



**THE CLIMATE EMERGENCY AND THE FUTURE OF FOOD:
THE SALZBURG PROCESS**

HOT TOPIC DISCUSSION PAPERS

April 2020 | Draft for Discussion



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WELCOME TO THE CLIMATE EMERGENCY AND THE FUTURE OF FOOD: THE SALZBURG PROCESS

When we started planning for this convening one year ago, we never could have imagined the state of the world today. We planned the Climate Emergency and the Future of Food international dialogue in anticipation of 2020 being a ‘Super Year’ in terms of key international milestones— the UN Convention on Biological Diversity (CBD) COP15 in October, the UNFCCC COP26 in November, and others — all oriented toward achieving the Sustainable Development Goals. Now we find ourselves in the midst of the global coronavirus COVID-19 pandemic which has revealed our deepest vulnerabilities, compounded existing inequalities, and highlighted the fragility and interconnectedness of human, animal, and ecosystem health.

Although key political international milestones have been postponed to 2021 due to the lockdowns and travel restrictions caused by COVID-19, they remain, nevertheless, critically important opportunities for aligning around key messages, forming communities, and building momentum for leadership at all levels in support of resilient, healthy, sustainable, and equitable food systems as fundamental components to any national and international effort to address the climate emergency. If anything, the pandemic has made this collective agenda, and the need to address the food-climate nexus, even more pressing and urgent.

Towards this end, and to maintain momentum, we transformed our international in-person dialogue on the Climate Emergency and the Future of Food, originally planned to take place in Salzburg, Austria, on 4-6 May 2020, into a virtual online dialogue which we renamed “The Salzburg Process.” Our overarching objectives remain the same: to build strategic alignment on key issues in food and climate and to accelerate the actions, investments, and policies needed to transform food systems – holistically and systemically.

Over the course of six weeks, The Salzburg Process will engage over 300 geographically and sectorally diverse participants to deliberate over five “hot topics” and four “levers of change”. The hot topics are nature-based solutions, livestock production, sustainable and healthy diets, food loss and waste, and just transitions. Each of these areas are the critical nexus where the food and climate agendas come together. Food systems are a significant factor in the creation of the daunting challenges we face in these areas and, importantly, they can provide brilliant pathways to the solutions. Meanwhile, the levers of change are policy reform, financial reform, practice reform, public narratives and strategic political communications. The discussions will feed into the development of a shared narrative and a “Shared Action Framework” for food systems transformation in the context of the climate emergency. The Shared Action Framework seeks to comprehensively identify opportunities, levers of change, and priorities across sectors, scales, and policy processes. And, of course, we hope this process will lead to strengthened networks, relationships, and innovations that sustain engagement.

“People who have managed to intervene in systems at the level of paradigm have hit a leverage point that totally transforms systems. So how do you change paradigms? In a nutshell, you keep pointing at the anomalies and failures in the old paradigm, you keep coming yourself, and loudly and with assurance from the new one, you insert people with the new paradigm in places of public visibility and power.... You work with active change agents and the vast middle ground of people who are open-minded.”

– Donella Meadows, pioneering environmental scientist, teacher and writer

The Salzburg Process is co-organized by the Global Alliance for the Future of Food and Salzburg Global Seminar. The [Global Alliance for the Future of Food](#) is a strategic alliance of philanthropic foundations working together and with others to transform global food systems now and for future generations. [Salzburg Global Seminar](#) is a non-profit organization that fosters lasting networks and partnerships for creative, just and sustainable change.

Together, we are thrilled to welcome you to The Salzburg Process, and look forward to the critical work we are embarking on together over the next weeks and months.

The COVID-19 Crisis, the Climate Emergency, and the Future of Food

Over the past several weeks, many of us have tried to take the time to understand what the COVID-19 pandemic means for our world, as a deeply transformative force. We are being tested in ways none of us ever imagined. As countries work to control the spread of the virus, there will be vast political, economic, social, and environmental consequences which will last for many years -- if not decades.

With the rapid introduction of emergency lockdown measures, the closure of borders, and the disruption of global and local supply chains, the fragility of our food and health systems has never been more painfully apparent.

As a stark reminder of the deep interconnections that exist between human, animal, and planetary health, the COVID-19 pandemic highlights just how much our food systems are locked into cycles that produce poor health, for people and the planet alike. Indeed, we know that the emergence of zoonotic disease and other infectious diseases, like Ebola, SARS, bird flu, and now COVID-19, are inextricably linked to how our food systems operate. As industrial food production encroaches onto formerly untouched land and ecosystems, often via land-use change and deforestation, humans and domestic animals are, in turn, increasingly exposed to wildlife and the diseases they carry.

What’s more, this crisis is exacerbating the existing inequities in our societies, with the devastating impacts of the virus and associated emergency response measures being most unequally felt by the most marginalized and racialized -- including women, small-holder farmers, low-paid and frontline workers, those in precarious employment and living conditions, and those already struggling with food

insecurity. We know from the headlines that workers in the restaurant, catering, and retail industries are laid-off, farm labourers are unable to get to the farms that need them, farmers are unable to get their products to markets, food markets are closed, and many communities are lacking access to sufficient, diverse, and nutritious food. At the same time, global and local supply chain disruptions are further straining existing systems and contributing further to food inequalities, from the wastage of vast quantities of commodities such as milk and eggs to the increase in the consumption of highly processed foods. The food systems we have built are no longer fit for purpose.

Yet, in the midst of this waking reality of food systems that don't serve us, we are learning that profound change is possible. Not only has the COVID-19 crisis revealed how swiftly and decisively change can be implemented, but that single-focussed interventions and siloed approaches aren't enough when facing a "shock" of this scale and magnitude. This is a pertinent lesson for how we tackle the climate emergency, which we are all already living through.

Now, more than ever, we need transformative systems change. Food systems are at the centre of many of the interconnected crises we face, including climate change, epidemics of non-communicable diseases, biodiversity loss, the decline of rural economies, and global trade vulnerabilities.

We need major global transformations in our political institutions, corporate structures, energy systems, governance arrangements, land use, food and agriculture practices, and every other human-made system that guides our actions and interactions. The status quo is not a viable path forward. It is only by addressing these interconnected challenges holistically that we will move from incremental shifts to the kind of profound shifts necessary to realize the transformation required of us, as a global community, now.

The Global Alliance's vision and its actions are guided by a set of shared principles -- renewability, health, equity, resilience, diversity, inclusion, and interconnectedness. When taken together, these principles help us to see the whole system in necessary and powerful new ways; they tell us how to act and enable us to make better choices about the future of our shared food systems. For participants entering The Salzburg Process, these principles create a useful, actionable framework through which to approach our upcoming conversations about food systems transformation in the context of both the immediate COVID-19 crisis and the ongoing climate emergency.

Participants in The Salzburg Process are uniquely poised to connect and to collaborate, to leverage current global attention on food insecurity, supply chain disruption, and system inequality, and accelerate the actions, investments, and policies needed to transform food systems.

Climate-resilient food and agriculture systems can powerfully contribute to a 1.5°C world by 2050, and a future that is healthy, sustainable, and equitable for all on our shared planet -- but, we must all act now, together. Genuine systems transformation takes place when diverse individuals, actions, and networks intersect across sectors and issue silos, the global and local, the macro and the micro.

PRINCIPLES AND THE FUTURE OF FOOD

RENEWABLE

Address the integrity of natural and social resources that are the foundation of a healthy planet and future generations in the face of changing global and local demands.

RESILIENT

Support regenerative, durable, and economically adaptive systems in the face of a changing planet.

EQUITABLE

Promote sustainable livelihoods and access to nutritious and just food systems for all.

DIVERSE

Value our rich and diverse agricultural, ecological, and cultural heritage.

HEALTHY

Advance the health and well-being of people, animals, the environment, and the societies that depend on all three.

INCLUSIVE

Ensure meaningful and authentic engagement of diverse people and organizations in transparent deliberations, shared power, democratic decisions, and collective actions affecting food systems for the public good.

INTERCONNECTED

Understand the implications of the interdependence of food, people, and the planet in a transition to more sustainable food systems.

To read more about our principles, visit the Global Alliance for the Future of Food's [website](#).

The Salzburg Process Objectives and Co-Creating a Shared Action Framework

The Salzburg Process has three interrelated and mutually reinforcing objectives:

1. Creation of a shared narrative that emphasizes the imperative for food systems transformation and presents key messages about collective priorities.
2. Development of a Shared Action Framework connected to five “Hot Topics” for food systems transformation that identifies opportunities, priorities, and levers of change across sectors, scales, and policy processes.
3. Formation of shared networks, relationships, and innovations that sustain engagement and connection across local, regional, and global levels; bridging sectors and silos, connecting the micro and the macro.

We recognize the growing number of movements and initiatives seeking transformative change and aspire for this process to celebrate and/or augment existing activities and a diversity of approaches while also catalyzing new forms of collaboration.

Following the virtual convenings in May, a draft shared narrative and Shared Action Framework will be circulated to participants and a broader network of stakeholders with the goal of socializing, further developing, and refining the framework. It is our hope that the framework and narrative are taken forward by participants and the broader community of allies in ways that are appropriate to their mission, resources, and capacity.

The Global Alliance is committed to active ongoing engagement with this process, and will be determining its role in advancing the framework and narrative. This will include: (1) disseminating the outcomes of The Salzburg Process to our broad network of stakeholders; (2) actively engaging Global Alliance members and other philanthropic partners in how they can independently incorporate the outcomes and priorities in their work; and (3) identifying ways in which the Global Alliance can collectively use the outcomes and priorities to influence and inform international policy processes. This will not include Global Alliance funding for all ideas generated; this is intended as a collaborative process with shared ownership and the identification of the “best and highest” role for each participant in moving the agenda forward.

HOT TOPIC DISCUSSION PAPERS

Food systems are significant contributors to, and heavily impacted by, climate change. Agriculture, food production, and deforestation are major drivers of climate change, and represent up to 37% of anthropogenic greenhouse gas (GHG) emissions.¹ At the same time, climate change is exacerbating negative impacts to food systems, livelihoods, biodiversity, human and ecosystem health, and infrastructure.

Once rescheduled, the UNFCCC COP26 will represent the five-year anniversary of the Paris Agreement adopted in 2015 and the first deadline for signatory countries to deliver their ‘Nationally Determined Contributions’ to achieving a well-below 2°C world by 2050. According to the Intergovernmental Panel on Climate Change’s (IPCC) Special Report on Global Warming of 1.5°C, this requires us to reduce our GHG emissions by 45% by 2030 and to reduce our emissions to net-zero by 2050.² Getting to a level of GHG emissions that keeps us within a warming range of only 1.5°C means we must radically transform our resource use, our economic system, and our food systems.

Coordinated action by a diverse range of stakeholders, across food systems, to tackle climate change, could simultaneously improve land, food security and nutrition, and, if managed well, reduce pressure on land and support biodiversity conservation. There is increasing consensus that the critical priorities to advance the climate-food agenda includes: nature-based solutions, livestock production, food loss and waste, diet shifts, and just transitions,³ as well as increasing interest across a wide group of stakeholders in the emissions abatement opportunities inherent in these priorities. But, more needs to be done to build strategic alignment around these areas of transformation and to accelerate system-wide action.

As such, to support The Salzburg Process, we commissioned five discussion papers on these “hot topics” central to the food-climate nexus: nature-based solutions, livestock production, sustainable and healthy diets, food loss and waste, and just transitions. We anticipate that these discussion papers will serve as ‘food-for-thought’ and act as a catalyst for informed debate amongst participants from a diversity of sectoral, geographical, and cultural perspectives.

The discussion papers are not meant to be comprehensive overviews of each topic, but instead an entry point for discussion, debate, and deliberation, ultimately leading to deeper understandings of areas of convergence and divergence across participants, and the identification of priorities to be included in the Shared Action Framework.

