute	IMAGINE	A Common Code for regenerative agriculture	Over the last 50 years, the world’s food systems have emerged in response to the demands of feeding an additional four billion people. This has been a miracle of efficiency and productivity, but it has left many behind and has come at a too high cost to our natural capital. We now urgently need to transform our food systems to become climate and nature positive, bring vitality and opportunity to rural livelihoods and deliver nutritional value for a healthy population. Regenerative food production sits at the heart of this as it seeks to improve soil health, water quality, climate resilience, biodiversity, carbon
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sequestration and farmer incomes. Many companies and organizations have published ambitions to transition to regenerative agriculture, but there is currently no common definition of regenerative agriculture. Each company is currently charting its own course, which risks confusion and mistrust amongst farmers, consumers and advocacy organisations. A Common Code would define regenerative agriculture for business, setting outcome-based measures against which to assess gains in natural capital, and thereby providing a framework and data for commitments, incentives, and innovation to support farmer and consumer transitions.

Research Institute	World Agroforestry	Scale out tree wind breaks in irrigated agriculture	Tree wind breaks are a major agroforestry system across Central Asia, chiefly with poplar trees (<i>Populus nigra</i> var. <i>pyramidalis</i>), in irrigated agriculture. These tree wind breaks with poplars have a long tradition as an agroforestry system in irrigated agriculture in the river basins of south and southeastern Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Such tree wind breaks reduce the overall water consumption of irrigated agriculture by 10-20% compared to open field conditions, depending on crops and tree wind break spacing. The trees serve as an additional source of income and farm income is increased by 10-15% over the rotation time of the trees. It was found that tree wind breaks from single tree rows with distances between trees of 1 m had the best effects on water saving and increasing farm income. The most suitable spacing between tree wind breaks was found to be around 200 m.
Research Institute		Agroecology Business Association(s)	Create a network or networks for agroecological entrepreneurs, identify their needs and advocacy agenda with banks, government, and service providers. This could mean strengthening and connecting existing networks. The network would provide a platform to elevate their work, learn from each other, and promote their leadership as part of a broader agenda.
UN Agency	FAO West Africa	Agro ecology as a way to build resilient and sustainable agri-food systems	Agroecology's holistic approach - incorporating the traditional knowledge and skills of the world's farming communities with cutting edge ecological, agronomic, economic, and sociological research, has the potential to support strong and sustainable agri-food systems that provide health and livelihood to both rural and urban communities; as well as environmental benefits.

Solution 6.2 Write-up: Integrating nature-positive production with Microinsurance

World Food Programme

1.1 Describe the solution: (what, in brief, is the solution)

Supporting the most vulnerable smallholder farmers to access microinsurance that protects their livelihoods and food security while incentivizing the adoption of sustainable, nature-positive agricultural practices.

1.2 What problem is it trying to address within food systems?

Climate variability and extremes impact every component of the food system, creating both supply and demand constraints that affect the year-round availability and accessibility of food for households. Recurrent climate shocks reduce the capacity of food insecure people to recover through progressively reducing productive assets, degrading their natural resource base and preventing farmers from investing long-term in sustainable agricultural productivity. This locks them in the low input – low output cycle of an unsustainable system that drives further encroachment into natural ecosystems when land and soil functions are degraded.

1.3 Why is addressing that problem important for achieving the goal of Action Track 3?

Farmers and rural populations frequently overexploit natural resources through unsustainable food production and income-generating activities. Climate-related shocks and stresses reduce food production and force farmers to rely on negative coping strategies, such as selling productive assets or deforesting and clearing more land to make up for lost income. This undermines the ecosystem services and biodiversity that support food production, while further increasing the vulnerability and exposure of farmers and rural communities to climate shocks. Recurrent droughts, floods and storms also speed up soil erosion, land degradation and damage to ecosystems, creating a vicious cycle that contributes to the negative environmental, health and economic outcomes of the current food system. This cycle can be broken through stabilizing household income and food security after climate shocks, combined with the promotion of practices that better manage and restore land and water used to produce food.

1.4 How can this solution address that problem?

Insurance payouts in adverse years enable food insecure households avoid negative coping mechanisms and ensure their food needs are met in the aftermath of climate shocks.

However, **insurance as a standalone tool is not sufficient**. It needs to be conceived as part of an integrated risk management strategy, where components mutually reinforce each other. Its protective function is enhanced when integrated with measures that also reduce farmers' risk to climate extremes. This includes practices that **rehabilitate and protect agricultural livelihoods, restore ecosystems and the services they provide**, and increase soil fertility and water retention. Other approaches for nature-positive production that can be integrated with insurance coverage are conservation agriculture, agroforestry and other climate-smart agriculture techniques. Household resilience is further strengthened through the provision of climate services that help farmers adjust their farming practices, and linkages with social protection and financial services that help communities absorb less severe risks.

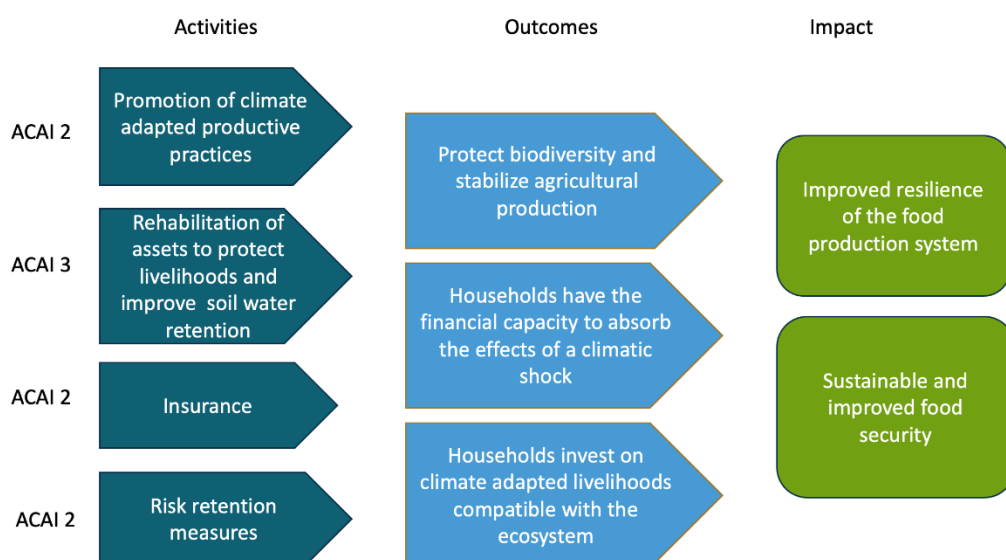
Insurance can serve as **incentive for communities and governments to invest in nature-positive practices** that have the co-benefit of reducing disaster risk while also restoring habitats that improve

ecosystem services and biodiversity. This, in turn, helps lower the cost of insurance premiums. These nature-based solutions strengthen ecosystems, make communities more resilient against climate shocks and facilitate climate change adaptation.

Furthermore, by protecting farmers against specific hazards, insurance has the potential to **unlock investments in sustainable agricultural production**. These investments result in higher input efficiency, while maximizing biodiversity and ecosystem functioning. Additionally, insurance enables households to **access financial services and credit at more favorable terms** which can further boost their investment and productivity.

Ultimately, insurance will contribute to improve farmers’ access to inputs and markets , increase their productivity and incomes and help promote sustainable pathways to assist the transition of the vulnerable and food insecure households from safety nets to more productive and sustainable livelihoods and food production systems in both good and adverse years.

Here below is how an impact pathway of an integrated risk management approach with a strong microinsurance component could look like.



1.5 What makes the solution a ‘game changing’ solution?

Parametric insurance is making insurance accessible to large numbers of people in remote areas. It is contributing to financial inclusion, promoting access to credit for inputs but also increasing savings opportunities that can help households cope with minor or more frequent shocks without having to sell productive assets. The integrated approach that is bundled with insurance includes capacity building oriented to promote nature-positive, climate adapted agricultural practices to ensure farmers food consumption, dietary diversity and income stability. Evidence collected by WFP over time indicates that households that are offered an integrated package of risk reduction, risk retention and risk transfer (insurance) measures have stabilized their income, increased their investments and agricultural production and improved their resilience capacity to climatic shocks after 2-3 years of the intervention.

1.6 How will your government support this idea?

Most governments are well aware of the power of insurance as a driver for agricultural development and many have introduced subsidies for agricultural insurance. WFP's model of 'smart subsidies', i.e. partial payment of insurance premiums in exchange for farmers investing in rehabilitating and strengthening their natural asset base, is gaining momentum and has exceptional potential for scale.

1.7 Is this a new concept or have you already discussed it with other member states or partner?

This is a well-developed, tried and tested initiative that is being implemented under the heading of WFP's 'R4' Rural Resilience Initiative (<https://www.wfp.org/r4-rural-resilience-initiative>) in 6 countries, reaching 200.000 smallholder families at the end of 2020. The concept is supported through a number of international initiatives and platforms, such as the InsuResilience Global Partnership, the Insurance Development Forum, and the Micro Insurance Network. Partners of these platforms recognize that there are many opportunities for greater engagement between the insurance and environmental sector to integrate Ecosystem-based Adaptation and insurance, which can lead to improved outcomes for both vulnerable people and nature. The insurance industry recognizes the need, and has a financial interest, in developing products that can reduce risks levels and increase resilience for customers and society.

1.8 Who are the key stakeholders to be further involved in the process of developing and refining the solution idea? Name other sectors

Key stakeholders in supporting smallholder farmers manage their climate risks in combination with nature-positive approaches include **private sector** partners - specifically local insurance companies and international re-insurance providers, index design service providers, and academic institutions. **Government** institutions are key partners to create the enabling environment for developing sustainable insurance markets in addition to strong linkages between local governments and NGOs to facilitate participatory processes to ensure nature-based risk reduction activities are contextualized and co-created with the community. Country-led **social protection systems** can provide a platform for integrating insurance with ecosystem and watershed restoration, through productive safety nets. For example, WFP partners with the Productive Safety Net Programme in Ethiopia to provide farmers with insurance for participation in community-led reforestation and watershed restoration projects.

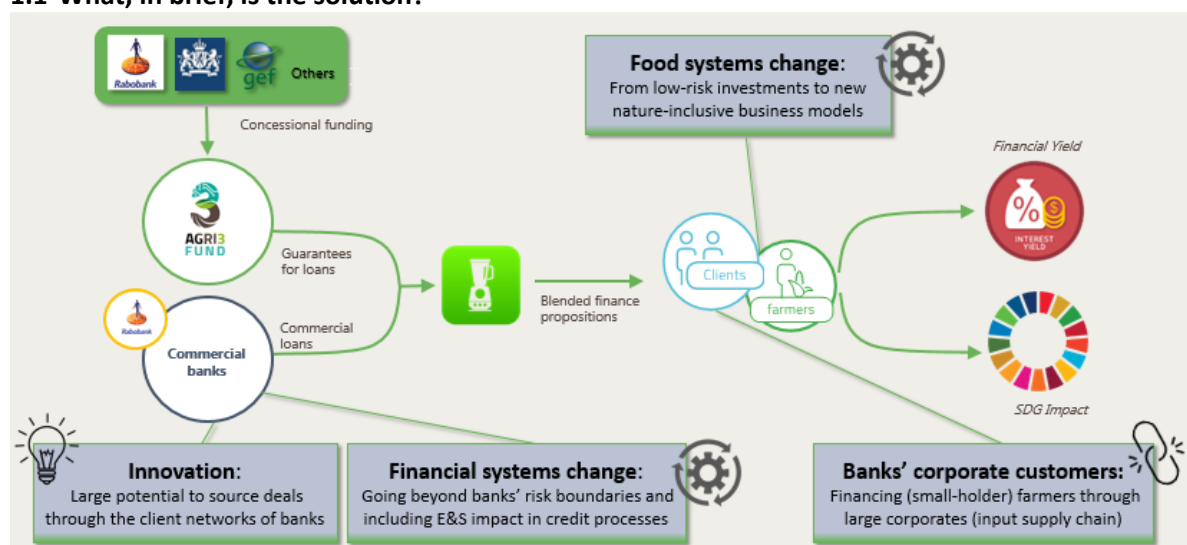
1.9 Are you interested in leading this solution?

WFP is recognized as one of the leading institutions in the microinsurance space and is already investing in internal and national capacities to deliver microinsurance services at scale as part of its 'R4' integrated package of risk management solutions.

Solution 6.3 Write-up: Fund to offer de-risking arrangements to finance investments in sustainable agriculture

Rabobank

1.1 What, in brief, is the solution?



AGRI3 Fund offers de-risking arrangements to commercial banks to finance high-risk investments in Forest Protection, Sustainable Agriculture and Improved Rural Livelihoods by (smallholder) farmers, input providers, traders, processors and other relevant food & agriculture value chain actors.

Impact at scale & “making green mainstream”: Investments can be scaled through the large client networks of the participating commercial- development banks, leveraging their infrastructure, footprint and deal capacity globally, regionally and locally. AGRI3 Fund fits well into ongoing strategic bank - client conversations, securing a full and ever growing pipeline of projects.

1.2 What problem is it trying to address within food systems?

Policies and regulations related to banking (e.g. regulatory framework driving the Risk Appetite of banks) significantly limit commercial banks to finance investments in sustainable practices within the agricultural sector. In fact, for commercial banks these investments come with significant hurdles and higher risks, for example because they go hand-in-hand with longer repayment periods. Overcoming these hurdles and incorporating positive impact on land-use in credit processes of banks (system change) are urgently needed for food system transition in context of the Paris agreement goals.

1.3 How can this solution address that problem? The Theory of Change:

Inputs: Guarantees from AGRI3 Fund and technical assistance (TA) from the AGRI3 TA Facility, with the latter contributing to the ultimate impact (scaling, sharing of solutions and business models, etc).

Outputs: (Blended) Finance by commercial banks to farmers or value chain actors (as a channel to their input suppliers: farmers) in line with the AGRI3 E&S Framework.

Outcomes: Investments by farmers in the protection, management or restoration of forests, implementing sustainable agricultural practices, while having a positive effect on rural livelihoods.

Impacts: Conservation, management and restoration of natural capital, climate change mitigation, improved rural livelihoods and increased agricultural production.

1.4 Why does this solution align to the criteria for a ‘game changing solution’ developed by the Summit?

1. Impact potential: Target of unlocking at least USD 1 bn in finance in the first phase of 5 years, while further scaling of the portfolio and its impact beyond those first 5 years. The Fund has an open architecture, meaning that commercial banks worldwide can participate. Scaling blended finance solutions is possible through the large client networks of banks and their kitchen table or board room relationships with these clients.
2. Actionability: AGR13 Fund is incorporated, operational and run by reputable fund managers. Initial funding of USD 80 mn is available, while the number of deals and pipeline are building up.
3. Sustainability: AGR13 Fund has been established for an indefinite period of time. It has been set up as a financially self-sustaining Fund.
4. All AGR13 supported deals sourced by commercial banks will need to have a positive effect on rural livelihoods, next to impact related to forest protection and / or sustainable agriculture.
5. Systems change:
 - a. Food systems change: From investing in low risk projects to increase production – to - investing in new business models to increase production that take into account the restoration and protection of natural ecosystems, enabled by b:
 - b. Financial systems change: From financing based on economics (with a check on negative E&S impacts where required by policy) – to - financing based on economics and positive E&S impacts, enabled by AGR13 risk mitigation.