The authors of the discussion papers were asked to: a) bring their own expertise to bear, b) do desktop research, and c) conduct up to 10 interviews reflecting diverse opinions and perspectives on the hot topics.

¹ The range of 21-37% includes Agriculture, Forestry and Other Land Use (AFOLU) as well as emissions associated with pre- and post-production activities in the global food system. IPCC (August 2019). [Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas fluxes in Terrestrial Ecosystems](#).

² Reduction compared to 2010 baseline. IPCC (October 2018). [Special Report on Global Warming of 1.5°C](#).

³ To better understand the terms and issues related to the food-climate nexus, please see the Food and Climate Research Network’s [FoodSource Glossary](#)

The discussion papers each provide:

1. An overview of the critical issues related to each hot topic
2. A landscape analysis of key organisations working on topic area
3. Convergences ripe for shared action in the near term, divergences potentially blocking coordinated action, and uncertainties deserving further attention
4. High-level recommendations for levers of change related to:
 - policy reform
 - financial reform
 - practice reform
 - public and political communications

We recognize that the five hot topics are deeply interconnected, both in terms of the issues raised and the recommendations proposed. Not surprisingly, a number of synergies have been identified across the papers. For example:

- There was convergence around the need for more inclusive, participatory approaches to governance that address the structural inequities and power imbalances in food systems. Most authors pointed to the importance of rights-based approaches, food sovereignty, resource and land rights, resilient livelihoods, and the important role of leadership from Indigenous Peoples and farmers in food systems transformation.
- Authors called for an integrated policy development and a systems approach that recognizes the interrelationships between the environment, food, agriculture, and health.
- Policy, subsidy, and trade reform were repeatedly identified as key opportunities to transform food systems.
- There were common points on issues such as metrics and measurement, ecosystem services and carbon pricing, financial disclosure, dietary guidelines, marketing and labelling as key levers for change. The role of business and private sector leadership in advancing these levers was noted, the important role of small- and medium-enterprises.
- The low power and visibility of those most affected by and within food systems — migrant workers, workers with precarious employment in the food system, those working in the informal sector, individuals, families and communities experiencing food insecurity, and other vulnerable populations — was noted by all authors. Many authors called for more adequate social safety nets and social programs in the wake of the social dislocation and uneven economic outcomes borne of the food system. It was emphasized that this must be managed at different levels – local, regional and national contexts — and requires different actors, market mechanisms, and other policy instruments in order to achieve greater equity.
- Support for agroecological, regenerative, ecological, bioregional and circular food systems practices were mentioned as holding great potential across various scales.
- Importance of a narrative shift that upholds a systems perspective.

The authors emphasized the need for major societal shifts, transformations, and reorientations of food systems. The recommendations gleaned through the process of research and engagement speak to specific pathways and levers that must lead us beyond reform to the systemic transformation and substantial structural changes we collectively seek.

These papers have been developed to set the context discussions; outline areas of tensions and initial recommendations for convergence; and to help catalyze an open, inclusive exchange between all participants during The Salzburg Process.

Next Steps

The Salzburg Process, and in particular the online workshops on 4-6 May 2020, are designed to facilitate small group discussions that explore the convergences more deeply, acknowledge the tensions and debate, and identify high-level global recommendations for each lever of change. We expect that the recommendations will be high level and that there will be a need to adapt recommendations in the final Shared Action Framework to suit local, regional, and national contexts.

Following the intensive webinars on 4-6 May, we will circulate a shared narrative with key messages and a Shared Action Framework for feedback by The Salzburg Process participants in June 2020. Others not engaged in the formal process will be engaged in the refinement of the Shared Action Framework post-event. We aim to launch the narrative and Shared Action Framework in the autumn of 2020 and will monitor upcoming political and media opportunities for an appropriate date.

We will also look for ways for participants to stay engaged with one another, grow the network of changemakers, continue the dialogue, and share strategies and activities.

Hot Topic Discussion Paper 1

NATURE-BASED SOLUTIONS

Elise Buckle, Founder and President of Climate & Sustainability; Faris Ahmed, Consultant; and Marie-Laure Varanne, Co-Director at climate-sustainability.org

1. Introduction

This paper explores the elements of nature-based approaches to enhance ecosystem resilience, improve livelihoods and build sustainable food systems. Our ecosystems and natural wealth are under great threat, as report after report sounds the alarm -- notably the recent IPCC report and the IPBES Global Assessment. However, another alarming trend also stands out: one of the main drivers of climate change, biodiversity and habitat loss, and ecosystem destruction, is unsustainable agriculture. In the age of COVID19, we have reached an 'Aha Moment', connecting the dots and seeing that many of the planetary crises in public health, climate, environment and food are interrelated -- and they can be traced back to our agriculture and food system. The moment to act on this realization is now. The evidence is compelling that, in order to affect real systems change, pre-empt future crises, and make real progress towards the Paris Agreement and the Sustainable Development Goals, we have to start with agriculture and food systems, and their relationship with nature. Indeed, unless we reshape our food systems towards more nature-based solutions, we will remain in business-as-usual mode, and be forced to contend with crisis after crisis.

1.1 Nature-Based Solutions: Origins, Concepts and Approaches

The concept of nature-based solutions has emerged in recent years in response to the urgency of climate change, accelerating environmental destruction and biodiversity loss. Nature-based solutions (NBS) encompass a range of approaches premised on valuing ecosystems as a basis for action to meet climate change, environmental and social challenges. What is the rationale behind NBS? The world's performance in meeting international targets on climate, development and biodiversity has been poor. Our actions have been fragmented and ineffective, while the crises have only deepened. There is a clear need for more comprehensive and integrated ways of helping nature as well as people, while avoiding 'silver bullets', technical-focused, or large scale engineering approaches which may have unintended consequences. More and more voices from civil society, government, and business have been calling for green policies, green economies, green infrastructure, and a green new deal for nature and people that will drive the transformation of our food systems, and reduce their negative environmental and social impacts.

The terminology of NBS increasingly came into use in the late 2000's via the International Union of Conservation of Nature (IUCN) and World Bank, and was subsequently taken up in various EU platforms (such as Think Nature, 2016). The Paris Agreement (2015) made numerous references to enacting solutions based on nature, without explicitly calling them NBS. The IPCC Land report (2018) and the IPBES Global Assessment (2019) both gave prominent attention to NBS. It was the UN Climate Action Summit in (New York, 2019) that really solidified the use of NBS as an important concept and pillar of

climate action for the world; and where a number of NBS-related networks were established, such the multi-actor nature-based solutions Coalition, led by China and New Zealand.

Hence, NBS became a 'hot topic', bringing together a variety of interrelated approaches and practices that place nature at their centre. Many are already in widespread use, but have remained less visible, under-documented and vastly underfunded. These include agroecology, regenerative agriculture, agroforestry, permaculture, conservation agriculture, organic 3.0, and other approaches -- exploring innovative new frontiers in soil health, carbon drawdown, net-zero-emission farming, as well immediate benefits for water quality, biodiversity, and management of human and animal health risks, livelihoods, food security, and numerous other benefits for society.

According to IUCN, Nature-Based Solutions can be defined as “Actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human wellbeing and biodiversity benefits”. This definition captures the close connectivity between people and nature, unlocking the great potential for applying natural solutions and processes in more integrated and multi-functional ways to address diverse problems. Inspiring examples of NBS include sustainably managed mangroves, which play a critical role in reducing the impacts of tidal waves, and in sustaining coastal wildlife and fisheries; and green roofs that can significantly reduce building temperatures, energy costs, absorb excess water and increase urban biodiversity.

Nature-based solutions are an appealing concept, and with their rapid ascent onto the world stage, have shown that they can inspire policy makers, practitioners and businesses alike. They are cost-effective, and with supporting policies and incentives, can be delivered in an affordable way across different landscapes. In relation to climate change, NBS (particularly ecological restoration and reforestation) can provide a third of global emission reductions by 2030, as well as supporting sustainable development and protecting biodiversity.

1.2 Caveats and Controversies

Nature-based solutions are a powerful framework to bring together related approaches and practices in environment and climate change, conservation, forestry, sustainable agriculture and food systems. But they are not without questions and controversy. Many civil society, Indigenous and social movements advocate caution with both the terminology and the application of NBS. They urge us not to see all NBS as the same. For example, monoculture plantations, green walls or afforestation projects do not provide the same biodiversity, resilience, co-benefits, or sequestration levels that a natural forest, grassland, mangrove, or soil system would offer. In fact, these plantations may consume more water, and be considered invasive in some cases. Furthermore, we are cautioned against ecosystem restoration that may adopt monoculture or technological approaches. In other words, NBS must avoid false solutions.

When NBS involve quantifying (and putting a monetary value on) a specific ecosystem function or service, there are dangers of reductionism and the 'financialization of nature'. This is further complicated by other ambiguities such as the absence of rigorous and transparent accounting methods for measuring outcomes of NBS projects -- which also makes it difficult to assess their cost-effectiveness (Seddon et al, 2019). In addition, some argue that NBS give a 'free pass' to continue emissions at

unacceptable levels, while maintaining the status quo and de-prioritizing the preservation of natural ecosystems.

There are also important political considerations. Some point out the dangers of ill-conceived NBS projects that are not developed and implemented with the full prior and informed consent of Indigenous and local communities, or without social and human rights impact assessments. And, NBS used as offsets open up the crucial issue of governance over natural resources and political sovereignty: who decides whose territory can be fenced off for their own climate commitments, while local communities are not given access to their own land and resources?

These concerns, particularly from civil society, social movements and Indigenous Peoples', suggest that NBS projects need to develop a set of clear and strong guiding principles that include safeguards, collective rights, meaningful participation and governance based on systems thinking.

1.3 Convergence and Divergence: Visions of Transformation underpinning NBS

When looking at NBS, it is extremely important to dig deeper into foundational concepts and underlying change paradigms, as they reveal the fault lines and the deeply held mindsets about nature and agriculture. For example, some claim that the terminology of 'Nature-based solutions' can instrumentalize nature; whereas the concept of 'working with Nature', as used in agroecology and food sovereignty discourses, implies a deep humility, understanding, and respect for nature.

There are deeply held mindsets about the model of agriculture itself, and what path leads to a truly sustainable and equitable food system that can work with nature. The vision of transformation favoured by the agri-business industry involves a strong focus on large scale food production, reliance on open and competitive global markets, and the development of new technologies to improve sustainability, lower emissions, and mitigate environmental and other challenges in the food system. The idea is that if large businesses and farmers transform their practices, benefits will trickle down and the market will transform smaller scale farming to adopt similar approaches, leading to greater environmental sustainability, economic growth and food security.

A countering vision put forward by small scale farmers and food provisioners embraces a different model of agriculture -- one that works closely with nature and peoples' knowledge systems to build abundant, diverse and resilient local food systems that nurture communities, value food providers, and lead to economic growth and food security. This vision of transformation is embedded in a political ecology approach, with food sovereignty and farmers' control over land, seeds, waters and food systems as a paramount goal.

There also exists a third or middle ground, where communities have been managing natural resources sustainably for generations, through approaches that are 'nature based'. In these cases, there is effectively no need for a "transformation", but rather a supportive institutional environment, and responsible governance that protects local and Indigenous communities from threats posed by agribusiness expansion that forces people to either abandon or defend their territories and ecosystems.

Finally, adding to the complexity and diversity of the NBS discourse as a 'meeting point' for environmental conservation and peasants rights movements, are the vastly different origins, communities, and even terminologies of these respective movements. Nonetheless, while there may be divergences in models of agriculture, there is a great deal of convergence around *agroecosystems*

approaches as key ingredients for transforming the food system. There is growing consensus that all food systems practices, whether conventional or organic, large or small scale, industrial or subsistence, can strive to transition toward diversified agroecological systems (IPES-Food 2016). The most prominent NBS-related agroecosystems approaches are discussed below.

2. Agroecosystem Approaches and NBS

2.1 Agroecology: Science, Practice, Movement

As the International Forum for Agroecology (Nyeleni, 2015) states in its declaration, "We see agroecology as a key form of resistance to an economic system that puts profit before life". This political stance forms the basis of agroecology, as put forward by the international peasant movement in the last 20 years -- and clearly differentiates it from other approaches to sustainable agriculture and nature-based solutions, since "Agroecology is a way of life and the language of Nature that we learn as her children. It is not a mere set of technologies or production practices" (Nyeleni, 2015). This is particularly true for Indigenous Peoples whose cultures, knowledge systems, and foodways have been an inspiration and a significant driver for the agroecology movement.

As commonly stated, agroecology is a *science, practice and movement*. It is a transdisciplinary approach that 'works with nature'; where natural ecosystems fit into a more holistic, societal analysis.

Agroecology has an expressly stated methodology of co-creating and sharing knowledge through peer-to-peer interaction and learning. The co-benefits of agroecology address many of the SDGs and include climate resilience, biodiversity gain, ecosystem/water conservation, food security, livelihoods, health, poverty reduction, gender equity, and human rights.

Impelled by strong and consistent advocacy from civil society, the FAO and the CFS have both taken up a program of work in agroecology, and IFAD has also become interested. The CFS High Level Panel of Experts report (2019) offers a detailed analysis of the benefits of agroecology, but does not attempt to pin down a specific definition, opting to describe agroecology's three pillars (science, practice, movement) and 13 principles in detail. The FAO uses the following (narrower) definition: "Agroecology is the science of applying ecological concepts and principles to manage interactions between plants, animals, humans and the environment for food security and nutrition". FAO outlines 10 elements of agroecology to guide policymakers, practitioners and stakeholders in planning, managing and evaluating agroecological transitions: diversity, co-creation and sharing of knowledge, synergies, efficiency, recycling, resilience, human and social values, culture and food traditions, responsible governance, and circular and solidarity economy.

Notably, the HLPE report points out that there is a significant lack of funding for research into agroecology, resulting in important knowledge gaps about its viability, and questions related to yields, performance at various scales, and its co-benefits.

2.2 Regenerative Agriculture: A Restorative Practice

Regenerative agriculture shares many principles and practices with agroecology, and was first used as a term by the Rodale Institute in the early 1980s. As an ecological agricultural practice, it aims to improve soil health, primarily through practices that increase soil organic matter, including composting and recycling nutrients. This not only aids in increasing soil biota diversity and health, but increases

biodiversity both above and below the soil surface, while increasing both water-holding capacity, and sequestering carbon at greater depths. As with other forms of ecological agriculture, regenerative agriculture (RA) also has many co-benefits for the community and society. RA concepts and practices differ widely, as RA is being adopted by a diversity of actors -- from farmer organizations to large companies, to research institutes.

According to Regeneration International, RA practices include: no-till or minimum tillage; increasing biological soil fertility through cover crops, crop rotations, compost, and animal manure; practices that restore soil microbial community population, structure and functionality; restoring system performance through multiple cropping and intercropping, multispecies cover crops, the integration of trees and shrubs in and around farm fields and pastures (evergreen agriculture), and borders planted for pollinator habitat and other beneficial insects; and, well-managed grazing practices to stimulate improved plant growth, increased soil carbon deposits, and overall pasture and grazing land productivity, while greatly increasing soil fertility, insect and plant biodiversity, and soil carbon sequestration.

2.3 Other NBS Related Approaches

Conservation Agriculture is defined as "a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment" (FAO 2007). It is a practice largely involving zero tilling, therefore retaining soils intact in their microbial integrity, and avoiding the release of carbon by not breaking up the soil. It shares other elements with regenerative agriculture as well as with agroecology -- such as building soils through soil cover, and crop rotation -- but is less explicitly concerned with farmer agency over the food system.

Organic 3.0 represents "the ongoing evolution of the organic movement, bringing organic out of its current niche into the mainstream and positioning organic systems as part of the multiple solutions needed to solve the tremendous challenges faced by our planet and our species" (IFOAM). It shares many common practices with ecological and regenerative approaches, but diverges on scale and biodiversity. The organic movement has historically placed a strong emphasis on consumer engagement.

Climate Smart Agriculture (CSA) approaches are favoured by donor governments and industry, and coordinated through the Global Alliance for Climate Smart Agriculture (GACSA). According to FAO, CSA is an approach to guide actions to reorient agricultural systems to effectively support development and ensure food security in a changing climate. CSA aims to tackle three main objectives: "Sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible" (FAO). CSA is an approach for developing agricultural strategies to secure sustainable food security under climate change. CSA provides the means to help stakeholders from local to national and international levels identify agricultural strategies suitable to their local conditions". CSA shares many principles with regenerative agriculture, but with a pronounced focus on technology development and precision farming, for sustainably increasing productivity and responding to climate challenges.

3. Other NBS Debates

3.1 Land sparing or land sharing?

The current negotiations on the Post-2020 Global Biodiversity Framework are discussing a proposal by the High-Ambition Coalition (Costa Rica, France, Canada and others) of “30 by 30”, to protect 30 percent of land and sea by 2030. While favoured by many countries, and seen as achievable, the protected areas issue opens up a debate between land sparing and land sharing approaches. The *land sparing* proposition unites large agricultural producers and conservationists, as it involves intensifying production in smaller areas, thus sparing land for conservation and preserving precious ecosystems and habitat. However, some are also concerned that sparing land may be an entry point to 'sustainable intensification' of agriculture, which is likely to involve high input and monoculture production, and other technologies that are not considered nature friendly, or healthy for the people involved in this form of production (such as agricultural workers).

Land sharing, on the other hand, is premised on encouraging open and sustainable use of natural resources across wider areas and landscapes, allowing rights and access to Indigenous Peoples, forest dwellers and local communities to the territories they have traditionally relied on for their livelihoods. It can also allow for the continuation of nature-based and biodiversity-friendly food production approaches, including agroforestry and silvo-fishery, as well as *in-situ* conservation. It can also be a win-win-win for people, nature and climate, since, according to the Rights and Resources Initiative (2017), "Legally recognised and protected community forestlands tend to store more carbon and experience lower rates of deforestation than forests owned or managed under other regime types, including protected areas".

3.2 Nature and Markets: Can they work together?

Although there is consensus on the common goal of the Paris Agreement to reduce carbon emissions to address climate change, there are divergent opinions regarding the means to get there. Companies tend to favor a carbon market approach which creates clear economic incentives and revenues to reward good behavior, while many civil society, environmental and Indigenous People's groups support putting a price on *carbon*, they are not keen on putting a price tag on nature. They argue that 'our land is worth more than carbon' (CCFD, 2016): forests, grasslands, and other ecosystems provide multiple co-benefits, not only carbon, and their value is also linked to biodiversity and ecosystem services for livelihoods, culture and tradition.

With increasing pressure from consumers and the general public, many companies are also now committed to becoming carbon neutral by 2050, creating an enormous demand for reliable carbon offset projects, which are often offered through NBS at the country level. The volume of transactions has been increasing exponentially on the voluntary market in the last few years, while governments have not been able to agree on a clear set of international rules and standards under Article 6 of the Paris Agreement related to carbon markets. Without clear and transparent rules, the level of public scrutiny has increased, as countries may be counting their emission reduction twice in their NDCs -- both in the country buying the carbon credits, and in the country offering the offsets. Strong governance and accounting systems are essential to eliminate double counting, and ensure transparency, integrity and reliability of data in carbon markets.

4. Mapping the Actors: NBS, Climate and Agriculture

The following list of actors is an incomplete reflection of the actors engaged on these issues and can be fleshed out and expanded by participants over the course of the Salzburg Process.

- **UN and intergovernmental agencies** that set the frameworks, norms, and international targets for environment and food systems: UNEP, UNFCCC, CBD, FAO, ITPGRFA, IFAD, CFS, IPBES, IPCC, Bioversity-CIAT Alliance, CGIAR, Ramsar, CCD.
- **Large multilateral funds** dedicated to environmental and food action: GCF, GEF, Adaptation Fund, GAFSP, Crop Trust.
- **Governments:**
 - Bilateral donors: Germany, Switzerland, France, Sweden, Norway;
 - National government programs: Senegal, Mexico, Bhutan, Brazil, Costa Rica, Cuba;
 - Subnational governments: Milan, Porto Allegre, Sikkim, Andhra Pradesh, California, C20 initiative.
- **Private/philanthropic funders:** Agroecology Fund, 11th Hour, New Field, Christiansen, McKnight and many other GA members; Heinrich Boll, Darwin, Goldman, Equator, Midori, and other funds.
- **Multinational companies and agri-business:** Danone, Body Shop, General Mills, Unilever, Fairtrade and organic certifiers.
- **PPPs and Industry Associations;** industry led alliances: AGRA, GACSA, FOLU, WFO, WBCSD, Forest Stewardship Council, Marine Stewardship Council, Nature Conservancy.
- **Environmental/sustainability NGOs** that cover a whole spectrum of issues and activities, ranging from reformist visions of agriculture to more radical and transformative visions.
 - Conservation community: WWF, IUCN, Conservation International, Wetlands Intl, Satoyama.
 - Grassroots initiatives: Extinction rebellion, Mangrove Action Project.
 - Environmental movements/watchdogs: Climate Action Network, Greenpeace, FOEI, PAN, Rainforest Action Network, Global Forest Coalition, CBD Alliance, CLARA, Rights & Resources.
 - Youth networks for environment/climate: Fridays for Future, Jeunes Volontaires pour l'environnement, Global Youth Biodiversity Network.
- **Peasant Agroecology/Food Sovereignty movements** and small scale farmers networks: La Via Campesina, AFSA, IUF, ROPPA, AFA, IPC for Food Sovereignty, WFFP.
- **Sustainable Agriculture organizations:** Regeneration International, IFOAM-Organics Intl, Rodale Institute.
- **Indigenous Peoples' movements:** IEN, WAMIP, IIFB, IITC, ICCA Consortium, Forest Peoples Programme.
- **Consumer Food Movement:** Slow Food, Terra Madre, Fairtrade International, chefs networks.
- **International NGO and NGO networks:** ActionAid, CIDSE, FIAN, Brot fur die Welt, CCFD, Biovision, Oxfam.

- **Research/Policy Institutes:** WRI, IPES-Food, EAT, IIED, CAWR, WorldWatch, IATP, TWN, IISD, GRAIN, ACB, ETC Group.

Box: Who Protects Nature?

- Eighty percent of the world's biodiversity is located in the traditional lands inhabited by Indigenous Peoples.
- There are more than 370 million Indigenous Peoples in the world, living in at least 70 countries. Most of the world's Indigenous Peoples live in Asia. Indigenous Peoples form about 5,000 distinct groups and occupy about 20 percent of the earth's territory. Although they make up less than 6 percent of the global population, they speak more than 4,000 of the world's 7,000 languages.
- One of the root causes of the poverty and marginalization of Indigenous Peoples is loss of control over their traditional lands, territories and natural resources (Source: IPS News/IFAD)
- Almost a quarter of the carbon stored in the world's tropical and sub-tropical forests is in collectively-managed territories, although one-third of this is in areas where Indigenous Peoples and local communities lack formal recognition of their tenure rights (CLARA, 2018).

5. Recommendations for the Shared Action Framework

This section contains recommendations to strengthen policies and practices, reform existing mechanisms, enhance funding, and build on best practices to advance nature-based solutions. The aim is to shift public policies to support agroecological and regenerative agricultural practices and other NBS that sustain food, ecosystems and equity. This shift involves more than policy reforms, it involves a change of mindset -- moving away from economic growth as the main measure of progress, to constructing metrics that place the economy alongside ecology, health and equity. It means redefining what is meant by 'sustainability' (IPES-Food, 2016), developing new sustainability indicators, and integrating true cost accounting metrics (TEEB, 2018) into all policy and planning. It also means keeping in mind that to affect a systemic and just transition, we need to see emissions, rights and ecosystem integrity not as mutually exclusive choices or trade-offs, but rather, approach them in an integrated and holistic manner that respects and advances all these fronts.