1.5 What is the existing evidence supporting the argument that this solution will work?

Rabobank is the first partner bank for AGR13 Fund, building up a strong pipeline of potential deals for both farmers and corporate clients in the value chain. Two deals sourced by Rabobank have been closed. These deals were only acceptable to the bank based on the partial risk mitigation provided by AGR13 Fund. While the clearing of forests on farmland is usually the most economically viable way to increase agricultural production, the first AGR13 deal in Brazil has shown that a different business model (protecting the forests, while renovating pastureland) can be financed by a commercial bank.

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

The AGR13 Fund is the result of a partnership between UN Environment Programme (UNEP), The Dutch Development Bank FMO, IDH: The Sustainable Trade Initiative, and Rabobank Group. The E&S framework has been developed with UNEP and builds on E&S requirements of the founding partners. Support has been obtained from the Dutch government with a revolving grant of USD 35M for AGR13 Fund and a USD 5M grant for the TA Facility, managed by IDH. The Dutch government is a strong ambassador for AGR13 and also aims to create more visibility for AGR13 within Europe (so called “Team Europe Initiatives”) and beyond. The Fund is also honoured with a commitment by the Global Environment Facility (GEF) to provide an additional USD 13M in funding and will fully leverage the political network of UNEP, the founding partner of AGR13.

1.7 Are there certain contexts for which this solution is particularly well suited?

AGR13 Fund is a global fund, with a special focus on emerging markets. The solution provided is well-suited for countries where the expansion of agricultural production is a powerful driver of environmental degradation.

1.8 Who are the key stakeholders in the process of developing and refining the solution idea?

The key stakeholders to be further involved are commercial banks and actors in the agricultural value chain. Together they work on sustainable agriculture solutions, which are embedded in local (economic) ecosystems, and provide lessons learned on what works and what does not. New business

models for farmers and financial products that can be replicated to other clients will be identified and developed. Additionally, both public and private institutions that are willing to invest in food systems transformation are key, as AGR13 Fund is able to provide its de-risking instruments by leveraging funding from these organizations.

Solution 6.4 Write-up: Accelerator Facility to support the transition to sustainable agriculture IDH

1.1 What, in brief, is the solution?

The proposed Accelerator Facility (Accelerator) aims to provide early-stage capital and technical assistance to develop commercially viable business models in sustainable land management. It builds on IDH's existing suite of funds that are struggling to identify larger ticket, investible projects that deliver scalable transformation in the food systems. The Accelerator would be the first-mover financier of seed capital, providing the critical backbone for launching earlier stage businesses, and growing them in a uniquely aligned and coordinated manner across IDH's and other sector funds -- from seed stage to investable and scalable commercial projects.

1.2 What problem is it trying to address within food systems?

Transition to a sustainable and regenerative agriculture-based food system is a long-term investment that requires innovative partnerships. To enable investors to spur this transformation, early-stage projects often require smaller tickets of patient capital, proof of concept models and tailored technical support. Meanwhile, commercial investors perceive this transition to be high risk due to: a) long lead times in financing projects (9 years, on average), b) lack of scale with most projects falling below €5mm in capital sought by investors, c) lack of appropriate investment vehicles offering acceptable risk mitigation, d) costly pipeline sourcing and due diligence. On the demand side, companies and project developers do not have sufficient resources and know-how, lacking the track record to deliver high-impact projects to the criteria of investment funds.

1.3 How can this solution address that problem?

Our theory of change is that catalytic capital and well-aligned grants for targeted technical assistance create a vibrant pipeline of commercially saleable businesses and crowd-in private sector investment, transitioning smallholder farmers to a sustainable, inclusive and climate resilient production system that enables them to reach a living income.

While the number of blended finance instruments is on the rise, a recent IDH commissioned research on regenerative agriculture highlighted that a different grant-capital-return mix is needed to enable capital flow at the project incubation phase, namely: 1) grants for capacity building, introduction of information technology, and support farmer organisation, registration and land tenure, 2) repayable grants and result based finance, and 3) equity or highly concessional seed capital. Our assumption is this integrated package allows the entrepreneurs to test the market and refine their business models. Once a viable proof of concept is demonstrated through the Accelerator, the exiting impact funds can step with larger ticket sizes to further transition the emerging business to investment readiness and provide follow-on finance.

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

Pioneering: The Accelerator Facility is a first of its kind early-stage instrument that builds a new asset class in sustainable land management and regenerative agriculture. It proposes to serve as a model to identify, nurture, finance and launch a pipeline of bankable deals while crowding-in private capital from the sector at large.

Actionable & Sustainable: The concept builds on IDH existing TA facility partnerships with sustainable land use and smallholder investment funds, existing processes and boots on the ground, which go

to lower the cost of implementing such a pioneering facility. The deliberate inclusion of repayable grants and equity into the funding mix further allows a certain cost recovery for the facility. A referral fee can be charged to the capital providers for facilitating their investment. Finally, potential incorporation of carbon payments can bring an additional revenue stream to self-finance and expand the facility.

Enabling a systems change: A transition to climate change resilient, equitable, low carbon food production system that provides the smallholder farming household with a living income. Particular attention will be given to ensure strong approaches towards smallholder and gender inclusion, local and regional food security, land rights and environmental and social safeguards.

1.5 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?

Empirical evidence: IDH's lessons learned and track record in delivering technical assistance for investment readiness and finance.

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

The Accelerator will work closely with national government and other strategic partners that can accompany with grants and results-based payments (including carbon finance) in the scale-up phase. It will also leverage the existing partnerships of IDH with Mirova Natural Capital, &Green Fund, and the AGR13 Fund.

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

The Accelerator targets a select number of geographies where IDH Landscape and Commodity programs have a strong experience and evidence base, including facilitating smallholder tree crop producers to become more climate-resilient and spurring the transition from monoculture to agro-forestry that caters to local, regional and global food markets.

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

Our key stakeholders include commodity trading companies and corporates with carbon offsetting and sustainable food production targets; impact investment funds investing in sustainable land management and regenerative agriculture, national governments that support smallholder tree crop transition to agroforestry, and funders for the accelerator.

7. Agrobiodiversity

Table 7.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Academic Institution	Hidalgo México	Integration of legume tree in the food production system	Legume tree has a great potential for food production they develop nitrogen fixation and can grow in arid regions producing pods and seeds rich in protein and fiber
Individual		To Bring the Forgotten Foods (Indigenous & Local Agro Biodiversity) to Food Plate.	<p>The current food plate across the globe has shrunk in variety and nutrition. This is an effect of the Green Revolution, Mono Cropping and Hybrid Seeds. The loss of local ago biodiversity over a period of time has resulted in very Poor Public Health, Soil Health and Nutrition for the Growers and Consumers alike. Reintroducing the Indigenous/Forgotten Foods to Food Plate is a Concept is based on all the 10 Tenets of "Action Track 3: Boost Nature-Positive Food Production at Scale" that will have long term positive impact in the following way.:</p> <ol style="list-style-type: none"> 1.Improve Soil Health through local and indigenous seeds 2.Restore the Rich Agro Biodiversity of the land and maintain Local Seed sovereignty 3.Create employment opportunities for the marginal and tribal farmers 4.Will reduce excessive production/consumption of a certain food type hence maintain a balance 5.Regain natural eco balance 6.Improve overall health of producers and consumers
Individual		Sustainable development in Genetically modified Seeds	<p>The reason behind is that we have food seeds taking 3-6months in soil. This means that this is a long time we want in an era of about six months at least we should have produced twice as much if we were to plant the very seed which is less genetically modified. Eg. If the in the a potatoe takes 6moths under soil scientists should make sure that in six months 3-4 potatoes are grown</p>
Member State	Brazil	Access and Benefit Sharing on the use of Genetic Resources	<p>Access and Benefit Sharing is a key component of the single undertaking comprised within the Convention of Biological Diversity (CBD), together with conservation and sustainable use. When addressing sustainability of food systems, one must not forget the essential function of genetic resources for food and agriculture, especially if we aim to promote genetic diversity, conservation and sustainable use. We would recommend as a "game changing solution" the Summit acknowledge the importance of national</p>

legislations regulating access to genetic resources, in line with international commitments under FAO's International Treaty on Plant Genetic Resources for Food and Agriculture, as well as the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization. In Brazil, the Law 13.123/2015 regulates access to genetic resources, protection and access to associated traditional knowledge and the sharing of benefits for the conservation and sustainable use of biodiversity. Benefit Sharing consists of the division of benefits from the economic exploitation of a finished product or reproductive material developed from access to genetic resources or associated traditional knowledge. The sharing of benefits may occur in monetary and non-monetary modalities, and the Law establishes limits to negotiation, collection and application according to the type of access that gave rise to the product for which the payment is due (access to genetic resources without traditional knowledge; access to traditional knowledge of identifiable origin; access to traditional knowledge of non-identifiable origin). This past March, an ordinance was approved, regulating non-monetary benefit sharing resulting from access to genetic resources (Ordinance 81/2020).

Private Sector	One Planet Business for Biodiversity	Staple crops diversification: beyond the "Big 5"	<p>The Challenge: Food systems heavily rely on 5 key commodities (wheat, rice, maize, potatoes, and soy). The top three account for an estimated 42.5% of the world's calorie supply. The figure is much higher in developing countries, e.g., in many parts of Asia, rice can provide 80% of caloric intake. Dependence of food systems on very few crops is associated with a wide range of risks in relation to lack of nutrients and associated negative health outcomes, and to decreased climate and economic resilience. Today the biggest part of the staple crops entering global trade and consumed worldwide, comes from 65% of the cultivated land which is owned by 1% of farms. The solution: Diversifying staples, due to their dominance, and if achieved with the right foods, can have huge impact on nutrition/health, the environment and farmer resilience.</p> <p>The initiative recognizes that to successfully bring on the market other major staples, we should focus on only one or two crops at a time. This is because to be a major staple, crops need to have well developed value chains and be established global commodities. It will require dedicated focused efforts to achieve this. Millets (which were broadly defined to include sorghum) are selected as the first crops to diversify</p>
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staples because they were the traditional staples across much of Africa and Asia and fit the criteria of a smart food – good for you (highly nutritious and targeting some of the biggest nutrition and health needs), good for the planet (environmentally sustainable) and good for the farmer (climate resilience). It is also recognized that this needs efforts from fork to farm, starting at the consumer and food processor end to drive awareness and demand for the selected foods.

Producers Association	Haile Wako Integrated Farm	Climate smart seeds production and supply using IOT	We are a registered company on the UNGM platform and supply our seeds to clients in a quality manner.
Producers Association	National Coalition for Natural Farming	Bio-Input Resource Centres (BRCs) are being proposed as a solution to transform the aides needed for food production.	The idea is inspired by the local shops that provide chemical inputs (pesticides, fertilisers etc) and the necessary know-how for its effective use. As one of the steps to encourage and increase the number of natural/organic farms, practices and production, BRCs are envisioned as the local shops that provide farmers direct access to naturally produced fertilisers and manure agents such as jeevamrut, vermicompost, neem oil etc and also ingenious farm equipments. These centres will also act as spaces for knowledge sharing amongst the communities. Additionally, these bio-input resources will be manufactured by the local people thereby encouraging a local and cyclical economy.
Producers Association	World Farmers Organization	Creation of seed banks to cope with climate variability	Climate change has brought extreme weather variations that have significantly affected the national territory and caused loss of agricultural production and even loss of life. In addition, COVID-19 has caused economic recession by coupling with the effects of climate change. Despite the challenges faced, seed banks have proven to be a model that can survive in this difficult scenario as seed facilitators. Since 2016, Seed Banks in Nicaragua has provided: <ul style="list-style-type: none"> • 290 tons of bean seeds. • 362 tons of rice seeds. • Better prepared producers. • Value Added to the Market. Specifically, two seed banks have been established in Nicaragua: a bean seed bank 'El sfuerzo', and a rice seed bank 'Regalo de dios'. Through the creation of these banks, seed production has increased, and the farmers' preparation and production capacity has improved, making them self sufficient
Research Institute	e2 Research	Promoting agricultural diversification in all its forms	Diverse agriculture systems are more resilient than the ones based only on a single crop. Moreover, crop-livestock systems are usually more resilient than pure crop-based systems. Diversity in all its forms, e.g. of genetic resources and production practices is

important, and so is diversity in marketing channels. Natural processes and cycles are also diverse, and mimicking those to the extent possible in agricultural production is important.

Research Institute	FTA/CIFOR	Recognize and promote the benefits of diversity from field and landscape to systems and diets	Diversity in production systems, from plot to landscapes, contributes to the preservation of biodiversity, allows for better, more adaptive use of natural resources and provides livelihood opportunities including for women and vulnerable social groups. It is an essential component of resilience of landscapes, farming systems and households to shocks whatever their origin, climatic, biological (pests and diseases) or economic (price volatility). Diversity is one of the main ways to ensure a balanced and healthy diets. The considerable pressure for simplification, driven by economies of scale and facility from production to transformation and distribution, needs to be counteracted by efficient measures that preserve and foster diversity all over food systems, from production to consumption.
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Research Institute	FTA/CIFOR	Mainstream orphan crops into cultivation	Many tree foods found in forests are 'orphan crops' that have been neglected by researchers and industry, but have great potential to diversify farming systems to support both human and environmental health. The application of new methods provides opportunities for modest investments to transform the status of these species under cultivation, when supported by policies that encourage their production and consumption. Broad gene pools, with new selection methods, provide for rapid productivity gains, while consumer-based interventions, when handled properly, support local use and integration into domestic and global markets.
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Research Institute	The Good Food Institute	Diversify crops and inputs used in alternative proteins	The global food system is a significant driver of poor health and environmental degradation around the world, particularly the excessive consumption of animal-sourced foods. In recent years, alternative proteins, like plant-based meat, have emerged as an option for consumers, primarily in the Global North, to increase consumption of plant-rich foods. However, the vast majority of alternative protein inputs, like soy and wheat, have not historically been optimized for alternative protein production. Diversified inputs will improve economic
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opportunities for farmers while reducing costs and improving the nutritional quality of alternative proteins, making them more accessible to consumers worldwide.

Increasing the diversity of alternative protein inputs will create new market opportunities for farmers and expand consumer access to affordable, nutritious protein sources. In particular, using indigenous crops as inputs will drive progress across numerous SDGs. They are adapted to local ecosystems, can offer affordable nutrition at scale, and can create lucrative diversification for farmers. A shift to a wide variety of high-value crops will also increase resilience to extreme weather, crop diseases, and pests.

As inputs are optimized for alternative protein production, prices will decrease and the nutritional quality and taste of products will improve. By utilizing side streams from large existing sectors (e.g., oil pressing, vegetable processing), some inputs can also reduce food waste. Input diversification will enable more localized production of alternative proteins, supporting both local farmers and food manufacturing industries.

The public and private sectors should support this solution by establishing university research centers and creating public-private industry research clusters with an emphasis on input research. As crops are identified for use as inputs, farmer support programs (e.g. financing, insurance and price guarantees, pooled procurement, tailored technical assistance) should be implemented to ensure that alternative protein inputs can be profitable and competitive for growers.