Finally, this is a societal shift, powered by more than policy; it draws energy from the gathering momentum and best agroecological practices and NBS coming from practitioners, farmer-led research, and consumer awareness and action. Transformative change often starts small, but with coordinated action by many actors and across different sectors, adds up to a much larger movement.

Policy reform: Change and adapt public policies to support regenerative agroecological practices and sustainable food systems

5.1 Build inclusive governance and meaningful participation. An effective transition to nature based policies requires a concerted effort at meaningful participation from diverse sectors and levels of government. Decentralized policy development, participatory planning and strong local institutions and processes are essential to creating sustainable food systems. There is considerable opportunity to build

on innovation and good practice in inclusive governance, such as municipal, regional and national Food Policy Councils and roundtables. At the international level, the Committee for World Food Security is seen as a leading model of inclusive food governance. Small scale farmers and food provisioners, as the lead actors in our food systems, should be central to all policy processes, and in driving the transition to NBS and sustainable food systems.

5.2 Redirect policy and economic incentives and subsidies towards agroecology and regenerative agriculture. As IPES-Food (2016) has pointed out, agroecology is prevented from advancing because government policies and incentives continue to subsidize a high chemical input model of agriculture that harms agroecosystems and nature. Redirection of these subsidies to agroecology and regenerative agroecological practices should be a top priority. New incentives to support and reward farmers -- whether small or large -- to transition to more agroecological, diversified practices, and support alternative land use practices and ecosystems integrity, should be a cornerstone of NBS policies. Reduction of inputs and moving towards agroecological approaches will have far-reaching co-benefits: climate mitigation and adaptation, healthy soils, waters and ecosystems, and enhanced biodiversity in agricultural landscapes.

Equally important are the *socio-economic* benefits from this transition: reduced farm debt (and greater net farm revenues) due to lower input costs, and the subsequent rise of a new generation of farmers -- who have been constrained by unfriendly farm policies -- to take up farming, leading to inter-generational farm renewal, re-invigorating rural economies and stemming urban migration.

National policies that create the impetus, as well as provide a 'safety net', for all farmers to transition to ecological and biodiversity based approaches in agriculture are key. Policies to support and underwrite these risky transitions include payments for ecosystem services, more inclusive business risk management programs for ecological farmers, and income stabilisation for farmers moving in the 'right' direction. And, eliminating incentives that take farmers in the 'wrong' direction, such as subsidies that pay them only based on yield and for specific commodity crops.

5.3 Reform the systems of land tenure, land rights and governance to empower farmers and producers to be the stewards of healthy soils, ecosystems and biodiversity. In sub-Saharan Africa, more than 80% of people don't own the land they farm. Global warming and desertification are also intensifying local conflicts, due to reduced access to natural resources, food and water. As stated by CLARA (2018), "Securing collective tenure rights represents one of the most cost effective, sustainable and equitable strategies to protect and restore vital ecosystem functions, conserve biodiversity, and reduce rates of forest loss and degradation". Recognizing tenure rights is particularly important for Indigenous Peoples, whose territories are home to high biodiversity, and they possess valuable traditional knowledge that is critical to community based management of natural resources and ecosystems. The CFS guidelines on Land Tenure guidelines are a critical framework to advancing these rights; and the recently adopted UNDROP (2018) is also a significant international instrument that recognizes Peasants' Rights. Government policies should also uphold UNDRIP, and support community conservation approaches such as ICCAs and biocultural protocols -- which are, in effect, the original nature-based solutions.

It is also fundamental to recognize the rights of women -- who are custodians of the environment, and possess sophisticated and diverse knowledge of genetic resources -- but their rights and access to land

productive resources are often denied. Similarly, the rights and knowledge systems of pastoral livestock keepers and small scale fishers are essential to uphold, especially as they depend largely on the commons for their livelihoods and cultures.

5.4 Include agriculture and soils in NDCs. Given their carbon sequestration potential, healthy soils that capture carbon are an important climate solution and should be included in the Nationally Determined Contributions (NDCs), submitted by countries to fulfill the objectives of the Paris Agreement. The recent study developed by Biovision and FAO clearly demonstrates the potential of agroecology to hedge against climate change and build resilient and sustainable livelihoods and food systems. Up to now, only a relatively small proportion of NDCs have made an explicit mention of soils and agriculture, often because agricultural policies and climate policies are being siloed in the institutional framework of governments.

5.5 Reform public institutions and policies for coherence and coordination. Institutional reform is essential in order to break down the silos that exist between many government departments -- to ensure that the Ministers of Environment, Agriculture, Natural Resources, Health, Trade, Culture and Finance work hand-in-hand to achieve common objectives. If the Ministry of Environment looks at forest conservation and nature protection, while the Ministry of Agriculture focuses singularly on the development and export of cash crops on large areas of land, leading to deforestation, the objective of sustainable land management and food sovereignty will not be achieved. A good example is Costa Rica, where the Minister of Environment and the Minister of Agriculture worked together to reverse deforestation and support a new model of agriculture. In addition, we are seeing more joined-up national and regional level policy development processes, such as Canada's National Food Policy (which helps coordinate food policies across 16 Federal departments), and the Common Agricultural Policy that aims to coordinate food systems policies across Europe.

5.6 Change procurement and trade policies. Procurement policies, linked to international and regional trade policies, are also key, as they can play the same role as subsidies in terms of incentivizing one form of agriculture over others. This is particularly true for economies like the US, Canada and the EU, with large producers and significant incentives and subsidies for farmers to develop large scale industrial crops for export. Providing the trade policy incentives that enable short supply chains, and prioritize the procurement of ecologically produced foods, would have a huge impact on reducing carbon emissions, bolstering local economies, and encouraging consumer demand and connections to local markets -- all key pillars in a system-wide transition to nature-based solutions.

The development of “bio-regions” with a more local and circular model of food production, can also build markets and foodsheds at the local level, and reconnect citizens and consumers with their environment and the landscapes around them. This enables food and agricultural policies to adopt a more integrated landscape vision that combines the various types of land uses (forests, agricultural land and cities) in the most optimal ways.

Financial reform: Redirect financial flows and leverage public/private investments for agroecological and regenerative nature-based solutions

5.7 Reinvest in public research and development in agroecological, regenerative and NBS practices.

Recent agricultural research has been characterized by privatization and growing capture of the research agenda towards a handful of cash crops with high profitability for export, or with value chains that are controlled by the biggest corporations. This has diverted public research away from agroecological, biodiverse practices, and generated proprietary inputs, seeds and technologies that are too expensive for small scale farmers. Policies aiming to support NBS must rethink agricultural research, allocating far greater funding to public research and innovation in agroecological and regenerative approaches -- including farmer-led participatory research and plant breeding, *in-situ* conservation of genetic resources, agroecology education and curriculum development, and extensive investments in training. Research funding must also go to diversified crops and traditional knowledge, and support the farmer-to-farmer knowledge exchange and participatory methodologies essential to NBS in agriculture.

5.8 More strategic investments, supporting the interests of small scale farmers and those farmers in transition. The financial system favours innovation and risk, yet is quite risk averse and inflexible when it comes to making strategic investments where there could be large returns and co-benefits across the system -- economic, social and environmental. While risks to small scale farmers are overestimated, the risks to the environment are either underestimated, or externalized. Major financial markets put a very high level of pressure on multinational companies, including in the food industry, to achieve a high return on investment (10 to 15% return on equities). This translates into a very short-sighted approach to agriculture. Governments should provide public guarantees to de-risk long-term investments that move towards more sustainable forms of agriculture. Furthermore, many argue that a different 'ROI' lens, and different criteria, should apply when lending to small scale farmers -- who are the biggest investors in agriculture to begin with.

While government funding is very limited, especially in times of economic recession, public-private partnerships can enable a much greater impact by de-risking investments in regenerative agriculture, and can leverage small amounts of public spending or philanthropic donations with much larger amounts of private investments.

Companies are also being encouraged to use the Financial Stability Board's Taskforce on Climate Related Financial Disclosures recommendations to fully anticipate and integrate long-term financial risks and opportunities related to climate change. New methodologies and tools are being developed to include the risks and opportunities related to nature. The use of new science-based targets for nature will enable companies to move towards regenerative business models, thereby reducing risk and boosting investor confidence.

As there is growing interest and concern among shareholders about climate-related risk, another innovative approach is to look at better connecting ESG metrics and financial performance, to take into account positive and negative externalities and help investors to make better investment decisions for the long-term. This is something that Danone, for example, has been experimenting with the introduction of a 'carbon-adjusted' recurring EPS evolution that takes into account an estimated financial cost for the absolute GHG emissions on its entire value chain.

A path-breaking food systems evaluation framework (called TEEBAgriFood) hosted by UN Environment is helping to identify the wider benefits and costs associated with environmental, health, social and cultural dimensions of the agri-food value chain. This holistic approach allows a true cost accounting method to better inform policy-makers, farmers, businesses and consumers.

5.9 Implement carbon pricing measures with transparent metrics and strong safeguards. Models and mechanisms for financing climate programs are expanding rapidly, from soil and landscape carbon finance and ecosystem service payments, to investment tools with a range of metrics, indicators and disclosure requirements. These developments open up new horizons, as well as controversies and equity issues. In this context, it is extremely important to use strong social and environmental safeguards to ensure that carbon credits consider the multiple co-benefits that go with carbon sequestration in forests and soils, including for biodiversity and livelihoods; and with the full participation of local communities. With many large corporations committing to carbon neutrality by 2050, there is an increasing demand for reliable projects that provide carbon offsets. However, governments have not instituted clear and strong legislation and rules to ensure transparency and integrity, and avoid double-counting of carbon credits. Voluntary carbon markets have been growing in popularity and volume of transactions, but not necessarily in terms of broad public trust. In the absence of a global consensus on Article 6, related to carbon markets in the Paris Agreement, governments are being strongly encouraged to set standards to improve the level of integrity of national and regional carbon markets.

Carbon pricing should also cover carbon capture above and below-ground, in farmland trees, shrub, and grass vegetation and in soils, not only forests. Agriculture is a sector with enormous potential to offer carbon-based solutions in the longer term. Farmers need to receive economic incentives to protect and enhance healthy soils and perennial vegetation, for carbon capture and storage, but also for their efforts to enhance biodiversity and transition to better water management. Costa Rica, Columbia and Ecuador are developing tropical carbon tax facilities that reward forest protection and restoration, and soil carbon soil accumulation. This economic tool is also being used to provide economic incentives to farmers to plant more trees on their land, and to redistribute wealth from the richest to the poorest communities.

5.10 Review the portfolios, investments and modalities of funding of international funding institutions. The international and regional development banks, global funds (*eg*, GCF, GEF) and other large financial institutions invest enormous amounts of money that mostly do not reach small scale farmers and agroecological food provisioners, nor are they designed to operate at that scale. The largest investments are thus supporting unsustainable models of agriculture. A widespread reform and shift in investment practices is critical. Large financial institutions can learn from the GAFSP (World Bank) model which has developed distinct public sector and private sector windows, catering to the interests of smallholder farmers, and created a more inclusive governance and accountability model to guide investments. Initial screens are being developed to assist these large institutions in reviewing their portfolios against principles of agroecological and regenerative food production, as well as facilitate access to funding for local communities in Global South countries who face many barriers, including the technicality and complexity of current funding proposal models, and the inability of small scale farmers organizations to effectively absorb very large amounts of funding.