Research Institute	Agrobiodiversity for Healthy Diets and Resilience in the Andes	The solution is an integrated approach that builds on agrobiodiversity to: (i) strengthen agrobiodiversity-based food chains and differential market systems that generate high-value income for mountain farmers, (ii) integrate species and varietal diversity (including seed security) as a climate adaptive strategy to strengthen resilience, (iii) locally adapt dietary guidelines based on what foods are desirable, available and accessible, (iv) integrate nutritious native foods into public food procurement and social protection programs, (v) incorporate nutrition innovations and indigenous knowledge about foodways in formal education, (vi) promote behavioral change and food literacy among (young and urban) consumers.
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8. Blue Foods

Table 8.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Member State	Iceland	Eliminating Illegal, Unregulated and Unreported (IUU) fishing	<p>IUU should be one of the game-changers in the final report (the non-negotiated paper) of the UN Secretary General in September. The more detailed arguments are presented below. First, eliminating IUU fishing would be a true game-changer for economies and communities that rely on capture fishing, most importantly low income coastal states and SIDS. To them, the loss due to IUU fishing is worth a colossal figure of 20-30 billion USD annually.</p> <p>Second, eliminating IUU is encapsulated in SDG 14 with a time frame for 2020, clearly not attained. It can be argued that IUU fishing is the single biggest hindrance on the way to achieve SDG 14 and therefore uniquely qualified for a game-changing proposal in the “decade of action”. Third, and most importantly. The UNFSS offers a once in a lifetime platform to lend the issue of eliminating IUU fishing the much-needed political weight. It is generally understood that eliminating IUU is not a technical or regulatory problem, it is still a persistent problem due to lack of political will in the international community. There is currently a decisive movement within the WTO to push harmful state subsidies (very often for illegal fishing) higher on the political agenda. There could be a watershed moment for IUU at a WTO ministerial meeting in July, and certainly at a WTO meeting in December. A major political push from the UN top leadership on the IUU issue in the FSS in September would be of immense consequence in this difficult process.</p>
NGO	Aquatic Life Institute	Aquatic Animal Welfare	<p>Incorporating welfare considerations not only for terrestrial livestock animals but also for farmed aquatic animals critically important in sustainable development of fisheries and aquaculture, as this is a cross-cutting solution in many challenge areas, including biosecurity, water quality, mortality rates, antimicrobial resistance, food safety, food security, and livelihoods.</p>

NGO	Environmental Defense Fund	Sustainable finance in support of small scale fisheries and aquaculture (SSFA)	<p>Public and private investment in wild fisheries and aquaculture disproportionately focus on mature opportunities that offer high economic returns, which often equates to industrial operations or systems that are already well managed. In order to provide the greatest food and nutrition benefits to the greatest number of people, policy action and public funding mechanisms are needed to generate a wider range of blue foods investment opportunities, including:</p> <ul style="list-style-type: none"> • Public investment funds, loan guarantees or other measures to mobilize investment in high-nutrition, low footprint, low-cost species and production systems - particularly for SSFA; • Capacity building, technical assistance, and financial literacy services, along with concessional sources of capital to support SME entrepreneurs; • Finance for SSFA actors for diversification into other blue foods products, or supplemental livelihood opportunities.
NGO	WWF Int	Brighter future for World's Forgotten Fisheries: Promoting sustainable inland fisheries to maximize food security and promote healthy ecosystems	<p>Wild capture inland fisheries are critical to the food security and livelihoods of hundreds of millions of people, including vulnerable communities and indigenous people, across the world. But they are invariably undervalued and overlooked – and are at increasing risk from environmental threats that undermine the health of freshwater ecosystems as well as insufficient governance and poor management of fishery resources. The environmental crisis is most acute in freshwater ecosystems, with freshwater species populations falling by 84% on average since 1970. Around 1/3rd of freshwater fish species are threatened with extinction.</p> <p>By ensuring a focused and systematic approach to sustainable inland fisheries management, this game-changing solution will transform attitudes to wild inland fisheries, prioritize research to gather critical data on fishery and river basin health, and support the development and implementation of effective fisheries and river basin management plans, and successful community scale fishery management initiatives. By investing in greater understanding and better management of the world's critically important wild inland fisheries, the interconnected and actionable parts of this solution will ensure more sustainable inland fisheries in rivers, lakes and wetlands across the world, providing affordable animal protein and nutrients to people, while supporting biodiversity and avoiding more costly alternatives for people, freshwater ecosystems and the climate.</p>

Producers Association	Global Salmon Initiative	Pre-competitive collaboration models	Form industry-wide, supply chain, pre-competitive collaboration models to help the identification, sharing and implementation of best-practices and innovations at speed and at scale (for example Global Salmon Initiative)
Producers Association	World Farmers Organization	Diversification of sales channels and production methods in the floriculture and aquaculture sector in Paraguay	<p>The sectors most affected by the effects of climate change and the pandemic in Paraguay are floriculture and aquaculture.</p> <p>The following measures have been implemented to tackle the difficulties caused by the drought and lack of labour (mainly from abroad):</p> <p>Floriculture Area:</p> <ul style="list-style-type: none"> • Reinvention: generating new marketing channels, use of digital platforms and delivery. • Infrastructure: with the corresponding sanitary measures adapted both for health care and environmental care. • Proper crop management: optimizing inputs such as water, phytosanitary products and others that can generate impacts on the environment. <p>Aquaculture Area:</p> <ul style="list-style-type: none"> • Organization of the producers: more than 100 ponds have been excavated and the association has taken advantage of this to Panambiveve Committee – Production and Sales Organization lower its cost of pond construction, purchase of fry, etc. • Multifaceted agriculture: the hardest stage of the pandemic was the quarantine in March and with no income for two consecutive months, fortunately there was a lot of produce from the farm. That's why farmers were able to fight during this time. • Product map: there is no shortage of diversified food production on the farm, but farmers need help in selling agricultural products

9. Indigenous Peoples' food production systems

Table 9.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Member State	New Zealand	"We're all in this together" – scaling up the He Waka Eke Noa partnership	A critical element of creating effective pathways towards nature-positive production is empowering food producers to make the necessary changes to their systems. New Zealand has established a partnership between government, iwi/Māori (New Zealand's indigenous peoples) and the agricultural sector to equip farmers and growers with the knowledge and tools they need to reduce emissions and increase on-farm sequestration, while continuing to sustainably produce quality food and fibre products for domestic and international markets. This work involves co-designing a practical and cost-effective system for reducing emissions at the farm level by 2025. It also includes co-designing an appropriate farm-level reporting and pricing mechanism. He Waka Eke Noa ("We're all in this together") creates a collaborative five-year work plan that includes clear and measurable actions, outcomes and timeframes that will facilitate and support measures to reduce emissions, some of which will have additional co-benefits for water quality and biodiversity. The partnership model also helps ensure that mātauranga Māori (Māori traditional knowledge) is included in the design and implementation of enduring solutions. Many countries have already expressed interest in New Zealand's He Waka Eke Noa approach. This innovative partnership model has significant potential to be scaled up, adapted and applied in other contexts internationally to address the global challenge of climate change and boost nature-positive production in a way that engages producers to make on-the-ground change that is socially, economically and environmentally sustainable.
Member State	New Zealand	Acknowledging indigenous leadership in food systems	Māori are key contributors to New Zealand's food producing and processing sectors, and Māori agribusiness is a major driver of our economy. 10% of New Zealand's total primary sector are Māori owned, and Māori hold a significant proportion of assets, including 38% of fishing quota, 12% of sheep and beef units, 10% of dairy and 10% of kiwifruit production. From a New Zealand perspective, it is essential that there is international recognition of the important role of indigenous participation and knowledge in enabling transitions to more sustainable and prosperous food systems. There is also plenty to learn from the intergenerational nature of indigenous planning, which seeks to enhance the land and build the capacity of the people and the business over the long term.

Māori landowners and agribusinesses, like many indigenous peoples around the world, face a variety of challenges. At the same time, many opportunities exist to recognise and support indigenous leadership in food systems. For example, the Ahuwhenua Trophy is a prestigious annual award that celebrates excellence in Māori farming. The award reflects the importance of Māori agribusiness within the New Zealand economy. As far as we are aware the Ahuwhenua Trophy is one of a kind, standing alone as the only award recognising indigenous excellence in agriculture anywhere in the world.

There are a variety of different services available to indigenous landowners in New Zealand, including the Māori Agribusiness Pathway to Increased Productivity; Māori Agribusiness Extension Programme; Whenua Māori Fund, and He Ara Mahi Hou (workforce skills and training). There is also a co-funding pathway to connect innovative Māori agribusinesses with the Sustainable Food and Fibre Futures fund. The New Zealand Government aims to assist Māori to achieve their primary sector aspirations through supporting Māori to build long-term supply chains, markets, and programmes for sustainably produced agricultural commodities and Māori products that will not only benefit New Zealand's economy, but also enable the development of whenua (land) and whānau (family) and their communities.

The International Māori Agribusiness Programme works with Iwi (tribes) and their organisations and businesses acknowledging their leadership in transforming the Māori economy and New Zealand primary sector advancement. The programme supports the building and advancement of the Māori primary sector in international trade and relationships, including the protection of traditional knowledge, and collaborates with Iwi and Māori-led primary sector innovation leaders to build new pathways for high value primary industry product and service sectors. There are further New Zealand experiences and case studies that can be shared with the international community with the aim of deepening international commitment to acknowledge and grow indigenous leadership in food systems. These include outlining how co-governance of freshwater with Māori is providing for the emergence of nature-positive local approaches; how the He Waka Eke Noa Primary Sector Climate Action Partnership is co-designing practical solutions to reduce New Zealand's agricultural emissions and build resilience to climate change; and the potential for scaling up international agribusiness dialogues and workshops between indigenous peoples such as those led by New Zealand in recent years.

NGO	Northern Great Plains Program, World Wildlife Fund-US	Restoring the buffalo economy in the Northern Great Plains: up-scaling tribally led efforts to restore bison to tribal lands as a nature-based solution to restore food security and sovereignty.	In the late 1800's American bison were reduced from tens of millions of animals to approximately 1,000 animals in efforts to subjugate bison-reliant Tribes. Formerly bison-reliant societies in North America currently have between 20-40% less income per capita than the average Tribe that was not bison-reliant. 40% of members of Northern Great Plains (NGP) Tribes that were all bison-reliant, are food insecure. Despite managing some of the largest intact grasslands in North America, an enormous asset, nearly half of NGP Native Nation agricultural lands are leased to non-tribal operators (2017 US Department of Agriculture, Census of Ag.) and most of the revenue and food generated on those lands leave the reservation. WWF is working with tribal partners to promote movement towards more tribal ag lands in tribal hands to leverage this enormous asset and ensure that those lands contribute to the health and prosperity of the Native people while creating the opportunity to renew traditional lifeways. One way to achieve this is to restore communal bison herds to tribal lands because bison were central to the economy and traditional lifeways of Native people in this region. One strong example of how this can be achieved is the Wolakota Buffalo Range established through the leadership of the Rosebud Economic Development Corporation, the economic arm of the Rosebud Sioux Tribe of South Dakota, in close partnership with WWF's Northern Great Plains Program https://news.mongabay.com/2020/12/hope-and-peace-bison-return-to-the-rosebud-reservation/ . As a result of a keen interest to achieve similar outcomes, WWF's bison program receives numerous requests for assistance in replicating and up-scaling tribally led bison restoration efforts across our region. There is a clear need for additional investment in these underserved communities to allocate tribal land and establish the necessary infrastructure to manage communal herds in the interests of the Native people who have just claim to these lands but currently see little opportunity or return from them. Up-scaling this program could potentially impact hundreds of thousands of acres of tribal land within the 15 Native Nations of the Northern Great Plains region.
Private Sector	Confederation of Indian Industry Leading Climate Change & Nature Portfolios	Collaboration with tribal and local communities to promote traditional practices	Tribal communities are residing along with high biodiversity areas from past and managing their relation sustainably with nature. Sustainable practices of production are mostly evolved with traditional knowledge and practices. Integrating their knowledge in developing approach for nature-positive production system will be crucial. These communities are also highly vulnerable to climate change and nature loss integrating them in this process will build resilience and open new opportunities for livelihood.

Research Institute	FTA/CIFOR	Understand, recognize, support and draw lessons from indigenous food systems and traditional diets	Indigenous food systems, including the knowledge and values embedded in them, are a model of sustainable use of natural resources. Their preservation is essential to protect and sustainably manage forests, biodiversity and other natural resources. They can provide a source of inspiration to bring a global transformation of food systems towards more sustainability in terms of values (sustainable management of resources, reduced waste, social values, sharing, link to health...), responsibility (towards land and biodiversity, society, future generations), and practices. The contributions of traditional diets, rich in diverse nutritious foods, to health and sustainable food systems, need to be better understood and promoted.
UN Agency	UNDP	Food & Rituals: Exploring Pathways to Resilient Food Systems	The initiative is challenging the loss of human capital and potential of African youth unemployed together with the lose of traditional food supply systems impacts on food security and access (at household level). This will be done by aggregating human capital for green jobs and indigenous knowledge for food systems innovations (tools: launch of a series of initiatives for African Youth to expend opportunities for green jobs, special study on indigenous knowledge systems to achieve food security and mobilization of practices and lessons learned across different landscapes)

E. Action Area Restore

10. Grasslands and savannahs

Table 10.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Individual		Transforming food systems through landscape restoration in dryland areas	<p>Landscape degradation is a growing challenge in food systems, particularly in dryland areas. Degradation is often driven by humans, and the environmental costs - soil erosion, reduced soil health and fertility, reduced recharge of the water table, downstream flooding, biodiversity loss, and reduced resilience to climate-change related shocks - cause socio-economic effects that impair local and regional food systems. Landscape restoration is more than land restoration. Integrated and sequential approaches are needed, delivered through catchment management processes, to rebuild environmental resilience, which provides the foundation for sustainable production and market linkage.</p> <p>Landscape restoration rests on three interconnected pillars:</p> <ol style="list-style-type: none"> 1. Enhance water buffering: community-led approaches are employed to develop an action plan, to enhance retention of rainfall by installing physical structures (eg terraces, basins, check dams) and to restore tree cover using farmer managed natural regeneration (FMNR) within the catchment. Soil and water conservation are scaled up on-farm to further strengthen water buffering and restore the hydrological balance. 2. Boost productivity: farmers are assisted to more efficiently access water for crops or market products, to adopt climate-smart agricultural approaches, and to diversify their livelihood by benefitting from increased tree coverage via complementary value chains (eg beekeeping, gathering fuelwood or forage, or other non-timber forest product). 3. Link farmer groups to market and finance: farmer groups or cooperatives engage more equitably with markets through value chains selected for their sustainability and profitability, and building a business plan. Access to financial services is supported through savings and loan

			<p>groups. Multi-stakeholder platforms bring all actors together to address bottlenecks and identify solutions.</p> <p>These interconnected pillars require government agencies to support local by-laws and to build national policies that support sustainable rural development. Gender inclusion, by prioritizing women's value chains and fostering their participation throughout each activity, is also essential for success.</p>
Producers Association	National Cattlemen's Beef Association Environmental Counsel	Promote incentives for landowners to conserve grasslands.	<p>The retention and conservation of grasslands worldwide is a necessary tool to ensuring nature-positive food production. Grasslands provide vital wildlife habitat, naturally filter water, and sequester carbon. Grasslands provide the most benefit when they are utilized for grazing. Ruminant grazing further facilitates carbon sequestration, works as a defence against invasive species, and promotes biodiversity. By promoting grazing and livestock production (including cattle production), the Summit can work to ensure that landowners see both economic and environmental value in their grasslands.</p>
Producers Association	Pastoralist Development Network of Kenya	Recommonization of fragmented pastoralist rangelands	<p>In 1968, Olgos in Kenya's Narok County formed part of the Land (Group Representatives) Act that was enacted, and formed a new approach to pastoral development that aimed to drastically transform the Maasai nomadic subsistence production system into a sedentary and ostensibly commercially oriented. However, this system failed as it failed to consider the critical pillars of communal governance, common space and resources access and mobility. Over time, the Olgos ecosystem underwent more extensive modification and degradation than in any other part of Maasai land owing to the introduction of individualisation and subsequent fragmentation of communally owned lands in the 1970s and 80's without first undertaking community risk and benefit analyses. This was further compounded by a burgeoning population, increasing livestock herds, increased demand for natural resources to sustain local community needs and increased demand for land for social amenities and infrastructural projects, and intensification of agricultural output (wheat, maize, beans and vegetables) that rendered the area a critically endangered ecosystem and natural habitat and threatened species due to this multiplicity of pressures. Subsequent fencing off of individual</p>

parcels to keep wildlife, people and neighbours' livestock at bay ended up fencing off corridors that are essential for movement of livestock and wildlife. Fragmentation also led to individualisation of such common resources as salt licks, medicinal plants, dry season reserves, water and strategic grazing areas. Within 5 years of the subdivision and subsequent fencing off, the area had undergone more extensive modification and degradation than at any other time in history. Livestock numbers decreased by about 60%, wild animals especially large game moved to other parts and the area became part of the district's critically endangered ecosystems and recipients of food aid. The myriad negative impacts of fragmentation and fences prompted elders to call for meetings to deliberate on ways to address the emergent challenges. The community unanimously resolved to rescind the individualization and erection of fences and fall back to communal land ownership and decision making in a form of recommissioning of the fragmented parcels of land for the survival of humans, livestock and nature. Recommissioning is gradually restoring the area back to its original form.

Research Institute	FTA/CIFOR	Support Forest and landscape restoration	It is estimated that, at the global level, up to 25 percent of all land (forests, cropland, rangelands and grassland) is highly degraded and 36 percent is slightly or moderately degraded. Degraded land provide less ecosystem services, contribute to climate change and biodiversity loss, are less productive, causing hunger, poverty and conflicts and driving further deforestation and land degradation in an effort to compensate for lost productivity. Restoring and sustainably manage land is a major way to improve the environmental, economic and social sustainability of food systems. It requires long term action, with multiple actors including the government and private sector, driven by the needs and priorities of local actors that depend on and manage the land to be restored.
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Research Institute	TFA	<p>Beef, Dairy & Cacao in Colombia: Bringing a food systems approach to accelerate sustainable reconversion of extensive cattle landscapes towards a productive, inclusive, diverse, and safe system in the Colombian Amazon</p>	<ul style="list-style-type: none"> - Preferential financial mechanisms, complementary technical assistance, monitoring and traceability systems linked to land-use and market linkages, can stimulate economic development through sustainable intensification (SI) - This investment provides viable alternatives in the form of poles of development to draw deforesters away from deforestation fronts where land tenure and enabling environment are not suitable for investments Intensification can reduce livestock area and liberate area for restoration - Cocoa represents an opportunity as it is not a deforester, but rather as a restorative, productive activity if established with agroforestry systems - Technical assistance (TA) that accompanies finance is considered fundamental because of the need for cultural and behavior change for producers. After 2-3 years the value of TA is expected to be clear and farmers will invest in this service with increased earnings
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Solution 10.2 Write-up: Considering the impact of human wildlife conflicts on sustainable food production and local communities, and make sure this is managed well
WWF

1.1 What, in brief, is the solution?

Repurposing agriculture from a major driver of biodiversity loss to a significant contributor to the conservation of natural ecosystems, by designing production zones to support ecological connectivity and human wildlife coexistence.

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

Wildlife Practice, World Wildlife Fund

1.3 What problem is it trying to address within food systems?

Over 18,500 species are known to be threatened with extinction due to agriculture, which has contributed to over 100 known species extinctions to date. On the other hand, wildlife can cause enormous damage to agriculture via the consumption of crops by wild herbivores, killing of livestock by wild predators, damage to infrastructure and equipment and even farmer injury and death. It is clear that managing the relationship between agriculture and wildlife and their habitats is at the core of our ability to bend the curve of biodiversity loss whilst equitably feeding the growing human population—the challenge of our time.

1.4 How can this solution address that problem?

Taking an ecological connectivity and coexistence approach to agriculture is the solution to this challenge. It would build an interconnected relationship between agricultural areas and the broader landscapes in which they sit, broadening the scope from a focus on on-farm agrobiodiversity, to ensuring production zones have a positive impact on the biodiversity of natural habitats surrounding them.

What would this mean in practice?

- It would mean preventing the conversion of natural habitats for agriculture in ways that increase fragmentation, and ensuring land-use planning and governance processes that place agricultural areas in the landscape in ways that retain connectivity of wildlife habitats and reduce the human-wildlife interface. This will not only reduce Human Wildlife Conflict (HWC) and its significant negative impacts on both wildlife and farmers, but also reduce the risk of spillover of emerging infectious diseases such as the virus causing COVID-19.
- It would mean managing agricultural areas themselves in ways that allow the flow of wildlife and ecological processes through them, whilst employing holistic measures to reduce conflict. This could include the maintenance or restoration of wildlife corridors within large scale plantations, the maintenance of riverine habitats within farmland (which often act as wildlife dispersal areas), ensuring the ‘right fences in the right places’, and employing holistic measures to manage HWC and ensure coexistence. There are many exciting innovations on this front that can make such efforts more effective than ever before.

- Last but not least, it would involve focussing restoration and rehabilitation efforts in the most critical connectivity areas or hotspots of HWC.

These approaches are already being applied with great success, from small scale farmers in India managing their crops in ways that allow the movement of tigers and other wildlife through them, to oil palm concessions in Borneo reforesting major strips through their concessions to function as wildlife corridors, to tea plantations in India employing holistic measures to reduce conflicts with elephants, to sourcing companies like Nestle, who now require all farms they source from, to maintain or establish wildlife corridors. However whilst successful these approaches are far from mainstream.

Taking a connectivity and coexistence approach to food production systems to scale will deliver healthy landscapes that are more resilient to climate change, provide strengthened ecosystem services such as pollination, and ensure flourishing populations of wildlife. And in the process, give food production and sourcing companies what they are all seeking - incredible stories of how their production zones are crucial to the survival of charismatic wildlife. With a connectivity and coexistence approach to food production systems we have the potential to turn the tide from agriculture as the biggest driver of biodiversity loss, to agriculture as a driving factor in biodiversity's recovery.

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

(1) impact potential at scale^[1] (including return on investment)

This solution absolutely delivers impact at scale, as its benefits will not be felt only within farm borders, but far beyond, in the natural habitats of the landscapes in which those farms exist.

In addition, the solution is scalable to almost any system. Ecological connectivity is needed everywhere - from urban environments, to the Congo Basin. Human wildlife coexistence is needed everywhere - from wolves in Europe, to elephants in Africa and primates in Asia.

(2) actionability (taking into account politics, capacity, costs)

Many solutions for ecological connectivity and human wildlife coexistence are already being implemented with success, demonstrating their actionability.

(3) sustainability (i.e., the ability to keep delivering to 2030 and beyond)

The benefits of human wildlife coexistence solutions are felt on both sides - by wildlife but also by farmers whose productivity increases. Thus the incentive for the sustainable continuation of these solutions is inbuilt.

1.6 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?

There are many case studies which showcase how solutions for ecological connectivity and human wildlife coexistence deliver key outcomes, which can be provided on request.

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

There has never been a better time to take this approach to scale, with a rapidly growing momentum in the political, corporate and financial spheres:

Political:

- The UN General Assembly in April 2021 adopted its first ever resolution on wildlife connectivity by consensus. The resolution was co-sponsored by 60 governments.
- The emerging post-2020 Global Biodiversity Framework (GBF) of the Convention on Biological Diversity has strong content on connectivity spanning several of the Target areas of the framework. This follows the Convention on Migratory Species and its 130 government parties issuing a declaration pushing for connectivity to be a priority in the GBF.

Corporate:

- 300 fashion brands have signed the 'Fashion Pact' within which they commit to 'wildlife friendly' agricultural practices, most of which have a strong focus on human-wildlife coexistence
- The World Business Council on Sustainable Development issued a 'Call to Action on Landscape Connectivity'

Financial:

- The most widely used industry standard for financial investment (the International Finance Corporation's Performance Standard) requires projects they invest in to 'implement measures to minimize habitat fragmentation, such as biological corridors'
- Banks are increasingly taking additional measures, such as the Inter-American Development Bank's requirement for 'project design for maximum ecological connectivity'.

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

Ecological connectivity solutions can be employed anyway, but would be particularly well-suited (or needed) in landscapes where agricultural systems heavily fragment remaining natural habitats, thus wildlife need to move through agricultural systems.

Human wildlife coexistence solutions can be employed anywhere, but would be particularly well-suited (or needed) in landscapes where human wildlife conflict hotspots occur.

11. Monitoring and stakeholder engagement with evidence

Table 11.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
UN Agency	UNDP	Targeted Scenario Analysis (TSA) – A new approach to capturing and presenting economic evidence to decision makers (public and private) on how sound ecosystem management could increase sustainable sectorial productivity.	<p>Targeted Scenario Analysis (TSA) is an innovative analytical approach, developed by United Nations Development Programme (UNDP) that captures and presents the value of ecosystem services within decision making, to help make the business case for mainstreaming sustainable policy and investment choices. TSA can generate and present data related to the management of ecosystems in a way that is more relevant to the choices facing a public or private decision maker.</p> <p>TSA's 5-step approach compares different ecosystems management scenarios at sector level to assess potential economic losses or gains in terms of sectoral output. The TSA approach is client and sector-focused, and the end product is a balanced time-bound presentation of economic and financial evidence, for the decision maker, that weighs up the pros and cons of continuing with business as usual (BAU) or following a sustainable development path in which ecosystems are more effectively managed. This alternate path is termed sustainable ecosystem management (SEM). Financial, economic, social and environmental criteria and indicators are used to compare scenarios.</p>

12. The Soils Hub

Table 12.1 Summary Table of Wave 2 solutions that map into the Wave 1 portfolio

Source	Organisation	Title	Synopsis
Academic Institution		Drained peat soils or organic soils need to be rewetted and restored to stop the soil organic matter decomposition and high greenhouse gas emissions.	Drained peat soils, both in the north and in the south emits huge GHG emissions. An increased water level and wet soil adapted plants could benefit both as climate mitigation, biodiversity increase and plant production of different kinds. How to perform in practice differs locally and needs to be discussed.
Individual	Finnish environment institute SYKE	Bringing food production with biodiverse soil in connection with citizens to support their health and well being - planetary health/biodiversity hypothesis	Bringing small scale food production on biodiverse soil in connection with daycares, schools, health centers and old people houses would foster the immune tolerance and broadly wellbeing of people in these contexts. Planetary health builds on the idea that human and environmental health are connected and depend on each other. This activity would scale up the experiments and pilots done on this in Finland. This method is usable everywhere in the world, in the countryside and in cities. It provides health, enhances learning of human-nature relationship and supports food production in poor communities. Read more: Nature step in daycares: https://www.syke.fi/en-US/Current/More_vegetables_more_contact_with_nature(53317) https://advances.sciencemag.org/content/6/42/eaba2578 Green childhood: https://koneensaatio.fi/en/kone-foundations-funding-for-research-and-the-arts-rises-to-40-million-euros-in-2020/ Halonen Jaana et al. The Helsinki Declaration 2020: Europe that protects. Comment. The Lancet-journal. Vol 4 November 2020 ISSN 2542-5196 2020; 4 (11): E503-E505 https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30242-4/fulltext
Individual	University of Ilorin, Nigeria	Phosphorus fertilizer application to soils	Soils have enough phosphorus for plant growth, but availability of this phosphorus pool to plants poses a quagmire. Over application of fertilizers to increase available phosphorus when washed off is dangerous to waterbodies

Individual	Improving Nutrients Use Efficiency through their balanced and site-specific use	I would quote here a paper of Raza et al (2018) titled "Piling up reactive nitrogen and declining nitrogen use efficiency in Pakistan: a challenge not challenged (1961–2013)", see its Fig 4 -Historical changes in NUE (%), N surplus, and N utilization in crop production. The historical data clearly shows that crops are responding to applied N over the time period but still there is low value for N Use efficiency. This means that one needs to balance this nitrogen (being responded by the crops) with that of additional phosphorus and potassium plus other micronutrients. In summary, it is the low use of phosphorus, and negligible use of potassium in Pakistan that is responsible for low N use efficiency and this could easily be rectified through farmer education programs (rather than reducing N input).
Individual	Sustainable nutrient management	<p>Blanket recommendations on fertilizer use and other agronomic interventions often fall short under smallholder conditions in sub-Saharan Africa (SSA) because they neglect important variability in agro-ecological and socio-economic conditions, both at higher (sub-regional or landscape) and lower scale (farm or field). Under the nutrient-limited and degraded soil fertility conditions in SSA, the Integrated Soil Fertility Management (ISFM) concept provides a plausible pathway for increasing nutrient use, while achieving yield and nutrient use efficiency gains that support social, economic and environmental sustainability. ISFM places a central focus on tailoring fertilizer recommendations to the specific biophysical and socio-economic conditions to optimize nutrient use efficiency and net returns from investment in fertilizer.</p> <p>We propose an integrated, generic and modular modelling framework that integrates biophysical and socio-economic data sources and process-based crop growth models, and is generally applicable to any crop, user group or purpose. The proposed framework operates at various spatial scales, from field-specific to (sub-)regional, and is scalable, as expansion to new purposes, areas or crops intrinsically build on relevant available farm, economic, crop, soil, climate information. This provides critical data, algorithms and guidelines for building nutrient management recommendation tools by last-mile extension service providers.</p>