5.11 Empower consumers to invest in healthy food for a healthy planet. Governments, companies, farmers and consumers need to work together to support the development of healthier and nature-friendly diets. Policies can support a shift in consumer awareness and behaviour through joint pricing mechanisms for a healthy, nutritious, diversified and plant-centred diet, along the whole supply chain from farm to fork. Labelling products for their carbon footprint, nutritional content, and the contribution to nature restoration and diversification, also helps direct consumer choices toward more sustainable alternatives, as well as driving more investment and market development from this heightened demand.

As people diversify their diets to include more vegetables and fruits, nuts and other types of highly nutritious foods, their product choices can support the development of agroforestry, the culture of more perennial crops, greater diversification in food production, etc. Empowered consumers also influence ecological farming methods, encourage less packaging and greater animal welfare. As a result, the opportunity for more quality assurance, traceability and transparency is strengthened.

Practice reform: Support and facilitate agroecological and regenerative practices and nature-based solutions at the community level and beyond

This paper has identified a number of approaches and practices that enhance ecosystem resilience, improve livelihoods, and build sustainable food systems. These practices must be supported and facilitated across the food system:

- Diversified agriculture and enterprise systems based on agroecology, regenerative agriculture, and other restorative practices
- Bioregional, territorial, and circular food systems that reconnect citizens and consumers with the landscapes where they live
- Integrated landscape approaches that combine natural, agroforestry, agricultural and built environments
- Protecting, promoting, and supporting family farmers and Indigenous communities producing food using agroecological and diversified approaches and principles
- Co-creation of knowledge, knowledge exchange and dissemination, and participatory research

6. Communicating to a wider audience about the root causes of the planetary crisis

It is clear that this is a critical moment to engage the wider public. The time for our biggest ideas is now, when the metaphor of a 'global reboot' after the system has crashed, is more likely to stick. And, COVID19 has rearranged the communications landscape, opening up spaces for thinking that even a year ago was impossible. Right now, the wider public's ear is attuned to hearing about root causes, not just symptoms, and not going back to 'business as usual'. They want to hear about how we can *rewire* the system to avoid future crashes -- because it is clear where the system's weaknesses lie. Today, it is easier to imagine and communicate about a concerted, collaborative effort to tackle several interrelated crises (global food insecurity, climate change, biodiversity loss and ecosystem destruction), by simultaneously addressing their underlying and interconnected causes.

Addressing these causes, first and foremost, means recharting a course away from fossil fuels and petroleum-intensive policies. A lot of people are now making the connection between climate change, reduced fossil fuel consumption and increased adoption of renewable energy (e.g. solar panels). But the public has not yet become aware of the role food and agriculture in exacerbating or in alleviating climate warming. It is absolutely essential to communicate about this topic in a clear and simple way, and to make simple solutions easy to understand for a non-expert audience. Civil society organizations, think tanks, educators, academic researchers, school teachers and journalists all have a key role to play, as the interface between experts and the non-expert audiences. Widely-known opinion leaders and celebrities can also have a big impact on popular perceptions, as they are role models for large parts of society (e.g., famous athletes changing their diets and their influence on youth, etc.). Food is also deeply cultural, hence communications needs to be adapted to local and regional contexts, also with each family having its own food culture.

Political communication strategies

- Work with “intermediaries” (including journalists, NGOs, think tanks, teachers, educators) to translate and disseminate expert knowledge to a wider non-expert audience.
- Develop a strong and compelling narrative and storyline around the framing of Awareness, Hope and Action, to alert people about the current state of planetary emergency (with the on-going health crisis being a wake-up call to humanity).
- Provide hope and optimism for action around the solutions, through evidence, demonstration, case studies and compelling examples of successful practices as steps to a societal shift, and activate transformative change to support life on earth.

We have identified a few topline messages that can be amplified through a broader public communications campaign:

Message 1 - AWARENESS: Our planetary crisis is an 'Aha!' moment. The alarming health, ecology and economy crises are interconnected, and solvable if we get to the root causes. And, our relationship with nature is at the heart of the problem. Scientists have been predicting pandemics for years, partly because of deforestation, biodiversity loss, global warming and human industrial expansion. Food systems are under pressure, wild animals are being pushed out of their natural habitats and are getting closer to domestic animals and humans, enabling transmission of zoonotic diseases to humans. Global warming is also unleashing new viruses and facilitating their quick spread to new geographies. Unsustainable models of production and consumption are putting the delicate balance between people and nature at risk. With half of our global GDP depending on nature, and global warming getting closer to a 2°C temperature increase since the industrial revolution, our society is reaching critical tipping points. Time is running out and we need to move fast.

Message 2 - HOPE: Solutions exist, they are in front of us, and many of them involve working with nature, not against her. They are systemic and holistic approaches like agroecology, and practices like regenerative agriculture, that nourish healthy soils, biodiversity and rebuild ecosystem resilience. These are time-tested approaches that, instead of being undermined by the current system, need immediate and full support through political leadership, policy incentives, funding, and research. Now it is the time to reverse the course if we act quickly, with determination and in a spirit of increased collaboration and solidarity across all nations and all sectors of society. We can only succeed in this transition if

governments, businesses, farmers, fishers, UN institutions, civil society, Indigenous peoples and researchers work together to protect our global commons and public goods.

Message 3 - ACTION: As the world recovers from a major health crisis and economic recession, this is the time for a global reset and to continue laying the ground for a deep transformation of our societies. This starts with re-organizing societal structures to put nature back at the centre, and to build from the principles of respect, resilience, and equity around nature-based solutions. By investing in NBS, we can achieve system-wide benefits. Agroecology and regenerative agriculture have the potential to deliver win-win-win opportunities for climate, people and nature. Nature-based solutions are the most effective way to address the climate, biodiversity and human crisis. This transformation is already happening in many parts of the world, but we need to accelerate it. We need stronger commitment and action from every part of society -- governments, farmers, consumers, civil society and business. Many companies are also seeing that bottom lines must change, and are transitioning to agroecosystems-based approaches, because it brings value, sustainability and resilience to their supply chains.

7. Conclusion

A planetary shift towards diverse, locally driven, and inclusive ways of work is possible, and is the driving force behind our policy recommendations. Now is the moment to harness our awareness, build hope, and drive action for climate, people and nature through a more systemic approach. nature-based solutions, embedded and integrated approaches, building on the principles of systems thinking, rights, equity, diversity, and resilience, can respond to this challenge.

Hot Topic Discussion Paper 2

LIVESTOCK PRODUCTION

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Introduction

Intensive, large scale production of livestock is fast becoming the dominant form of animal husbandry. Often referred to as industrialized livestock systems, these massive animal rearing and processing operations are praised for efficient production of large quantities of animal protein for human consumption, as well as animal feed and other products. Such reviews, however, fail to account for multiple negative and devastating external costs as described later in this paper. Achieving resilient and healthy food systems consistent with the Sustainable Development Goals (SDGs) will require dismantling industrial livestock systems as they currently exist.

At the onset, it is important to note the rapidly changing landscape in which this paper is drafted. Coronavirus is the latest in a train of Emerging Infectious Diseases (EIDs) disrupting traditional supply chains, and coinciding with the wide scale disruptive impacts of other animal disease burdens such as African Swine Flu. The pandemic has triggered new interest in the relationship between EIDs and animal agriculture, with some [popular press](#) outlets going so far as to suggest a link between industrialized livestock systems and the origin of the coronavirus. While there is no evidence to support such claims, across time, scientists have well documented significant association between disease and animal agriculture. A 2019 review of the scientific literature concluded that since 1940, agricultural drivers were associated with more than 25% of infectious diseases ([Rohr, et al, 2019](#)). The magnitude of this disruption in the livestock sector along with heightened interest in how animals are raised, may together create new opportunities to reexamine and restructure animal production systems for greater sustainability.

Along with the pandemic, other recent contextual events include Amazon rainforest fires at unprecedented scales that are linked to cattle production and expansion of soy production areas in Brazil ([Guardian, 2019](#)). Earlier projections of widespread trade deregulation opening commodity crop flows have been eclipsed by a prolonged trade war between the US and China, implicating profound shifts in feedstock markets and production bases for corn and soy. Meanwhile, a boom has transpired in faux meat innovation and growing consumer demand signals a potential for these alternative products to disrupt meat markets in the developed world. The most significant context of all is climate change: the 2019 [IPCC Special Report](#) on climate attributes 9-14% of total GHG to crop and livestock production, with methane from ruminants of particular concern.

As we commence, there are a myriad of issues that require untangling and examination during the Salzburg Process. While our focus is industrialized livestock systems, it is important to acknowledge the widely differing livestock and livestock keeper populations, as well as production methods across the globe and within single countries. In many areas, for example, traditional pastoralist and smallholder or subsistence farming systems continue to dominate. Frequently, different scales of production operate in parallel, though oftentimes in tension with one another, and nearly always with competing and complex

social, economic, and environmental functions. Across the globe, strong cultural and historic associations with animal species persist in different contexts necessitating consideration during solution development. Furthermore, not all animal sourced foods are equal in terms of nutritional value and are consumed in vastly different quantities based on several factors (eg. geography, gender, status, religion). Some populations experience dietary diseases linked to over-consumption while others experience stunting and wasting due to underconsumption.

As one of the fastest growing sub-sectors in agriculture, animal agriculture presents a significant opportunity to foster economic growth, reduce poverty, and improve global food security. Understanding and evaluating the range of production systems that can accomplish this growth is critically important to influencing economic welfare, human and animal health, and environmental sustainability. A common vision of how animals fit within resilient and healthy food systems is needed, including an understanding of which species, systems, and production practices are best in specific contexts.

Livestock Sector Overview

Animal sourced foods supply the world population an estimated 40% of its protein and 18% of calorie intake ([FAOSTAT, 2020](#)). Current projections are that protein consumption will sharply increase over the coming decades, as dietary transitions unfold, and rising incomes translate into rising demand for animal products ([Tilman & Clark, 2014](#)). In 2018, there were estimated global populations of 1.49 billion cattle, 1.21 billion sheep, 1.05 billion goats, 0.98 billion pigs, and 23.70 billion chickens spread across the globe in various production systems ([FAOSTAT, 2018](#)) As demand for animal products grows, so too will animal populations and demand for land to raise animals and crops for livestock feed.⁴

The Basics. In much of the world, beef and veal production follows one of two broad scenarios: conventional feedlot or grass-fed, pastured supply chains. In either supply chain, animals are typically birthed and grow on pasture until weaning and then are either sent to a feedlot for finishing on grain in the conventional system or finished on pasture/hay in the grass-fed system. Goat and sheep production varies globally with higher concentrations in pastures and grasslands in areas endowed with higher rainfall (New Zealand, Wales, etc.), and greater dispersal over wider areas in arid and semi-arid zones (Australia, Greater Horn of Africa, Southern Cone in South America). Unlike beef operations, these animals in industrial systems are rarely separated after weaning for onward transport to feedlots. Rather they continue grazing and browsing on pasture or range, perhaps with partial provisioning of feed supplements, at the site of breeding. In contrast to ruminant production, monogastric livestock systems typically take place entirely in large, self-contained structures. These massive and sometimes multi-level structures house pigs or poultry animals typically separated into densely arrayed narrow pens⁵. In large-scale operations, animals do not go outdoors and are raised under artificial light with mechanical feeding and watering systems. At the other end of the spectrum, small-scale animal keeping is commonplace in many poorer communities around the world, where chickens scavenge and pigs serve as household food waste processors. These animals tend to be consumed locally and/or provide a rare

⁴ Other sources for interesting, relevant livestock data include [FAO 2019 Statistical Yearbook](#) and [2014 Meat Atlas](#).

⁵ Some poultry operations have moved from so-called 'battery cage' production to 'free-range' operations where animals are permitted to move around the house and may be provided optional outdoor access.

source of animal protein. Proximity to urban markets, transport infrastructure, and processing capacity is a defining characteristic of all these systems.⁶

Industrialized Livestock Systems. Industrialized livestock systems create many problems which have been well documented in scientific literature and are nicely summarized in easy-to-read online FoodPrint publications.⁷ This brief discussion merely touches upon a few aspects.