Member State	Brazil	National Plan for the Recovery of Native Vegetation (PLANAVEG)	<p>a) Problem addressed within food systems: rehabilitation of native vegetation</p> <p>b) What makes the solution to a "game changer": the contribution of a national plan for recovering native vegetation for sustainable food systems.</p> <p>c) Importance of addressing the problem for achieving the goal of AT3: restore and rehabilitate degraded ecosystems for sustainable food production.</p> <p>d) Is this a new concept? It is a well-established practical experience in Brazil. PLANAVEG is a policy that aims to promote the restoration of native vegetation on 12 million hectares by 2030 through credit, incentives and enforcement of the Brazilian Forest Code. It also includes other elements such as technical assistance, awareness-raising, and research to reduce costs and improve the efficiency of actions to recover native vegetation. The plan focuses particularly on Permanent Preservation Areas (APP), Legal Reserves and degraded areas.</p>
Member State	Brazil	National Survey and Interpretation Program of Brazilian Soils (PRONASOLOS)	<p>a) Problem addressed within food systems: sustainable use of soils for food production.</p> <p>b) What make the solution to a "game changer": detailed information on soil profiles is fundamental for sustainable food production systems.</p> <p>c) Importance of addressing the problem for achieving the goal of AT3: Sustainably manage soil use to the benefit of the environment and sustainable food production.</p> <p>d) Is this a new concept? It is a well-established practical experience in Brazil. Deep knowledge of the Brazilian savanna soil was the first and fundamental step in transforming the Brazilian Cerrado region into an extraordinary producer of food and agricultural products. In order to continue to strengthen the sustainable development of Brazilian agriculture, MAPA recently created the National Soil Program (PRONASOLOS), a platform which provides access to a collection of national studies, maps and information on soil profiles collected over the last eight decades in the country. The objective of PRONASOLOS includes mapping the country's soil over an area of 1.3 million km² in the first ten years of the program, and to do the same on 6.9 million km² by 2048 at scales ranging from 1:25,000 to 1:100,000. Currently less than 5% of the national territory has soil maps in such detailed scales, that is, 1:100,000 or greater. The platform should contribute to expand in a sustainable way the use of precision and digital agriculture, as well as to enhance</p>

			planning activities in which knowledge of soil characteristics is decisive.
Member State	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Digital agro-advisories for sustainable soil management and climate adaptation	There is a need to deliver current actionable information to farmers throughout India, not only to mitigate short-term losses due to droughts or extreme weather events, but also to establishing a preparedness towards the mid-term and long-term impacts of climate change. NiceSSM (https://nicesm.org/) is a digital advisory and knowledge platform which provides timely agrometeorology and sustainable soil management advisories for smallholder farmers in local languages across India. NiceSSM (stands for "Network for Information and Climate (Ex)Change and Sustainable Soil Management") under the project Soil Protection and Rehabilitation of Degraded Soil for Food Security (ProSoil) in India commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) together with the National Bank for Agriculture Development (NABARD).
Member State	GIZ	Addressing food insecurity in Western Kenya by maintaining soil health	Food insecurity is a major concern to many rural households who mainly derive their livelihood from farming. Over the years, there has been declining crop yields which can be attributed to relatively poor soil health. Nutrient depletion has been found to be the major cause for poor soil health. This is caused by various factors such as wind and water erosion, compaction for the soils through use of heavy machineries, loss of organic carbon and change of soil chemistry. ProSoil Kenya has been advocating for soil testing and analysis to ascertain the soil status. Based on the soil testing findings, farmers are advised on specific sustainable land management measures to address their situation. Evidently, practising conservation agriculture has stood up has the main intervention in maintaining of good soil health. Hence, this is a confirmation that soil health is a precondition for attainment of food security.
Member State	GIZ	SOL-Mobile	The global project "Soil Conservation and Rehabilitation for Food Security" has been implementing soil conservation measures in the Benin country package since 2015. In order to reach a larger number of smallholder farmers in the villages of the project regions and to raise their awareness of sustainable land management, the project initiated a large-scale awareness-raising measure called "SOL-Mobil". The SOL-Mobile is an innovative approach that was introduced at the suggestion of the consultants in the project to achieve more widespread impact. It is a minibus equipped with animating information material. It has photos and films and, for example, a "picture box" that tells the story of soil cultivation through pictures and

explains how soil degradation occurred in the past. This makes the villagers aware of soil ecosystem issues and the challenges of sustainable land management. There is also something to attract the haptic sense: the different measures of sustainable land management are shown on photos and the corresponding seeds are presented. The SOL-Mobil offers two events per day and village: One event takes place during the day, which informs smallholders about soil conservation and sparks their curiosity. This is also the opportunity to invite the participants to the evening event. During the evening event, films are shown on sustainable land management and good experiences in implementing measures, such as the cultivation of the mucuna bean in Togo and Benin to improve soil quality. Some technology is needed for the film evening. The SOL-Mobile is equipped with a projector, loudspeakers, lamps, a table, a projection screen and a generator that provides electricity. This is a big event in the village! After the film screenings, the SOL-Mobile team exchanges views with the participants in the form of question and answer sessions with the smallholder farmers on the topics shown. Since the launch of the SOL-Mobile in Benin at the end of 2017, more than 115,000 people in rural areas have been sensibilised to sustainable land management. Due to its great success, a second SOL-Mobile was launched in 2019. Events with the SOL-Mobile are also possible during the Covid-19 pandemic, but only with smaller groups. The Tunisia country package of the Global Project will integrate the SOL-Mobile approach into its communication and awareness raising strategy based on the good experiences in Benin. Two minibuses have been ordered to carry out corresponding awareness-raising campaigns in Tunisia, especially in rural areas. In combination with other soil protection and rehabilitation measures, 17,000 smallholder farmers are to be reached in the future in the Tunisia country package and 15,000 hectares are to be protected or rehabilitated.

Member State	GIZ	Addressing food insecurity as well as climate change adaptation and mitigation in sub Saharan Africa by maintaining soil health	Food insecurity is a major concern to many rural households who mainly derive their livelihood from farming. Over the years, there have been declining crop yields which can be attributed to relatively poor soil health. Nutrient depletion has been found to be the major cause for poor soil health. This is caused by various factors such as wind and water erosion, compaction through use of heavy machinery, loss of organic carbon and change of soil life (e.g. microbial activity) and chemistry (e.g. increased acidity). ProSoil Kenya has been advocating for soil testing and analysis to ascertain the soil status. Based on the soil testing findings, farmers are advised on specific
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			sustainable land management measures to address their situation. Evidently, practicing Conservation Agriculture has stood up as the main intervention in maintaining of good soil health. Hence, this is a confirmation that soil health is a precondition for attainment of food security.
Member State	US	Next Generation Nitrogen	Next Generation Nitrogen Management - Next generation N management is a systems approach with multiple opportunities, including dissemination of N good practices and development and application of enhanced fertilizer technologies and approaches
NGO	GIZ Ethiopia	Reclaiming acidic soils in SSA using agricultural lime	<p>Soil acidity affects Central Africa, parts of tropical West Africa, the highlands of Ethiopia as well as Madagascar. It severely limits the uptake of essential plant nutrients thereby limiting the productivity of existing agricultural land. This in turn can additionally lead to higher deforestation due to extension of agricultural area. Acidic soils can be reclaimed by agricultural lime application, a natural product produced by grinding limestone a commonly found deposit.</p> <p>Taking Ethiopia as an example, soil acidity severely affects around 3.5 million ha in the Ethiopian highlands, resulting in significant crop yield losses and even crop failure. As a result, around 1 million ha of acidic land has already been abandoned. Thousands of large-scale field demonstrations have shown that crop yields on acidic soils can be increased on average by 60% to 80% through the application of lime and that farmers are interested in buying lime. If lime is applied at large scale, Ethiopia could become self-sufficient in wheat (currently around 1.7 million tons are imported annually) using the currently available agricultural land without infringing on forest and protected areas.</p> <p>Facilitating and encouraging the application of lime on all acidic soils in SSA could have massive effects on food security and ecosystem conservation.</p>
Private Sector	IFDC - International Fertilizer Development Center	Restore Soil Health on 200 million hectares of farmland in Africa to sequester C increase farm productivity and farmer incomes and increase water and nutrient use efficiency	What will success look like: In Africa, Soil Nutrient and Carbon depletion have been halted on 200 million hectares of farmland, and Soil Health is restored through buildup of Soil Organic Matter including nutrients. This will 1) sequester large volumes of C, 2) increase production and incomes of 100 million small farmers, 3) increase the water and nutrient use efficiency. This calls for coordinated National and Regional policies, institutional investments (World Bank, African Development Bank, Islamic Development Bank, IFAD), investment by donor agencies, and strategic interventions by the Fertilizer and Agrofood Industry. Indicative investment: \$25 per hectare per year (or \$5 billion per year for 200 million hectares) for a 10 year period, or a total of \$50 billion.

Private Sector	Nutrien	Agricultural Carbon Program	<p>By 2050, the agriculture sector will need to grow food for almost 10 billion people while providing nature-positive outcomes.</p> <p>That’s why Nutrien has launched the agriculture industry’s most comprehensive Carbon Program, offering support for growers to not only drive sustainable agriculture but also increase grower profitability. Nutrien is uniquely positioned with our direct relationship with over 500,000 growers globally to provide year-round agronomic solutions. Every farm and every acre is unique. We need to offer growers customized, whole-acre solutions that drive nature-positive outcomes such as soil carbon sequestration while sustainably producing healthy crops. We are currently piloting with growers our Carbon Program to determine how to best launch and scale globally. Pilot considerations including optimal processes for collecting farm and field-level data to reliably measure and verify carbon and other sustainability outcomes through our industry leading Digital Hub.</p> <p>Nutrien’s global reach supports shared-value partnerships to create an ecosystem that will help enable the generation and monetization of positive carbon outcomes at scale, while helping to meet global sustainability goals and objectives.</p> <p>With a long-term goal to scale this program and build real, lasting change, Nutrien is challenging all to come together to invest in research to establish baseline field-level data so the system can evolve and policies can be set to unlock the potential of the agriculture industry as a leader in climate action, while meeting the challenge of feeding a growing global population.</p>
Private Sector	Cf Industries	Nutrient Use Efficiency (NUE)	<ul style="list-style-type: none"> o The goal of nutrient management should be to achieve a balance between optimal nutrient use efficiency (NUE) and optimal crop productivity. NUE describes the capacity for a cropping system to convert inputs to outputs in relation to the nutrient status (system-wide surplus or deficit). CF Industries recommends strongly that when assessing global fertilizer use, the UN Food Systems Summit focus on NUE as the key metric for both agronomic and environmental performance of cropping systems. o Focusing on NUE rather than rate reductions enable scenarios in which both crop yields and environmental outcomes are optimized. In other words, both farmers and the environment win. Accounting for only lbs./acre or tons of nutrients being used does not consider the dynamics of the agricultural systems. Sole rate considerations also do not hold up as a performance indicator for non-cereal crops (leafy greens, citrus, almonds, etc.); and each soil and environment will support very different rates of applications (e.g., Eastern Colorado corn NUE is going to be very different than central Iowa corn NUE because of

			<p>water use, climate, hybrid/genetic potential).</p> <p>o Moreover, focusing on NUE, rather than rate of fertilizer applied, can help provide farmers with confidence that climate-smart approaches do not lead to reductions in soil productivity. This approach is also important to recognize given that a focus on fertilizer rate reduction rather than NUE would likely lead to more land being brought into use, oftentimes accelerating deforestation contrary to both business and environmental goals.</p>
Private Sector	International Fertilizer Development Center IFDC,	Soil nutrients to meet the triple challenge of food and nutrition security, climate, and biodiversity. This can be scaled up to 2 billion people in Africa	<p>Soil nutrients to meet the triple challenge of food and nutrition security, climate, and biodiversity</p> <p>The Action Track 3 Ideas Paper (draft 23 Feb 2021) mentions areas for further development. One area that needs further development is building awareness of the importance of soils and soil nutrients.</p> <p>Soil nutrients are essential to produce more nutritious food. Nutrients are either directly supplied by the soil or derived from mineral and organic fertilizers.</p> <p>Approximately 50% of all food produced globally is produced with the help of mineral fertilizers, which makes the fertilizer industry a key player in global food and nutrition security. In many parts of the world, mineral fertilizers are used in excess, leading to losses to the environment, which must be addressed. On the African continent, however, the average fertilizer use per unit area is about 10% of the global average. This causes rapid depletion of soil nutrients and organic matter and increasing erosion, which largely explains the continent's low and even declining agricultural production levels; it's a downward spiral into hunger and poverty. Over 70-80% of the food production increase on the African continent over the past decades was due to the expansion of agricultural land at the expense of nature and biodiversity, and this is the largest source of greenhouse gas emissions on the continent. Further expansion would be detrimental and has reached its limits in many countries, especially those in the Sahel. Therefore, agricultural intensification in Africa is the only sustainable way forward, as reverting to pre-green revolution farming will not meet the food and nutrition security challenge of the rapidly growing population. Feeding the African continent must be attained through the increase of the soil nutrient base largely through the application of mineral fertilizer combined with organic fertilizer where it is available. Poorly managed nutrient applications can decrease profitability and increase nutrient losses, potentially degrading water and air quality. Yet, properly managed fertilizers support cropping systems that provide economic, social, and environmental benefits. Optimized use of the Right mineral fertilizers at the Right rate, at the Right time, and in the Right place (the 4R principle),</p>

combined with organic amendments, is the foundation to achieving food system goals, i.e., increased production of nutritious food, increased farmer profitability, enhanced environmental protection, and improved sustainability. Sustainable food systems produce more with less: increased efficiency of land, water, nutrients, and labor make it possible to increase productivity and profitability per unit area, which prevents unnecessary expansion of agricultural land at the expense of nature, alleviates competition between agriculture and livestock, and reduces deforestation and other land use changes. Responsible and efficient use of mineral fertilizer protects natural ecosystems and mitigates GHG emission from conversion of new lands for food and feed production and allows farmers to manage existing food production systems sustainably, to the benefit of both nature and people.

Most fertilizers currently being used were developed at least 50 years ago. Their efficiency is largely influenced by their management; if poorly managed, only a fraction is taken up by the crop. These fertilizers are prone to losses to the environment due to erratic climatic conditions, poor capacity of soils to hold water and nutrients, and various soil health (physical, chemical, biological) properties. The cost and low use efficiency of fertilizers result in low returns on investments for smallholder farmers in Africa, which hampers farmer adoption.

Novel, climate-smart, and higher efficiency fertilizers are increasingly available to help achieve food security, improve the nutritional content of food (grains, root crops, fruits, etc.), promote soil ecosystem services, and thus promote soil health and reverse soil degradation with minimal adverse impact on climate and biodiversity. The take-home message is to invest in development of smart fertilizers that feed soils, plants, and people safely with minimal trade-offs.

This action serves to manage existing food production systems sustainably, to the benefit of both nature and people, and to restore and rehabilitate degraded ecosystems and soil function for sustainable food production.

Building and restoring soil health is accomplished through investing in soil organic matter. The most effective and sustainable way to sequester carbon (C) is with in situ soil organic matter (SOM) buildup – most practically with root biomass and crop residues. A 10 metric tons (mt) aboveground biomass produces 2-3 mt root biomass and 2-3 mt of crop residue throughout the crop cycle. The production of biomass on most of the soils in sub-Saharan

Africa (SSA) will require enhanced soil nutrient levels via fertilizers. The principles of regenerative agriculture remain important, but the limited amount of nutrients available in most African soils cannot catalyze this process of additional biomass production and, therefore, more SOM. There will be no increase and no improvement in soil organic matter and soil health without external nutrient input. To store soil C, we need carbon, nitrogen (N), phosphorus (P), and sulfur (S) at a ratio of roughly 100:10:1:1. Soil carbon sequestration may be feasible at annual rates of 100-300 kg ha⁻¹, when accompanied by 20-60 kg fertilizer N ha⁻¹, 2-6 kg fertilizer P ha⁻¹, and 2-6 kg fertilizer S ha⁻¹ (though much of the S may come from deposition). Therefore, we must raise the carrying capacity of the system by improving soil fertility and health by increasing SOM through fertilization.

Enforcing organic or agro-ecological production systems without raising the overall soil nutrient levels will worsen hunger and poverty on the African continent. The amount of nutrients internal to the system is simply inadequate to raise crop yield and farm profitability. Much effort should be made in recycling organic waste to complete the nutrient cycle and get nutrients back to farms where they are needed, which will simultaneously prevent nutrient pollution in urban areas and concentrated feedlots. Efficient use of mineral fertilizers in combination with organic amendments in SSA is needed to restore and rehabilitate degraded ecosystems and soil functions for sustainable food production.

Soil restoration and rehabilitation is 10 to more than 100 times slower and more difficult to attain than degradation of soil and SOM. So how do we ensure food and nutrition security and protect our ecosystem? Science, evidence-based data, and decision support tools can identify management scenarios and their outcomes for specific land and cropping/grazing systems. Such tools utilize data on soil properties, hydrology, topography, weather, and land capability classification to assess the suitability of a given land and, when combined with modeling, determine long-term productivity and sustainability of given practice(s). Land planners, policymakers, and global bodies then need to act on those recommendations, considering social, economic, and cultural issues and balancing the trade-offs. Such action may involve incentives for farmers to convert their farmlands to nonagricultural uses as buffers to marginal lands.

Globally tradable carbon credits are part of the solution. We have an opportunity to encourage smallholder farmers

in Africa to improve productivity and profitability, reduce yield gaps, and improve soil health and soil fertility by using carbon credits for input and/or market access financing. Let's not waste this opportunity to make progress in meeting this triple challenge and organize this global market for the benefit of African farmers, who will contribute to and thrive from healthier and more productive food systems.

In conclusion, there is scientific evidence that we need more and better fertilizers on the African continent to develop farming systems that guarantee food and nutrition security, mitigate climate change, and protect the environment. This will require coordinated action from governments, industry, the research community, and donors/investors to positively impact the livelihoods of 2 billion people in Africa by 2050.

Private Sector	Natural Capital	Maati Mange More (3M)- A participatory campaign to enable living soils - to restore the depleting soil health and protect ecosystem.	<p>Maati Mange More (3M) idea: Our farmers consider soil as their mother who feeds them. The organic matter/humus is considered as a living part of the soil which breaths life to it. This humus content has decreased to as much as 0.2% to 1.0% making the soil almost dead in around 40% land. The main concern now is what urgent measures should be taken to maintain and increase the humus content in the soil in future. For soil health farmers are dependent on the market which is available at higher costs. A productive and fertile soil comprises of Water 20-35%, air 20-35%, nutrients 40-50% and 2-5% organic matter (humus, micro organisms). 3M Campaign aims at restoring living soils and making it more productive by promoting a soil farm card participatory assessment tool. This can be a complementary idea with the soil health card (Lab test based). Natural Capital will partner with FPOs and NGOs for the action research. Participatory assessment carried out with farmers to realize farm category on the basis of organic carbon content (fertility of soil) present in soil based on experiences and feelings. The categories can divided into the five Farm soil health well-being-</p> <ol style="list-style-type: none"> 1. Dead farm 2. Poor farm 3. Average farm 4. Good Farm and 5. Ideal farm. <p>A framework along with GIS App will develop to support and monitor shifting of farms from one category in the ladder. How 3M will work? 3M product is complimentary/ plugged in solution for Government of India Soil Health Card (SHC). SHC current uses are poor due to the poor technical facilitation and participation of farmers. SHC mainly provide inputs to use</p>
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balance fertilizer for particular crop production. But 3M build farmers understanding on living soil health, build participatory perspective and action plan to improve farm from one category to next. The 3M participatory farm Well-being card owned by the farmers & GIS App data handled by the FPO to provide right information to the market players on farm quality product. This will create value to FPOs sustainable business with many environmental benefits. Govt of India can adopt this model and alien and scale 3M with SHC scheme

Private Sector	Nutrien	Plant Nutrient Use Efficiency (NUE) Grower Education Program and Implementation	<p>Crop production has impacted the environment - whether by smallholder farming systems or large commercial farms. Farming affects soil, water and air quality, and biodiversity. But with modern agricultural techniques and best practices, a positive balance can be maintained between well-nourished crops and environmental protection – important parts of sustainable agriculture.</p> <p>All forms of plant nutrients are critical in feeding the world. Soils supply the majority of a plant’s nutrient requirements. Crop residues and animal manures also provide nutrients. Supplementing the soil with macro and micronutrients that aren’t present in the right amounts is important to supporting the soil for long term productivity, preventing the degradation of soils and pressure to expand food production on less suitable land.</p> <p>The fertilizer industry is committed to farmer education, sustainable crop production, effective use of crop nutrients and safe products with guaranteed nutrient contents. The effort defined here, regarding Nutrient Use Efficiency (NUE) for sustainable crop production, is one segment of a larger sustainability effort.</p> <p>Nutrient stewardship aims to ensure that the crop utilizes as much of the applied nutrient as is practically possible.</p> <p>NUE is a measure of nutrient outputs as compared to nutrient inputs within farming or cropping systems. Low nutrient use efficiency values indicate waste, and high values indicate depletion of soil nutrients.</p> <p>Every nutrient application is a critical combination of source, rate, time and place. Nutrient stewardship demands matching fertilizer application with actual soil nutrient supply and plant need. Applying the 4Rs of Nutrient Stewardship: right nutrient source, at the right rate, the right time and in the right place to minimize environmental impact while optimizing profits.</p> <p>Balanced crop nutrition is a prerequisite of nutrient stewardship, but there are challenges within this complex system. For example, within the cropping system, an insufficient supply of phosphorus, potassium or sulfur can diminish nitrogen use efficiency potentially increasing environmental and economic losses. In developing</p>
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countries constraints including the inability to evaluate soil fertility in a timely manner often limits the ability to make sound crop management decisions or decisions are made that aren't based on agronomic science.

The fertilizer industry is engaging in efforts to promote nutrient stewardship and agricultural sustainability. It is necessary that we work with our agricultural stakeholders to quantify the effects of those actions. Nutrient use efficiency is typically calculated at a regional or national scale. The use of NUE calculations at the farm level is not commonplace. Our industry can offer a better measure of performance which addresses economic, environmental and social aspects for evaluating plant NUE and environmental stewardship for sustainable crop nutrition by working directly with growers to quantify NUE.

Warning- A blanket policy or recommendation to reduce fertilizer is not a best practice. Fertilizer provides essential nutrients required to grow healthy and abundant crops. Moreover, any source of plant nutrients can be over or under applied. The solution is optimizing all sources of plant nutrient uptake. Fertilizer, and all other forms of plant nutrients, must be applied to optimize the NUE. Optimizing plant nutrients is the sustainable path forward.

Private Sector	OCP AFRICA	OCP School Lab an innovative program that aims at increasing the yields and the incomes of smallholder's farmers on strategic crops by offering a full set of agri-services	OCP School Lab an innovative program that aims at increasing the yields and the incomes of smallholder's farmers on strategic crops by offering a full set of agri-services: o A School: interactive training sessions with live demos on good agricultural practices and animated videos for higher impact o A Lab: Soil-testing using latest innovations (X-rays, big data and machine learning) and live information on soil needs and fertilizer recommendations
Private Sector	Public Affairs, CF Industries	4R Plus and 4R Nutrient Stewardship	4R Nutrient Stewardship is a framework for implementing nutrient management best practices to increase cropping system productivity, improve on-farm economics, optimize nutrient use and reduce nutrient loss to the environment via water and air pathways (including GHG mitigation). The 4R framework pursues using the right nutrient source, at the right rate, the right time and in the right place. In the US, farmers implementing the 4Rs have achieved nitrogen use efficiencies that are (on average) double that of their global peers and 50 percent improved beyond their US peers. While being more efficient, they have been able to double corn and wheat yields beyond their global peers and achieve 20 percent improved yield beyond their US

peers. 4R practices can include (but are not limited too) improved soil testing, precision agriculture, data based recommendations and use of enhanced products. See www.nutrientstewardship.org and www.4Rfarming.org for additional detail.

4R Plus builds up on 4R Nutrient Stewardship and adds complementary conservation practices to improve the provision of nutrients when the crop needs them and to enhance soil health and improve water quality. The complementary conservation practices include no-till farming and cover crops. Through 4R Plus practices, farmers can optimize their nutrient use efficiency, increase productivity, and minimize their environmental impact. 4R Plus is being promoted through a multi-faceted education and communications campaign designed to spread information and awareness about these benefits directly to farmers and their trusted advisors. The Nature Conservancy launched 4R Plus in Iowa in 2018 with a multiyear grant from CF Industries. 4R Plus is supported by a coalition of over 60 organizations, including NGOs, government agencies, and private sector companies through the agricultural value chain. For additional information about 4R Plus, please visit www.4RPlus.org.

Private Sector	Rabobank	Develop investment solutions and market for soil health and carbon farming	<p>WBCSD and Rabobank want to help develop investment solutions and the wider market for soil health and carbon farming solutions, by (1) Advocating for action: raising awareness by CO advocacy, developing and sharing knowledge with farmers, (2) Increasing investment pipelines: provide access to the soil / agriculture carbon markets for farmers and investors by being a leading voice to consider farmer needs (3) Technical needs development: bringing expertise and developing new business models that facilitate scale up of carbon markets in the ag space, taking into account and stimulating specific soil health and carbon farming protocols and standards, (4) contribute to guidance and a ‘matchmaking’ ecosystem to support the scale-up of insetting.</p> <p>Farmers all over the world are key elements of the solution; they grow the trees and crops and work the soils that can meet the increased need for food, and –critically important– remove carbon from the air and act as custodians of our natural resources. Investing into soil health and carbon farming offers great benefits. Future proof farmlands, higher yields, improved biodiversity. It also generates a new revenue stream through the selling nature-based carbon credits and ecosystem services to corporates who have committed themselves to achieving net zero carbon emissions in the foreseeable future. Executed in a robust market, this can form a new source of income that enables farmers to invest in making their farms more sustainable. Next to credits, these solutions</p>
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			could also help to decarbonize agrofood supply chains. Large food corporates have a growing appetite to invest in scope III emission reduction projects in their own supply chain and restore landscapes and the natural resources and rural economies that form the backbone of our food system.
Private Sector	Ragn-Sells Group	Recirculation of nutrients (NPK) from waste in detoxified, large scale processes ready for scaling up.	We need to stop wasting nutrients, especially the ones that we can't replace, as phosphorus and potassium. According to UNEP (https://www.unep.org/news-and-stories/story/meeting-global-phosphorus-challenge-will-deliver-food-security-and-reduce) there is a special need for phosphorus to produce the amount of food that a growing population will demand. Potassium and phosphorus are finite resources that can't be replaced, here it is a must to introduce solutions that recirculate those. Today sourcing of phosphorus are mined from reserves often containing high levels of Cadmium (e.g. causing osteoporosis) and Uranium (a toxin). We have developed solutions that will stop the wasting and at the same time recirculate high quality raw material, now possible to scale. Read more at www.easymining.se where you will find more information about our different processes for potassium(ash2salt), nitrogen and phosphorus(ash2phos), all are now either under construction and in final planning to be constructed.
Private Sector	The Fertilizer Institute	4R Nutrient Stewardship provides a framework to achieve cropping system goals, such as increased production, increased farmer profitability, enhanced environmental protection and improved sustainability.	4R Nutrient Stewardship provides a framework to achieve cropping system goals, such as increased production, increased farmer profitability, enhanced environmental protection and improved sustainability. To achieve those goals, the 4R concept incorporates the: Right fertilizer source at the, Right rate, at the Right time and in the Right place. Properly managed fertilizers support cropping systems that provide economic, social and environmental benefits. On the other hand, poorly managed nutrient applications can decrease profitability and increase nutrient losses, potentially degrading water and air. 4R nutrient stewardship requires the implementation of best management practices (BMPs) that optimize the efficiency of fertilizer use. The goal of fertilizer BMPs is to match nutrient supply with crop requirements and to minimize nutrient losses from fields. Selection of BMPs varies by location, and those chosen for a given farm are dependent on local soil and climatic conditions, crop, management conditions and other site specific factors. Other agronomic and conservation practices, such as no-till farming and the use of cover crops, play a valuable role in supporting 4R nutrient stewardship. As a result, fertilizer BMPs are most effective when applied with other agronomic and conservation practices.

Producers Association	AAPRESID (Argentina No Till Farmers Association)	Adapt no-till farming through collaborative innovation with farmers and scientists	In Argentina, no-till farming is implemented in over 90% of agricultural surface. In this context, farmers along with scientists and researchers work together to develop solutions, knowledge, and adapted technologies for each region or particular condition. Farmers as the main actors, identify common problems and needs: declining soil fertility, wind or water erosion, water surpluses due to increasingly frequent rains, biodiversity loss due to monoculture, yields fall and instability, etc. In this collaborative process, the farmers are those in charge of innovation: they define the research lines, the needs for human resources and the main action strategies. This leading role of farmers is key for building sustainable agricultural systems to achieve healthy soils, food security and a better balance of GHG emissions, while emulating nature focused on "always living and always green systems". This innovative approach has proven benefits such as: 1) reducing carbon emissions, 2) reducing 90% of soil erosion, 3) improving soil quality and organic matter, 4) improving water use efficiency, 5) enhancing biodiversity, 6) reducing 15-50% of energy use and 60% of fuel consumption, 7) increasing yields and lowering costs of sowing.
Producers Association	World Farmers Organization	Direct selling and soil health to enhance consumers' awareness about production and promote climate - friendly farming practices.	An example of the proposed action come from "Brenkenhagener Gemueseohof" farm based in Germany: The climate change effects on farming in the region where "Brenkenhagener Gemueseohof" " farm is based has been tremendous in the last couple of years. In 2017 during seeding time they were facing high rainfalls followed by a drought in spring and summer. These extreme weather events tend to happen more often and causing yield losses. The COVID 19 pandemic has caused higher fluctuation of prices on agricultural products, as the pandemic has affected the global market. The combined risks of yield losses, due to severe weather events caused by climate change, and the fluctuation of prices has put the farming sector in Germany under high pressure. Especially the meat and milk sector are threatened by the low prices, which causes farmers to quit farming. For Brenkenhagener Gemueseohof farmers, being crop farming the main activity, the best possible way to mitigate the effects of climate change is through improving soil quality. On their farm they used to have a three year crop rotation. Throughout the last years they have experienced that this three year crop rotation was vulnerable to external effects such as weather conditions, so they have changed this crop rotation towards a more diverse one, alternating summer and winter crops. They have also included cover crops in between the main crops. Another part of the farm's climate friendly practices is the reduced tillage, practice implemented during the last 5 years, which is also

improving soil health. Secondly, through their vegetable production for direct markets they were able to achieve higher prices as the consumers are able to connect to their products. Throughout the pandemic of COVID 19, they made leverage of this potential, observing that among the consumers there was a rising awareness on food is produced: they tried to delivery most of the produce by themselves, so to not rely on transportation companies, choosing nearby processing companies for grains and vegetables. Within these regional markets they were also able to impart knowledge on climate friendly production towards the population. Their vegetables as well are produces in a climate friendly way: tomatoes are grown in a greenhouse under controlled conditions using drip irrigation. As they are sold in the region, they have not long transportation as most others vegetables have.