In many parts of the world, particularly in North America, the consolidation of livestock production into specialized and concentrated rearing and finishing operations has been accompanied and enabled by growth stimulants such as antibiotics and hormones, increased mechanization, use of synthetic chemicals, disinfectants, and changes in land use and infrastructure. These changes have enabled the dramatic shift from mixed crop-livestock farming into segregated animal production and commodity crop operations, which often produce animal feedstuffs, grown in monocultures in agro-climate zones of the continent known as ‘belts’ such as the ‘Corn Belt.’ The decoupling of livestock and crop production has resulted in concentrated manure quantities that exceed land capacity and can be difficult to handle and store safely. Improper storage, handling, and disposal of manure and other animal wastes have negative impacts on human and animal health and water quality. These materials often attract parasites and breed other pathogens, often water-borne, that can transfer to humans and other animals in addition to acting as significant sources of chemical toxins. In addition to environmental health concerns, intensive operations raise many welfare concerns, including repeated impregnations, shortened birthing intervals, poor housing systems, increased disease-pressure and poor end-of-production life handling ([Clay et al.,2020](#)).

Concentrated corporate ownership in meat packing combined with the rise of contract agriculture places market power in the hands of only a few people and companies who then exert disproportionate control. The pandemic has shone a light on the impact of this consolidation in relation to resilience (or lack thereof) in the meat supply chain. The increasing closures of large meat processing/packing facilities in the US has created panic in the meat industry, leaving producers no place to slaughter and process animals. The pandemic has also highlighted the impact of industrialized livestock systems on worker health, with major meat packing plants shutting down due to widespread COVID19 infection caused by elbow to elbow working conditions. This comes on the heels of novel strong avian influenza viruses emerging on confined poultry farms in North Carolina for the first time--these intensive practices of confinement, poor hygiene, drugs and chemicals exacerbate bacterial and viral resistance and virulence ([NYTimes,4/10/20](#)). As people are urged to maintain social distancing during the pandemic, it is reasonable to wonder whether the same principle should apply to animals raised in exceedingly crowded industrialized conditions. The list of woes goes on and on.

Alternative Production Systems. Despite the prevalence of industrial production, regenerative and agroecological livestock production systems do exist which provide ecosystem services and there are many examples of successful alternatives to industrialized systems. For example, and to this point, advocates of ecologically-oriented beef production systems stress: “it’s not the cow, but the how!” In a

⁶ Although focused on US production, these four USDA APHIS manuals provide excellent descriptions of typical animal production systems in many developed countries and are particularly interesting because of the focus on prevention of disease transmission: [poultry](#), [swine](#), [cow/calf](#), [beef feedlot](#).

⁷ GRACE Communications Foundation has published four online FootPrint reports on: [dairy](#), [eggs](#), [beef](#), and [chicken](#).

2017 [statement on Sustainable Animal Agriculture Systems](#), the Global Alliance for the Future of Food distilled a consultation among experts, advocates and funders working in the domain of livestock systems into a core set of high-level messages which continue to resonate, including:

- There are viable pathways forward towards more sustainable animal agriculture systems. These alternatives have the potential to restore natural resources, climate resilience, and human health.
- Sustainable animal agriculture, particularly when integrated into diversified, ecologically sound farming systems, can contribute to resolving pressing global issues; the evidence for this can be leveraged to raise awareness and act as a call-to-action.

Landmark Reports & Key organizations. Here we present [Mind Map #1](#). To help orient Salzburg participants, we constructed this map to illustrate a range of actors and instances of their multi-stakeholder collaborations on specific sub-themes within animal agriculture. Six widely read and influential reports that raise critical issues and provide historical context are summarized as well.

Convergences, Divergences And Unknowns

Across the interviews conducted and available research literature on the transformation underway in livestock systems, there are numerous areas where divergences occur. Disagreements about priorities, scales at which to focus, and factors that are contextually dependent abound. The complexity of these interactions with the multiple positive, negative, and mixed impacts that livestock systems can exhibit has been extensively analyzed by tracing these livestock system interactions with the SDGs ([Mehrabi et al., 2020](#)). There are a few areas where some agreement and convergence can be described, although these also give way to uncertainties. In particular, questions arise about issue overlaps, the robustness of the underlying science, or which process, institutional vehicle, or policy instrument might best apply to any particular solution (see this table on [Interventions in the Livestock Sector for Sustainable Development](#)). In the following collection of issue areas, some of these tensions are illuminated in brief, and linked to high-level recommendations grouped under four levers of change in the next section (also see this mapping of [relationships between issues and levers](#)).

GHG emissions

According to a 2013 FAO report, the total GHG emissions associated with livestock supply chains add up to 7.1 Gigatons, accounting for 14.5% of the total anthropogenic emissions ([FAO, 2013](#)); fairly consistent with the 2019 IPCC report. Beef and dairy cattle combined contribute 62% of the livestock sector emissions while hogs, chickens, other small ruminants, and poultry contribute the remaining 38% ([FAO, 2013](#)). These emissions are geographically distributed due to the extensive reach of global livestock product trade, which introduces multiple additional steps, each with varying infrastructure, to the livestock supply chain. Approaching this value chain using a cradle to gate or life-cycle approach may provide insight into the relative contributions of livestock production (animal growth + slaughter), as well as trade (storage + transportation) portions of the wider supply chain through which emissions are distributed. This segmentation may help resolve unknowns and identify the most effective interventions for emissions reductions. Emissions intensity of enteric methane is a measure of emissions per unit of product (amount of meat or milk produced per livestock unit) and intensive livestock production

systems score high in this regard as they produce faster weight gain during shorter lifespans in cattle ([Capper, 2012](#)). Other research explores the potential reductions with changes in feed practices ([Buckwell et al., 2018](#)).

Alternative Grazing Systems

Placing a sole focus on emissions intensity misses other negative externalities generated in confined feedlots such as animal welfare, the relatively high impacts to water and/or air quality, embedded energy use, soil health, and biodiversity loss from direct and indirect land use. More holistic assessments are necessary to fully understand the potential positive contributions of alternative systems of production. Recent research has explored claims around the restorative potential for grazing ruminant animals under regenerative techniques and tested the potential for sequestration of carbon in soils in a number of contexts and found little positive contribution ([Garnett et al., 2017](#)). A more holistic assessment of livestock conducted in 2016, compared the soil-building and loss mechanisms and soil carbon accumulation across three different grazing and feed supply systems. The study compared 'fixed management' scenarios under a cropping system for feed with a parallel continuous grazing system for livestock, and a third rotational grazing with Adaptive Multi-Paddock (AMP) grazing which provided sufficient intervals for vegetative cover to be restored ([Teague et al., 2016](#)). This study concluded that better managed ruminant grazing can play an important role as part of a suite of policies and protocols, framing the challenge of long-term sustainability and resilience of agroecosystems as one that encompasses erosion, soil ecological function, and net emissions under regeneratively managed agroecosystems.

Land Conversion

At the regional and sub-national level, an extensive form of livestock grazing in the Amazon Region is linked to substantial forest loss and biodiversity declines, made more apparent with evidence linking three times greater frequency of fires in Amazon areas where beef farming is concentrated ([Guardian, 12/10/2019](#)). The land degradation cycle results from crop production on fragile soils and poor cultivation practices. Cattle are subsequently introduced on degraded lands as crop productivity declines. As this cycle continues, new croplands are established through fire to clear brush which leads to further encroachment on forested areas. While national legislation, such as the Brazilian Forest Code, has had some success in safeguarding intact rainforest areas, enforcement has been erratic and neglected ([Yale School of Forestry, Global Forest Atlas](#)). Zero-deforestation cattle agreements, signed by major meatpacking companies in the Brazilian Amazon state of Para, using property-level data on beef supply chains have been analyzed, with some measurable decline in forest loss recorded among properties supplying beef ([Gibbs et al., 2015](#)). The agreements however are narrowly scoped and suffer from implementation challenges, and a more recent breakdown in the traceability of other livestock sources coming to the slaughterhouses threatens to override these targeted efforts.

Land Boundary for Sustainable Consumption

Taking a wider perspective on land resources, nearly 40% of the world's terrestrial surface is too steep, too dry, or has temperatures outside the range for arable crops ([FAO, 2011](#)). In these fragile and difficult environments only animals adapted to these highly variable conditions can convert available plant material indigestible to humans into milk or meat protein. These lands have been grazed and managed for millennia by groups of pastoralists, who traditionally monitored the vegetative cover and water

supplies to determine the timing and the movement of the animals to new sources of forage. An alternative vision for the distribution of lands committed to produce feed for animals starts with this focus on non-arable lands, lowering competition for arable lands to be instead dedicated to producing food for people. Additional animal feeding strategies are focused on 'low cost' sources exclusively – utilizing non-arable land sources and food and crop waste that is not suitable for human consumption or biofuels production ([Van Zanten et al., 2018](#)). Projected minimal and maximum global average values for low-cost sources are contrasted to reveal regional differences of current consumption levels and the nutritional contribution of animal source food from low-cost livestock and current production to daily recommended nutrient intake (Ibid). (see this [related chart](#)).

Human and Ecological Health Impacts

A broader evaluation of the food-health nexus has revealed five interacting channels of impacts in food systems, and each of these also apply to the livestock domain ([JPES 2017b](#)). One of these five channels takes focus on the impacts of occupational hazards, such as exposure to dust and hazardous fumes in feedlots, injuries involving animal handling, and production line injuries in slaughterhouses and meat packing plants, as well as livelihood stresses from low pay and minimal benefits. These vulnerabilities have been recently made more apparent from the closure of packing plants due to lack of protective gear among workers in close proximity at risk of Covid-19 infections ([Guardian, 4/13/2020](#)).

Environmental contamination is perhaps one of the most apparent channels stemming from both livestock operations and corn monoculture production for feed, with high nitrogen levels in water bodies measured downstream of draining fields that have had heavy animal manure and chemical fertilizer applications. The hypoxia phenomenon generated by the cumulative loading of these animal manures in addition to over-applied nitrogen fertilizers into the Mississippi River basin has reached an unprecedented scale of a 'dead zone' in the Gulf of Mexico.

There has been increasing evidence that CAFOs are responsible for drastic health effects not just for the residences around these operations, but for the employees inside these facilities as well. There have been reports of cases of dust leading to higher rates of bronchitis and asthma after these CAFOs moved to their neighborhoods. Higher levels of ammonia and hydrogen sulfide gas are also measured in the vicinity of CAFOs, but pro-business public authorities have either refused to take action against them or have provided policy measures to help CAFOs cover their emissions to avoid such litigation. Manure lagoons incorporating vast quantities of fecal matter on or near site have been frequently implicated in water pollution through spills during storm events and leaching into groundwater resources. Calls for increased oversight of industrial-scale animal farms are mounting, with efforts to apply regulations common to other point-source water polluting industries to align with restrictions on CAFOs.

Animal Welfare

The consequences of animal confinement particularly at high concentrations, can be quite negative for animal health and welfare, with suffering from acute disease burdens and abuse well documented in multiple reports of poor conditions in CAFOs ([HSUS, n.d.](#); [Clay et al., 2020](#); [Neo et Emil, 2017](#)). Growing consumer awareness and concern about animal welfare has risen in tandem with information campaigns, resulting in regulatory standards but which are unevenly implemented and enforced. Facilities deemed 'free-range,' the term describing the practice of permitting animal behaviors such as ground scratching for chickens and rooting for pigs, aim to promote better animal health and welfare

and in multiple labeling schemes can attract a premium for these modifications, though this has led to segmentation in the market rather than more pervasive system-wide reforms.

Genetic Diversity and Concentration in Animal Breeding

High production breeds for poultry (both broilers and layers), and pigs are increasingly controlled by fewer vertically and horizontally integrated firms, with three companies supplying 95% of commercial breeding stock for broilers, and two companies controlling an estimated 90% of layer poultry genetics, and three leading pig breeders supplying almost all of global pig stock ([IPES 2017a](#)).

Industrial breeding systems place a premium on conversion efficiencies. Other qualities, such as disease resistance and adaptivity to local climatic conditions, as well as multi-functional attributes sought in traditional breeding, are secondary concerns. Suitability for animal traction and transport, versatility for combined meat and milk production qualities, relevance for local cultural and spiritual practices, and the taste and appeal of traditional animal breeds ([Hoffman et al., 2011](#)) are also less appreciated. Genetic erosion is translated into developing countries populations, as native breeds are eliminated under restrictive conditions established by overseas development assistance programs that promote production intensification and increasingly as highly consolidated private sector initiatives extend their control over transnational value chains that seek to protect intellectual property in breeding lines and provide uniformity in animal products ([IPES 2017a](#)). Disease vulnerability due to narrow and uniform breed varieties is but one dimension of the widening risk burdens saddling producers with difficult management choices ([Gura, 2009](#)) and leaving them with few alternatives. The overall result is a narrowing of genetic diversity in industrial breeding lines, already very low for chicken (both broilers and layers), dairy and pork breeds. The uniformity of high-performance breeds in confinement systems eliminates immunological firebreaks, increasing the virulence of diseases that spread more easily through such homogeneous conditions ([Wallace, 2016](#)).

Biosecurity

Although the definitive origin of the current pandemic has yet to be determined, COVID19 has elevated concern over zoonotic disease transmission and has put a spotlight on industrialized livestock systems. A 2019 literature review found that since 1940, agricultural drivers were associated with more than 25% of all - and greater than 50% of infectious diseases caused by germs that spread between animals and people ([Rohr, et al, 2019](#)). These percentages are anticipated to increase along with human population growth and the further expansion and intensification of agriculture. Earlier regional epidemics (or global pandemics) have included H5N1 highly pathogenic avian influenza, H1N1 pandemic influenza, Ebola, severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS).

Zoonotic disease transmission can be disproportionately impactful in developing regions, where the link between humans, animals and the surrounding environment is particularly close. When compounded with poverty, inadequate sanitary standards and lack of resilience, much of the development that a country has achieved can be fundamentally reversed ([Di Marco et al.,2020](#)). Bushmeat consumption, and livelihood generated from hunting wild animals is a common cultural practice, and increasingly has provided smaller livestock producers displaced from conventional production opportunities in hunting or raising exotic animals for niche markets. This dynamic has been implicated in multiple cases of

zoonotic disease outbreaks, traced to wet markets where domesticated livestock and wildlife are packed closely together in urban sites.

Trade-offs have also arisen between biosecurity controls that seek to isolate animals from outside exposure to disease and the conditions under confinement requiring disease control measures taken with the administration of high and sustained levels of antibiotics in feeds. These in turn generate their own health hazards, with high volumes of sub-therapeutic use of antibiotics contributing to significant levels of antimicrobial resistance and dramatic shrinking of the remaining arsenal of effective antibiotic controls for human diseases ([Wallace, 2016](#)).

Faux Meat

[Impossible Foods](#) won the 2019 UN Global Climate Action award, suggesting global leaders believe faux meat may be the preferred meat of the future. There is a growing range of faux meat products (as well as faux dairy and eggs). In the burger category alone we see a spectrum ranging from traditional plant-based burgers to those engineered to mimic the taste of meat to cellular options not yet commercially viable. These products exist in highly developed economies and may not reach many parts of the globe for years. While trendy, faux meat has not significantly impacted overall meat consumption (e.g., total per capita meat consumption in the U.S. is expected to rise to 225.6 lbs. in 2020, up from 224.3 lbs. in 2019) ([USDA, NASS](#)). Many sustainability advocates presume faux meat to be superior to traditional meat production. Certainly, there are advantages to faux meat (e.g., less E. coli, antibiotics, hormones, animal welfare concerns) but there are also disadvantages (e.g., job loss, sodium rich highly processed food, pesticides) (See here for further [TCA discussion of faux meat](#)).

Contract Agriculture

As demand for animal protein increases, and operations scale up, larger players exert dominance, causing medium scale producers little choice but to convert to contract agriculture, requiring them to give up autonomy, work on tight margins, and solely bear many costs such for things like physical structures, waste and regulatory compliance ([Tourrand et al., 2015](#); [IPES 2017a](#)). Risks for producers operating under contract growing relationships are often disproportionately skewed in favor of suppliers, with price fluctuations and short-term contracts not matching the longer duration of loans most producers acquire, leading to pronounced debt burdens and high losses ([Gura, 2009](#)). Massive animal culls precipitated by disease outbreaks often do not compensate these contracted producers for their losses, and in some cases, create perverse incentives to conceal animals from inspection, thus contributing to further expansion of disease reservoirs and transmission.

Employment for Women and Youth

Livestock is crucial to nearly two thirds of rural households in developing countries, contributing to the livelihood of 1.7 billion poor people (FAO) and 40% of the planet's agricultural GDP ([FAO, 2006](#)). Most of those employed in the sector are women, with livestock products providing cash, in-kind income, and what is known as 'cash on the hoof' – bankable assets for future needs. Rural women and youth can raise small ruminants, poultry and dairy animals with limited investments and land. Strengthening livestock value chains in consideration of these smaller producers could become an important facet of balancing urban and rural development, while addressing regional migration and household food and nutrition security ([Herrero et al., 2012](#)).

Values

Livestock provide multiple goods and services beyond meat and milk and eggs, hides, wool or feathers. In many developing country contexts, animals are equally valued for the provision of transport of goods and people, as well as animal traction and manure as integral functions to crop production. Comparisons on productivity that focus solely on the quantity and quality of milk, meat or eggs and exclude products and services relevant to smallholders have resulted in divergent and biased evaluations in favor of industrial livestock systems. Apart from these utilitarian concerns, there are also deep questions over the treatment of animals and their commodification, and the normalizing of industrial livestock systems and the interconnections between culture, values, and development – together with the politics of production and consumption of meat ([Neo & Emel, 2017](#)).

Subsidies

Domestic subsidies and export promotion policies result in pronounced shifts from domestic to international flows of feedstocks, while introducing a typical technical package abroad: a narrowing selection of improved seed varieties, particular specialization in animal breeds and growing concentration and vertical integration of enterprises, while increasing scales of production. These trends were perhaps only partially foreseen in earlier analyses, but at the longer term, system-wide (and down to community and household) levels could be contributing to cascading effects, including pronounced inequality between developing and developed country abilities to develop adaptive capacities and reduce vulnerabilities to shocks – lowering overall resilience in the global system.

High Level Recommendations

Redesigning how we produce livestock will require a mix of actions, some focused on dismantling industrialized systems and others that boost and strengthen sustainable production systems.

Policy Reform

The need for policy change in relation to production systems and consumption patterns requires multiple strategies and targeting of policy entry points, with advocacy opportunities at local, regional, national and international levels. “Policy” covers wide application, from industry practices, government policy at all levels, and regulatory frameworks that are effective both in terms of outcomes and administrative burdens. What vision of the ‘policy cascade’ can help define these entry points and strategies, and how will entrenched interests be persuaded to join in the transformation?

1. **Dietary directives** that transmit messages around healthy and nutritious diets and their connection to animal protein can be expanded. Dietary recommendations are a regular feature in national policy strategies for nutrition and health initiatives, though they can be battlegrounds ([Merrigan et al., 2014](#)) for particular interests promoting their sector’s products or prioritization in the food plate ([US](#), [UK](#)) food pagoda ([China](#)) or spinning top ([Japan](#)) hierarchies ([Wang et al., 2016](#)). As EAT-Lancet and other initiatives have argued, in particularly high saturated fat consuming societies, a reduction of animal-source protein should be targeted, while promoting beans, pulses and other sources.

2. **Subsidy reforms** can address underlying industry support for industrial systems. Export promotion and tariff protections are a common feature in national policies, though some reforms have been

attempted to address these trade-distorting measures. Production subsidies and crop insurance typically favor major grains, with far less support for horticultural and other ‘minor’ crops that have significant nutritional value. Subsidies and trade conflicts are revealing policy incoherence between development assistance to developing country agricultural sectors, as aided countries are undermined by the dumping of commodities which destabilizes their national food and nutrition security and local agricultural sector potential for self-reliance.

3. Tracking externalities in industrial production systems through true cost accounting (TCA) methodologies and circular economy concepts are emerging as important processes to identify hidden costs in the food system. Experiments are formalizing the opportunities to address trade-offs and potential synergies in system transformation. Open source access for information about these methodologies and frameworks to analyze and expose externalities and dependencies are being made available for consumers, investors and policymakers, and are incentivizing corporate production practices to shift toward more holistic and inclusive business models, with some adopting TCA for internal accounting, while others adopting more public-facing reporting initiatives. A variety of applications, including an analysis of corn production in Minnesota, comparisons of livestock system modalities in the US, and Zero-Budget Natural Farming in India are in progress, and a community of practice to further develop TCA is underway ([Global Alliance](#)).

4. Soil Health and climate linkages are finally rising into prominence after recent rounds in the UNFCCC scientific and policy debates on agricultural links to climate change have finally begun to adopt program initiatives around soil carbon and soil health measures. The [Koronivia Joint Work on Ag \(KJWA\)](#) is the policy arena where a number of stakeholder groups are developing and strengthening language and case studies needed for the livestock component of carbon sequestration. More formal representation for the livestock sector in the global context may also be considered under a proposal submitted for the FAO Committee on Agriculture (COAG) in September/ October, 2020.

5. Animal genetic diversity has been part of the global Convention on Biological Diversity workplan in rounds devoted to agrobiodiversity, and in separate policy initiatives at the global level giving recognition of the importance and threats to preserving animal genetic diversity. However, it needs to transfer from endorsement of the [Global Plan of Action for Animal Genetic Resources](#) in the Interlaken Declaration, the first ever international framework for the promotion of the wise management of animal genetic resources for food and agriculture, to a level of deeper member state commitment and contribution of sufficient financial resources to make the Plan effective ([Hoffman, et al.,2011](#)).

6. Pastoralist support and recognition of access rights are vital to preserve well-adapted production systems in the face of increasing climate crisis stresses. Policy options to support pastoralists, such as incentives for monitoring and early warning systems for drought risk reduction at national level, are not well executed against the need to function in an increasingly challenging production environment, while innovations such as including climate-indexed livestock insurance and effective herd reduction and re-stocking policies have been under-resourced. Recognition of access rights to grazing lands and water sources is essential to reducing conflict and livelihood stressors for livestock keepers on the move. Increasingly, the core adaptive strategies of mobility are coming into conflict with changing land uses, with the arrival of fencing, artificial barriers imposed by infrastructure development and lack of recognition for customary grazing rights conspiring to constrict the mobility which has been a keystone

of the adaptive success of pastoralism. Exposure and vulnerability assessments need to be conducted in particularly drought-prone regions with sufficient anticipation to enable effective planning and mobilization of resources ([Walz, et al.2018](#)). Mobility enhancing tools such as SMS-based messaging on price and weather information, and formalizing drove road/corridor protection will preserve ‘room to maneuver’ options for pastoralists, while drought resilience packages including well-maintained water points and support for grass-banking, and incentives to diversify livestock livelihoods are important safeguards. These options are regularly discussed in policy arenas such as the African Union, but tracking how pastoralist networks such as [CELEP interpret and monitor their implementation](#) is vital to understanding how impactful these policy frameworks and initiatives are translating on the ground.