Research Institute	The Breakthrough Institute	Scaling up fertilizer manufacturing	Africa will need to scale-up fertilizer manufacturing in East and West Africa by taking advantage of natural gas and phosphate deposits there. Nigeria, which has the continent's largest natural gas reserves, and Mozambique could dramatically increase nitrogen-based fertilizer production. In West Africa, Togo and Senegal have considerable phosphate reserves, but currently only export small amounts of phosphate and phosphate fertilizer to nearby countries. Likewise, Tanzania and Angola have appreciable natural gas and phosphate resources, and could increase fertilizer supply both for themselves and for growing agricultural producers like Cameroon in Central Africa, and Ethiopia..Africa is capable of boosting regional manufacturing of fertilizers with the implementation of African Free Trade Area, which allows the industry to capture greater market potential and scale production. Still, greater public and private investment from within and outside of the continent to provide financing for plants and improve infrastructure across the continent to maximize fertilizer use, boost yields, and realize the environmental and agricultural potential of intensification.Increasing regional production of fertilizers could greatly impact fertilizer use and yield improvements.
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UN Agency	Global Soil Partnership, FAO	Sustainable soil management for safe, nutritious and resilient agri-food systems	Soil is an essential natural resource for the well-functioning of ecosystems and for human wellbeing. Soils provide 95% of the food we eat, but they are not only the physical support for plants, they also provide them with the macro- and micronutrients they need to grow and to meet the nutrient demands of all organisms, including humans. Conventional agricultural practices such as the misuse of agrochemicals, inadequate waste management and disposal, mono-cropping and excessive tillage, and lack of well-designed drainage systems, are accelerating soil degradation processes and exacerbating food insecurity and social inequalities worldwide. Although people get enough calories from conventionally produced foods, these often lack the necessary nutrients and are in many cases unhealthy. Hidden hunger caused by micronutrient deficiencies in soils, and thus in food, accounts for an estimated 1.1 million of the 3.1 million undernutrition-related deaths each year. Ingestion of contaminated food produced in polluted soils is also the main route of exposure to a wide range of soil contaminants and a cause of acute and chronic illness and even death. The adoption of Sustainable soil management practices by farmers (who can receive financial incentives via payment for ecosystem systems, RECSOIL) constitutes a concrete contribution to enhance agro-food systems.
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F. Wave 2 submissions proposed to be assigned to Solution Clusters in other Action Tracks

These submissions were received by Action Track 3 and developed as they addressed gaps in our current portfolio. After discussing and synthesising our work with the other four Action Tracks, we agreed that these submissions will be taken forward as part of the work of other Action Tracks.

Action Track 2

Solution Write-up: Preventing zoonotic diseases emergence for sustainable food systems through a One Health approach : the One Health High-Level Expert Panel and the PREZODE initiative

France

Background

- Moving towards a food system transformation to deliver affordable healthy diets in a sustainable way, which is the overarching objective of the Food System Summit, is intertwined with many other issues at stake within the agriculture-health-environment nexus and global changes.
- New risks are emerging linked to socioecological processes impacting this agriculture-health-environment nexus: climate change, deforestation, urban growth, changing production conditions and market chains, waste mismanagement...
- However, while food systems are facing those threats, the COVID-19 crisis has highlighted the pivotal importance of functional food supply chains and the need to further increase their resilience to emerging risks and crisis.
- *The current pandemic has indeed shaken the world, taking a very heavy human, economic and social toll, with a particularly disastrous effect on the poorest populations. But the fact is that over the past 50 years the emergence of health crises linked to zoonoses has been picking up speed due to increased environmental pressure, driving movement of people, wildlife, reservoirs, and vectors, transformation of landscapes agricultural expansion and urbanization.*
- All this requires a better understanding of the interactions between global changes (climate change, biodiversity loss, urbanization) that transform socio-ecosystems, including food systems, to be able to promote solutions that maximize co-benefits and accelerate system-wide transformations.
- **In this context, it is high time to accelerate the implementation of the a One Health approach, which integrates human, animal and environmental health, to prevent, detect and respond to new pandemics and benefit to food systems at the same time.**
- A One Health approach is beneficial to both the prevention of zoonotic diseases and to agricultural biodiversity, including in livestock management and help increase food quality and food safety. The One Health approach is not new and has been conceptualized in the early 2000s (even if its roots date back way earlier). It is now of utmost importance to accelerate its implantation in practice, with stronger consideration to its environmental dimension,
- *In this context, the One Health High level Experts Panel (OHHLEP) will be instrumental to inform public officials and help them make appropriate decisions to address and prevent future zoonotic crises, as well as to inform citizens. In addition, the PREZODE (PREventing Zoonotic Disease Emergence) initiative, although primarily*

aiming at preventing the emergence and spread of zoonotic diseases, represents a unique opportunity to address simultaneously several flaws in the current global food system.

1.1. Describe the solution: (what, in brief, is the solution)

OHHLEP

The One Health High-Level Expert Panel (“OHHLEP”) is established by WHO, OIE, FAO and UNEP. This group of 20 high-level independent scientific experts will provide guidance on One Health-related matters that support improved cooperation among governments. It will initially focus on: 1) providing policy relevant scientific assessment on the emergence of health crises arising from the human-animal-ecosystem interface, and research gaps; and 2) guidance on development of a long term strategic approach to reducing risk of zoonotic pandemics, with an associated monitoring and early warning framework, and the synergies needed to institutionalize and implement the One Health approach, including in areas that drive pandemic risk. The OHHLEP’s advice will contribute to enhancing strategic orientations and coordination, and to providing high political visibility on the subject of One Health.

PREZODE

- The overarching goal of the PREZODE initiative is to support international and local organizations, governments and civil society on the ground to prevent the emergence and spread of zoonotic diseases and to avoid the impact of pandemic crisis, **including impacts on food systems**, social systems, and economic development.
- *PREZODE is designed to incorporate and reinforce networks in human health, animal health and welfare and the environment. In line with the One Health concept, it aims to better characterise and detect emerging zoonotic threats and develop preventive measures with all stakeholders to protect humans, the planet, and socio-ecosystems.*
- The PREZODE initiative will complement the work of the OHHLEP and will decline the recommendations at the operational level.

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

In the context of the COVID-19 crisis, stressing the urgency of accelerating the implementation of the One Health approach and preventing zoonotic emerging diseases, France and Germany suggested to the WHO, OIE, FAO and UNEP to create the OHHLEP, which was *announced on 12 November 2020 at the Paris Peace Forum and will hold its 1st meeting on 18-19 May 2021, ahead of the World Health Assembly.*

In addition, the PREZODE initiative first emerged thanks to the gathering of French research institutes in line with the creation of the OHHLEP and with recent recommendations of the report on biodiversity and pandemics published by IPBES in October 2020. PREZODE was announced by the French President during the One Planet Summit for biodiversity held on 11 January with the support of FAO and of the European Union.

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

The COVID-19 crisis has highlighted the close links between human, animal and environmental health, in a context of increased human-livestock-wildlife contacts and ecosystems degradation.

In order to better understand pandemics emergence such as COVID-19 and to reduce the risk of zoonotic diseases, determined actions are needed. **This issue is highly relevant with regards to the FSS process, in a cross-cutting manner.**

The One Health approach, fostered by the OHHLEP and the PREZODE initiative, do not target a specific segment of food systems. It is about promoting a global vision of socio-ecosystems that are favorable to healthy and sustainable food systems.

In this sense, the One Health approach encompasses the various Action Tracks. It is also a relevant approach for the different ACAI inside AT3, though specifically addressing the ACAI "PROTECT".

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

The One Health approach must be supported, and the One Health High-Level Expert Panel and the PREZODE initiative will make a key contribution to this end. Together with the ACAI, the goal is to design virtuous socio-ecosystems.

The One Health approach can prevent and control risks by considering the interdependence of social and epidemiological dynamics, biodiversity and health, and veterinary and human public health. It considers the necessity for:

- Safer food systems (food derived from animals, including both livestock and wildlife, is an important vehicle for many zoonotic pathogens)
- Cross-sectional collaboration of veterinary and human medicine and other disciplines regarding wildlife preservation and animal management, across the food production chain,
- Sustainable nutrient management in agriculture,
- Empowerment of the local communities and actors involved in the food systems and at the front line of emerging risks,
- Intensified cooperation of relevant International Organizations in the field of One Health, with WHO, OIE, FAO and UNEP at the core.
- It has also the ability to improve connection between consumers and producers.

1.5. How can this solution address that problem?

OHHLEP :

The OHHLEP will perform the following functions:

- Provide advice on the analysis of scientific evidence on the links between human, animal and ecosystem health, and contribute to foresight on emerging threats to health
- Provide advice on better understanding of the impacts of food systems (including agriculture, livestock farming and trade, wildlife hunting and trade, aquaculture, animal products processing, handling, distribution and consumer practices) and ecological and environmental factors that may be contributing to zoonotic disease emergence/re-emergence and spillover events;

- Contribute to the One Health research agenda setting and propose, advise on and review approaches and specific studies relevant to the development of a global approach to reduce risk of zoonotic pandemics;
- Provide advice by invitation on One Health policy response in relevant member countries;
- Provide recommendations on specific issues identified by the Partners in the areas of highest concern for attention and action, and future directions, in One Health

PREZODE:

The PREZODE initiative is built around 5 operational pillars:

- Pillar 1 - Risk assessment of the emergence of zoonotic diseases
- Pillar 2 - Reducing the risk of zoonotic emergencies by building suitable and resilient socio-ecosystems
- Pillar 3 - Developing early warning systems, rapid response and assessing the socio-economic impacts
- Pillar 4 - Prototyping a global information system for surveillance and early detection
- Pillar 5 (cross-cutting) – Empowerment of the local communities, capacity building and health network strengthening

All 5 pillars are relevant to prevent the emergence and spread of zoonotic diseases, to avoid the impact of pandemic crisis while ensuring food security and poorest community livelihood. The second pillar of the Initiative, in particular, will be one of the instruments for boosting nature-based solutions at scale and allowing to protect natural ecosystems against new conversions for food and feed production. It will allow to systematically assess the relationship between human diseases and agriculture, and to understand the links between land-use changes associated with agricultural development and the multiplication of zoonoses.

It will work through innovative, participatory approaches involving local communities, researchers, technical and financial development partners and decision-makers at the local, regional and global levels.

1.6. Why does this solution align to the definition and criteria for a ‘game changing solution’ developed by the Summit?

Through its One Health approach, OHHLEP and PREZODE address the environmental, animal and agricultural roots of food systems. It has therefore the power to trigger a systemic change at scale.

1.7. 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?

The PREZODE initiative and OHHLEP are consistent with the recent recommendations of the IPBES workshop (2020) on biodiversity and pandemics and in accordance with the work and commitments of international organizations in this area. PREZODE will focus on the quality of the data, thanks to involving local population in the project.

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

OHHLEP, initially proposed by France and Germany at the highest level, has been endorsed and is now led by the “Tripartite Plus” (WHO, OIE, FAO and UNEP). It is currently funded by France and Germany, and its support has already been embedded in EU+MS positions (see draft EU WHA resolution)

The PREZODE initiative has been announced by the French President during the One Planet Summit for biodiversity held on 11 January with the support of FAO and of the European Union. It will be partly funded by the French government, with in-kind support from French research institutes, but fundraising efforts are still ongoing in 2021.

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

OHHLEP has a global scope and no particular limitations in terms of context. The experts involved in the OHHLEP were chosen for their independence, and also to represent geographical, gender and disciplines diversity.

The PREZODE initiative is a **global initiative** directed to all local contexts, with a focus on specific hotspots but not limited to those. It is built on and will strengthen existing cooperation between the different regions of the world (Africa, Asia, Pacific, Caribbean, Indian Ocean, Mediterranean, Middle East, Latin America and Europe); many national partners from these regions have already expressed their strong interest during first regional workshops held by PREZODE in December 2020. It is designed to incorporate and reinforce networks in human health, animal welfare and the environment.

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

OHHLEP already involves the key international organizations competent for One Health issues (“Tripartite Plus”) but would benefit from political and financial support from the Member States and other stakeholders.

PREZODE will be guided by the OHHLEP recommendations and will also work in close collaboration with OIE, FAO, WHO, UNEP, IAEA and with programs initiated by the World Bank, by national development agencies and by foundations. It has a unique network of partners (researchers, international organizations, NGOs, governments) and relies on projects and partnership networks already underway in Europe, Africa, Asia and Latin America, coordinated by French research institutions (CIRAD, IRD, the network of Pasteur institutes and their public and private partners, as well as on the One Health expertise of INRAE and ANSES and in remote sensing from CNES).

The connection with key scientific and operational partners in the field (EcoHealth Alliance, GALVmed, the World Conservation Society, Agronomes et Vétérinaires sans frontières,...) already initiated in December 2020 (see #10 above) will be strongly strengthened through new co-construction international workshops and through their adherence to the PREZODE Charter in order to allow the project to immediately gain international stature.

Action Track 5

Solution Write-up: You can't manage what you don't measure: National food production inventories

New Zealand

1.1 What problem is your proposition addressing?

Reducing the emissions impact of food production systems requires a national understanding of mitigation opportunities, but also improved measurement and reporting of these agricultural greenhouse gases (GHGs). Many governments lack such capacities, particularly in low- and middle-income countries, reducing the ability of countries to meet their Nationally Determined Contribution (NDC) commitments for the agricultural sector in cost-effective and sustainable ways due to:

- Shortfalls in capacity to develop robust agricultural emissions inventory systems;
- Insufficient good-quality local statistical information;
- Emissions inventory methods being unable to recognise or capture agricultural emission-reduction options; and
- Locally appropriate agricultural emission-reduction or offset options not yet being identified, researched and developed and/or disseminated.

Improving national agricultural greenhouse gas inventories is an essential first step that must underpin any future development of low emissions food systems.

1.2 How does your proposition address the problem?

Through the Global Research Alliance on Agricultural Greenhouse Gases (GRA), New Zealand will support countries, initially in Latin America, Africa and ASEAN, to build the capacity required to better report on their national emissions and contribute to meeting NDCs. Developing regional activities takes advantage of shared climate and common production systems which helps to reduce duplication of effort and shares learnings for extension and implementation across countries.

By the end of the programme, it is expected that countries involved will have robust systems in place for monitoring, reporting and verification of agricultural GHG emissions and that the roll-out of new low emission agriculture systems, technologies and practices has started. Success would be for participating nations to make a measurable contribution to their GHG emission commitments through being better able to quantify their agriculture sector GHG emissions, and by increasingly adopting low emission and productivity enhancing agricultural systems, technologies and practices.

New Zealand welcomes contributions from other partners and will identify synergies where similar initiatives are underway, recognising that global challenges require collective approaches. Improving the quantification of agricultural greenhouse gas emissions under different management scenarios is key to understanding best practice and unleashing breakthrough solutions: you can't manage what you don't measure.

1.3 Is this a new solution or an existing solution that needs scaling?

This is an existing solution that requires scaling up by raising capability and capacity for measuring, monitoring and reporting agricultural greenhouse gases. Agreement by member states at the UN Food Systems Summit to scale up support to strengthen countries' capabilities to better monitor and manage their national emissions could make a significant contribution towards reducing agricultural emissions and help countries meet their NDCs.

1.4 Which organisation/s, institution/s or groups of individuals are associated with the solution?

New Zealand is bringing together donors to raise global food production/agriculture inventories. We are funding work to bring agricultural inventories up to Tier 2⁵ in some ASEAN, Southern and Eastern African, Latin American and Pacific countries through the GRA and welcome others to join this solution. The GRA is an alliance of 64 member countries from all regions of the world and 24 Partner organisations that includes regional research institutes, farmer organisations, development banks and multilateral fora including the FAO, and IPCC.

1.5 What is the scientific evidence that supports your proposition?

Scientists have a good understanding of how emissions increase in line with changes in animal productivity, which affects feed intake (especially important for methane) and the amount of nitrogen excreted. This combined with good quality data on agricultural productivity and animal population changes means New Zealand's inventory provides clear, reliable evidence of trends in agricultural GHGs. The inventory also includes nitrous oxide emissions from crop residue returned to the soil, cropland cultivation and cropland burning. Agricultural GHG inventory is an essential and robust tool to show changes in absolute emissions, and in emissions intensity, meaning there can be reasonable certainty about whether emissions are increasing or decreasing.⁶

1.6 Is this idea applicable to a particular geography, demography, landscape or other type of setting?

This proposal is applicable to agricultural landscapes.

1.7 Who are the main actors that would put this action into place?

The main actors to put this action into place are the GRA partners, with targeted technical expertise from New Zealand. The GRA works to increase international cooperation and investment, bringing countries together to find ways to reduce the emissions intensity of agricultural production systems and increase the potential for soil carbon sequestration, and improve efficiency, productivity, resilience and adaptive capacity, thereby contributing in a sustainable way to overall mitigation efforts, while helping meet food security objectives.

Source and process

Don Syme, Deputy Permanent Representative to the FAO, New Zealand Embassy Rome.

⁵ A Tier represents a level of methodological complexity. Tier 2 is intermediate and requires a more structured system that better reflects national agricultural production systems and can be improved as a country collects more accurate data in production and also develops their own emissions factors.

⁶ <https://www.nzagrc.org.nz/policy/listing,412,what-is-a-national-ghg-inventory.html>

Background

A growing number of countries, including almost all G7 members, have made “net-zero” commitments for mid-century for their entire economies. But few, if any, have actually focused on food and land use systems (their focus has been on energy and transport), or how food and land use systems will play into their national net-zero commitments. Getting to net-zero—or actually “net-negative”—emissions in food and land use systems will be critical if countries are to achieve overall economy-wide net zero emissions and fulfill the Paris Agreement. The proposed Alliance seeks to address this.

1.1 What, in brief, is the solution?

The “Food and Land Net Zero Country Alliance” would be a voluntary coalition of countries that commit to net-zero food and land use GHG emissions by 2050 (with intermediate targets for 2030 and 2040) and work to achieve this target in a manner that supports economic development, food security, and climate stability. Members develop bold strategies for achieving the target, receive technical assistance, take action (e.g., via policies, practices, investments), and monitor progress. A coalition of technical partners would provide support where needed. The Alliance’s scope would cover the entire food system (both production and consumption) and land system (e.g., forests, grasslands, wetlands, croplands, rangelands)—embedding food and land use deep into national decarbonization pathways and post-COVID recovery.

Specific activities include (but are not limited to):

- Targets – Make bold, quantitative commitment and enhance ambitions to eliminate GHG emissions from food and land systems (a.k.a. AFOLU) in Nationally Determined Contributions (NDCs) and Long-term Low-Emission Development Strategies (LT-LEDS)—while ensuring coherence with other political objectives such as food security, employment, and Convention on Biological Diversity targets.
- Strategy – Develop a comprehensive, evidence-based mid-century pathway and “national implementation roadmap” for achieving the net zero target—covering all relevant food and land use sectors. The strategy should be able to get the country to net zero (or below) emissions in the food and land use sectors by 2050 while also helping the world meet rising food demands (and not “offshore” or shift food production and emissions to other countries).
- Measurement – Scale up support to strengthen countries’ capabilities to better quantify and understand their national food- and land-related GHG emissions.
- Innovation – Identify and prioritize the innovations in technologies and practices needed to achieve the target by mid-century.
- Policy – Identify and prioritize the public policies to catalyze the shifts needed to achieve the target.
- Investment – Attract the investment to support the innovations, public policies, and private sector practices.
- Monitoring and communications – Monitor and communicate progress (and challenges) over time.
- Implementation support – Help align technical and/or financial support for implementation when and where needed.

The Alliance would foster mutual sharing of ambitions and experiences, know-how, and joint access to a cohort of technical assistance providers. By linking with programs like the NDC Partnership, members might be able to access financial assistance, as well.

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

This solution emerged as a synthesis of multiple ideas from various participating members of Action Track 3 (as well as other Action Tracks). This solution bridges them together into a coherent whole and “big agenda-setting initiative”. Importantly, we noticed that there was a major gap in the world and among the suite of Food Systems Summit game changers; this solution fills that gap.

1.3 What problem is it trying to address within food systems?

There is currently too little national government attention on and capacity for developing and implementing strategies that eliminate greenhouse gas emissions from food and land use systems. National focus to date is still primarily on energy and transportation emissions. Food and land systems (e.g., forests, grasslands, farmlands) are too often treated as “afterthoughts” when it comes to the climate agenda. Moreover, the food agenda too often treats climate as an “afterthought”. And when climate strategies do identify agricultural solutions, they rarely include rigorous quantification of how to do it and of who benefits, which are critical for credible roadmaps to truly low-carbon systems. The proposed solution seeks to address these challenges.

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

Addressing this problem is critical if the world is to achieve all of the following at the same time: food security, rural economic development, climate security (i.e., limit global warming to under 1.5°C), and biodiversity conservation.

1.5 How can this solution address that problem?

The Alliance will address the problem “head on” by generating national government attention on getting greenhouse gas emissions from the food and land use sector to zero (and even below zero in order to enable the entire economy to go net zero), by building the domestic capacity to develop and implement “net zero” strategies, by facilitating sharing of “what is working” and “what is not working” amongst participants (in a mutually supporting fashion), by monitoring progress, and by publicly communicating results (giving “kudos” where warranted and inspiring others to join on the journey).

1.6 Why does this solution align to the definition and criteria for a ‘game changing solution’ developed by the Summit?

This solution is “game changing” because it:

- Has impact at scale. It gets entire countries on the path to net zero (or better) food and land use systems. And seeing countries make commitments and progress will encourage other countries over time to join and embark on the path, as well.
- Is actionable. It involves influencing government policies, business practices, and financial investments. Moreover, the Alliance provides needed technical assistance to countries.
- Is sustainable. The Alliance gets the ambitions baked into NDCs and the target goes to mid-century.
- Embeds accountability. The Alliance is making a public commitment and will transparently track progress over time.

1.7 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?

Coalitions of willing countries have proven to be an effective way of breaking out from status quo ambitions and forging new, progressive paths forward. A few countries already have net zero emissions ambitions from the food and land sector (e.g., Denmark). Others are exploring.

Roadmaps for deep decarbonization of the food and land use sectors have been developed for some countries. The ability to monitor all forms of land cover/use and their associated carbon stocks and flows is under development (via a grant from the Bezos Earth Fund), and greenhouse gas accounting rules for this space are emerging, as well. Likewise, momentum around “net zero is growing, with a particular push by the UN Secretary General.

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

We believe that several countries would be interested in this Alliance. These include (but are not limited to): New Zealand (a leader in working on GHG emissions reductions from agriculture), Denmark (which has set a net zero target for its agriculture sector), Colombia (an active Food & Land Use Coalition country), and China (an active Food & Land Use Coalition country interested in how to dramatically reduce non-CO₂ emissions in its agriculture sector). Likewise, over time, countries active in the NDC Partnership should be supportive since they will need to be continuously ratcheting up their NDC ambitions (which means further lowering agricultural emissions and getting the land system to start removing carbon from the atmosphere). A number of countries actively involved in the FABLE Network and 2050 Pathways Platform would find the Alliance an effective, targeted initiative for converting their net zero efforts into action when it comes to food and land use systems. When it comes to other stakeholders, we believe (based on their emerging strategies) a number of institutions would be supportive as well, including development banks, members of the Food & Land Use Coalition (which includes business groups like WBCSD), research institutions (e.g., the CGIAR system, Global Research Alliance on Agricultural Greenhouse Gases), and more.

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

This solution is well suited for nearly any context. It is relevant for any form of agricultural system (e.g., crops, livestock) and land types (e.g., croplands, pastures, forests, wetlands, grasslands). It is relevant for OECD and non-OECD countries (technical assistance would be provided). A key criterion is that participating countries are committed to seriously addressing greenhouse gas emissions from their food and land use systems. It would be difficult, however, to have Alliance activities occur in countries with current high rates of conflict (for safety reasons).

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

Sustainability NGOs (e.g., WRI, WWF), multistakeholder coalitions (e.g., Food & Land Use Coalition), NDC Partnership, relevant UN agencies (e.g., FAO, UNEP), research institutions (e.g., GGIAR, CCAFS, Global Research Alliance on Agricultural Greenhouse Gases), and more. Selected developed countries (e.g., New Zealand, Denmark) and emerging/developing economies (e.g., Colombia, China). Selected foundations.

1.1 What, in brief, is the solution?

The agriculture sector is faced with larger data gaps and more complexities around the estimation of emissions and decarbonization pathways than arguably any other sector, which makes the measurement and disclosure of Paris Alignment of banking portfolios in this sector particularly challenging. Against this background, the Banking for Impact on Climate in Agriculture (B4ICA) Initiative aims to convene and facilitate a coalition of banks, scientists and other relevant experts and partner organizations to develop data, a method, tools and guidance for finance institutions to assess, manage and act on alignment of agriculture portfolios to climate scenarios.

1.2 What problem is it trying to address within food systems?

The agriculture and land use sectors represent one quarter of global GHGs. Given the material impacts of climate change and the short time window of opportunity left to prevent the disastrous scenarios unfolding, banks must move toward reducing GHG emissions in their food and agriculture portfolios in alignment with global climate targets toward net zero while strengthening rural livelihoods for a just rural transition towards sustainable food systems. Investors (asset owners and asset managers) are demanding it, regulators push for it (BoE, ECB, NGFS), global agreements (Paris Climate Agreement, Sustainable Development Goals) require it, and employees, clients, and communities will benefit from it. More importantly, there is a momentum in the financial sector to act now as a matter of ongoing concern for clients as demonstrated by the extent to which today financial institutions are committing to measuring, disclosing and over time reducing their financed emissions (via the Net-Zero Banking Alliance, the Principles for Responsible Banking & the Collective Commitment to Climate Action, the Platform for Carbon Accounting in Financials, etc.)

1.3 How can this solution address that problem?

To achieve this, B4ICA proposes to support banks to align their agri-banking portfolios towards the Paris Agreement via the following project outcomes:

1. **Technical Landscape Analysis:** Create an analysis of the technical challenges (e.g. availability of data), opportunities and stakeholders associated with building the accounting methodology framework, strategic guidance and data driven tools. The analysis should support addressing the necessary scoping of work, refining the deliverables' details, the timeline for deliverables, and asks for stakeholder support.
2. **Credible accounting methodology frameworks:** Develop with key stakeholders a framework of robust, credible, and consistent methodologies for allocating climate impacts across banking portfolios. The methodologies should address two issues: (1) fill the GHG-emission accounting data gaps in agriculture, forestry, and other land-use (AFOLU) with respect to GHG-emission footprint proxies and science-based decarbonization pathways (2) enable the portfolio assessment and client engagement for the Paris alignment of portfolios based on these two data building blocks.
3. **Strategic guidance and targets:** Create strategic guidance supporting banks to align portfolios toward climate pathways, informed by the GHG Protocol, Science-based Targets (FLAG), Just Rural Transition (JRT) initiative and/or other agricultural land-use initiatives as appropriate.
4. **Data driven tools:** Create data-driven tools that enable the analysis of portfolios' alignment with GHG targets/pathways; these should be fit for serving various purposes such as portfolio decisions, client engagement, transition risk assessment and/or disclosure.

5. **Regional action coalitions to pilot the tools:** Enhance these tools by having banks (1) test them in specific grower settings and (2) [TBD] exploring the application of these tools as the foundation for developing innovative products and services to advance emission reduction farmer practices and corporate verification and measures at scale in selected value chains. Opportunities for active expansion and exploration include scaling investments into carbon markets. This can be done by closely engaging key companies in the value chain, farm associations / farmers, sub-sector industry platforms and regions. Focus commodities include dairy, rice, soy and livestock across Europe, the Americas and Asia-Pacific regions.

1.4 Why does this solution align to the definition and criteria for a ‘game changing solution’ developed by the Summit?

The solutions aligns with the criteria because: **1)** It has the potential to set a standard for finance to agriculture (and indirectly the agriculture sector) to move towards a net zero future; hence it has the potential to have global impact at scale. **2)** By providing guidance and tools (incl. filling existing data gaps) for banks to use the initiative will facilitate climate action; the tools will be open source for non-participants. **3)** Will facilitate climate action in the long term. Also, the solution is departing from current practice by addressing a long term constraint, thinks big with concrete pathways and actions for long term systemic change and advances regenerating environmental integrity.

1.5 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?

Similar methodologies have been developed for other sectors by other bank led consortiums (e.g. PACTA) The partners involved have both credibility among key stakeholders and a proven track record of establishing carbon accounting and Paris Alignment methodologies. Rabobank, Santander and other banks with extensive agricultural portfolios have a vested interest in resolving this key challenge to their Paris Alignment/Net-Zero commitments.

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

The initiative is being co-convened by the WBCSD, UNEP FI and PCAF, and supported by leading international banks, such as Rabobank and Santander. Our expectations are that this initiative will be welcomed by national and international financial regulatory bodies as well as other governmental and inter-governmental agencies as it addresses a key gap in carbon accounting and Paris alignment activities for a key economic sector.

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

The primary audience for this project are the climate (sustainability) expert practitioners of a bank, which could have a background in risk advisory, non-financial reporting and/ or strategy making. These experts would help develop the tools together with experts and use them to translate findings into internal policies and practices that would provide guidance to other departments within the bank such as the commercial lines.

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

<p><u>Convening Partners</u></p> <ul style="list-style-type: none"> • WBCSD: Primary convener of Leading Bank Group; Primary convener of Technical Partners and Critical Advisors; Co-convener and project manager of Technical WGs • PCAF: Co-convener of Leading Bank Group; Technical Lead of Carbon Accounting Technical WG; • UNEP FI: Co-convener of Leading Bank Group; Technical WG advisor 	
<p><u>Leading Bank Group</u></p> <p>Purpose: Guide the governance and pace of the project; determine deliverables; Provide resources (human +/- financial) to technical WGs, including piloting the tools developed:</p> <ul style="list-style-type: none"> • Confirmed: Rabobank, Santander • Goal: Between 4-8 other leading international banks tbc before June 30. <p><u>Supporting banks:</u> (est. 20-40) banks with significant food and agricultural portfolios, interested in testing and using key components of the initiative.</p>	<p><u>Technical Partners & Advisors:</u></p> <p>Purpose: provide advice to the WGs to build upon previous and current climate work:</p> <ul style="list-style-type: none"> • Science & CSOs • Corporate • Farmer Reps • Technical Partners