7. Engagement with industry across the value chain (for meat, dairy, leather goods, etc.) can become the basis to develop consumer awareness and outreach plans. Within the beef livestock industry, the [Global Roundtable for Sustainable Beef \(GRSB\)](#) network functions to provide guidance to advance industry sustainability policies. GRSB is organized to create industry standards through increased stakeholder engagement and efforts to enhance consumer awareness of the network’s efforts. Goals and principles such as increasing transparency and information sharing throughout the beef supply chain, and integration of effective traceability systems into supply chain management, as well as the use of technological innovations such as remote sensing and computerized information systems, are envisioned to provide rapid responses to consumer inquiries and ensuring the integrity of the beef supply chain ([Maia de Souza, 2017](#)). (See Appendix for GRSB visualization of goals and principles)

8. Contract reform and labor conditions to address negative impacts on producers and workers along the value chain in slaughterhouses and packing plants are urgently needed. Contracts could be monitored and regulated to ensure small farmers and workers better terms of trade, greater risk sharing protections and require corporate compliance with social, food and worker safety and environmental standards. Networks such as the [HEAL Food Alliance](#) and the [Animal Agriculture Reform Collaborative \(AARC\)](#) in the US advocate for food system justice and target multinational food corporations to advocate for better conditions for workers and communities, and increase transparency and accountability in corporate practices.

Financial Reform

How will better accountability mechanisms of industry actors and clearer indicators of social and environmental performance of livestock systems be developed and reinforced?

9. Ecosystem services and carbon markets initiatives are emerging to develop voluntary markets for soil carbon and wider ecosystem services, based upon a range of scientific models and metrics. The [Ecosystem Services Market Consortium \(ESMC\)](#), [Voluntary Carbon Standards](#), and the [Soil Carbon Initiative](#) are some of the more prominent examples. The [Land to Market and Ecosystem Outcome Verification – EOV](#) (Savory Institute) represents another approach, as it seeks to build greater transparency around benchmarking and indicators through third party certification and training innovations in linking ecosystem performance on rangelands to markets, linking the verification of outcomes to a number of intermediate livestock product industries – in fiber, leather, fashion and meat and other dairy products. Partner representatives from among these industries support the EOV process

through a seal reflecting these sources of sustainably produced products, and in turn generate sales for producers and support data collection and training for the networks.

10. **Financial disclosures and investor strategies** may drive longer term investments and risk assessments of the protein industry are being linked to climate and biodiversity loss. The [Task Force on Climate-related Financial Disclosures \(TCFD\)](#) recommends companies complete climate-risk scenario analyses and planning, and this has been the catalyst for [Farm Animal Investment Risk and Returns \(FAIRR\) Initiative](#) and other investor interests pursuing risk analysis and reporting to seek ESG reporting compliance developed by the TCFD among livestock sector corporations. Investors interested in urging global food businesses to mitigate risks posed by animal production and to develop strategies to diversify investments into alternative and plant-based proteins are being supported by [FAIRR](#), which published the inaugural Collier FAIRR Protein Producer Index – in 2018, the world’s first assessment of 60 meat, dairy and fish producers on critical sustainability risks.

Practices

Where are some of the key entry points at the level of practice – from production and consumption ends of the livestock system continuum – that will help shift industrial system path dependency toward more resilient and adaptive structures?

11. **Grazing management** needs to be mainstreamed and given greater market and technical support. A range of practices to reduce the environmental and social impacts of livestock systems are being promoted through the collaboration of animal agriculture stakeholder networks and ranching and farming communities. These differ from one context to another, for example the innovations gaining momentum around [Adaptive Multi-Paddock \(AMP\)](#) grazing in the West is known in the Greater Horn of Africa as ‘Masai mob grazing’ (Kenya) where other initiatives embracing traditional knowledge systems and rangeland restoration practices include [Farmer/Pastoralist-managed Natural Regeneration \(FMNR\)](#), supported through the work of World Vision Australia.

12. **Crop-livestock integration** would solve multiple problems. With the introduction of mechanization and artificial fertilizers, both predicated upon the use of cheap fossil fuel inputs, a protracted separation of animals from cropping areas has precipitated a host of problems enumerated above, including nitrogen loading, CAFOs, soil loss and degradation from monocrop feed production, and high energy costs. The compounding climate crisis has inspired the search for alternatives and crop-livestock ‘re-integration’ has become the subject of modeling alternative scenarios at field, farm and even national scales, such as France ([Le Noë, 2019](#)). Motivated by efforts to reduce the externalities and short-lived efficiencies separating animals and their ecosystem services from the crop production landscape, recoupling animals and crops was shown to provide multiple benefits in these model projections, in contrast with continuing on the current conventional production trajectories.

13. [Protein Challenge 2040](#) is one of several broad initiatives that engage full value chain dimensions of production and consumption, and prompt pre-competitive collaboration projects, and explore innovation potentials around an assortment of key strategies. These include an effort to scale up sustainable animal feed innovation (reduce dependency on soy and fish meal, developing alternatives from algae, insects, micro-organisms). Other projects include raising the awareness of benefits of

plant-based diets with consumers based on national dietary recommendations, and ‘closing the protein nutrient loop’ – finding ways to deliver new, high-value sustainable protein utilizing unavoidable protein wastes occurring elsewhere in food systems.

Political and Public Communication

How can policy networks and multi-stakeholder processes function to enable clarification of societal values, help organize cross-scale and tele-connected challenges into principled solutions and risk-managed investments, and generate public support through evidence-based and behavioral change-oriented campaigns?

14. **Policy Network** potential, such as seen in The Global Agenda for Sustainable Livestock ([GASL](#)) and the Global Roundtable for Sustainable Beef ([GRS](#)) with their different origins and scope, is significant. The GASL is a multi-stakeholder process structured to consider multiple views and to encourage dialogue and consensus around key priorities for research, and key principles of sustainability have been agreed upon, including the need to “increase efficiency, enhance livelihoods and well-being, protect resources, increase resources, and to improve governance” along with key areas of action and investment in conjunction with these key principles (see table in Appendix entry for GASL).

15. **Monitoring tools for sustainable sourcing** are being developed by private firms and civil society networks. A small number of emerging platforms are leveraging satellite data and value-chain tracking systems to develop third party verification mechanisms, e.g., [Orbital Insight](#) for digital traceability – with the aim of linking place to products in the meat production system and enabling potential investors to go from ‘pixel to insight.’ By providing investor risk assessments projecting meat industry vulnerabilities and potentials for climate and other risk-reduced pathways, this monitoring effort may provide market shaping responses among institutional investors adopting greener portfolios. Another model, [OpenTeam](#) (Open Technology Ecosystem for Agricultural Management) is an open source system led by farmers to develop monitoring tools for farm-level natural resource management and database platforms that will help them improve farm decision making and enter into partnership with researchers and quantify ecosystem service improvements for emerging voluntary markets.

16. **Consumer campaigns** such as [Meatless Mondays](#) organized by the Humane Society of the US and others, as well as other consumer campaigns can induce dietary behavior change in stages and facilitate dietary transitions through social media and other tools. Less but better meat messaging, and work with celebrity chefs to introduce alternative recipes with lower (or no) meat on the plate are also becoming more widely adopted approaches to shift diets toward more nutritious and healthful outcomes.

Synergies With Other Papers

There are many synergies between this and other hot topic papers. [Mind Map #2](#) is presented to highlight these interrelationships, offering visual cues as to the hierarchy of ideas conveyed with the shapes and colors in the map, and solid or dashed lines to suggest levels of relationship.

Conclusion

The 2009 FAO State of Food ([SOFA](#)) report, “Livestock in the Balance,” argued that for the livestock sector to provide the protein and environmental services expected of it, while minimizing harms and protecting livelihoods of particularly vulnerable populations, investments and policy changes will be necessary. We couldn’t agree more.

“...the livestock sector is not contributing as well as it might to the provision of the private and public goods that are expected of it, largely because the necessary policy changes and investments have not been made. The rapid growth of the sector, in a setting of weak institutions and governance, has given rise to systemic risks that may have catastrophic implications for livelihoods, human and animal health and the environment. To meet the challenges and constraints it faces, the livestock sector requires renewed attention and investments from the agricultural research and development community and robust institutional and governance mechanisms that reflect the diversity within the sector and the multiple demands placed upon it. Action is required at all levels, from the local level, through the regional and national levels to the international level. Multilateral institutions need to be involved, as well as civil society. However, no single entity is in a position to carry out its task in isolation.” (SOFA 2019, p.109)

This paper has presented food for thought – it is clear we are on an unsustainable trajectory. The crisis of the current pandemic, while devastating, is also presenting opportunities for new thinking. Determining how animals fit in a sustainable food system and which species or systems are preferred are big questions to address. But it is also quite clear that an appreciation for contextually dependent factors and for livestock sector interconnection with the ‘hot topics’ and many other societal priorities are equally big questions to grapple with through open dialogue among many different stakeholders to create more sustainable solutions for what comes next.

Hot Topic Discussion Paper 3

SUSTAINABLE AND HEALTHY DIETS

Mark Driscoll, Tasting the Future

1.0 Introduction

A robust evidence base has emerged showing that sustainable, healthy diets are key to planetary and human health and have the potential to transform the way food is grown, processed, distributed, marketed, consumed, and wasted. Producing more food efficiently is no longer good enough to meet the challenges of the 21st century. A dietary transition is key to reducing greenhouse gas emissions and will help us adapt and build resilience to reduce the impacts of global heating. It will help us restore biodiversity and address malnutrition in all its forms (hunger, obesity, nutrient deficiencies). 80% of chronic diseases are preventable through lifestyle change with our diet being the largest contributing factor⁸.

Our food system is highly interconnected and so the dietary choices we make in one place have far-reaching implications on the environment, societies and economies around the world. There is now widespread recognition from those working on solutions across the globe of the need to collaborate and identify a set of interventions that can deliver multiple outcomes, benefiting both human and planetary health. The Covid-19 epidemic is exposing the fragility of our food system and raises fundamental questions about how our diets have contributed to the epidemic and how future diets can build resiliency, food security and improve human and planetary health.

1.1 What is a healthy and sustainable diet?

There is no one accepted definition of a healthy and sustainable diet. This is in part due to different cultural and geographical perceptions and interpretations of the term ‘sustainability’ and ‘good health’. However, in general, people do agree that a sustainable, healthy diet is a dietary pattern that provides us with the many nutrients we need for health, in appropriate amounts and is culturally acceptable, affordable and sustainable. It is one which we can produce and consume within planetary boundaries whilst feeding the growing global population. The FAO provides a more formal definition for sustainable diets which is often used and quoted in academic literature:

‘Sustainable Diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources’⁹.

In practice a sustainable, healthy diet is cognizant of geography, culture, custom and dietary diversity. Diets will vary depending on the individual’s specific bodily characteristics, their cultural context and a wide range of social, economic and environmental determinants linked to place. Differing contexts (Global North and South) mean that there are a range of definitions and solutions pathways that can’t

⁸ https://www.who.int/chp/chronic_disease_report/part1/en/index11.html

⁹ <http://www.fao.org/ag/humannutrition/28507-0e8d8dc364ee46865d5841c48976e9980.pdf>

be globally generalized. Interestingly, stakeholders interviewed thought that ‘taste’ was often a missing ingredient of definitions, with those in the Global South highlighting that ‘food safety’ is often the biggest driver (behind other health dimensions and sustainability) of behaviours, and missing from much of the debate around sustainable and healthy diets.

In order to understand sustainable, healthy diets we need to be able to articulate what they look like on our plates/bowls. Stakeholders referred to sustainable healthy diets as ones that contain:

- Large proportions of plants in diets (e.g. fruits, vegetables, wholegrains, nuts, legumes, etc.)
- Traditional and Indigenous crops
- Moderate amounts of dairy, poultry and fish and small amounts of red meat (high quality e.g. pasture fed, extensive well-managed regenerative livestock systems, recognizing that in some parts of the world consumption will need to increase to meet nutritional needs).
- Fish from sustainable sources (wild caught and farmed)
- Local and seasonal food (shorter value chains that connect citizens with farmers who receive a fair price)
- Significant reductions of food waste, loss and minimal plastic packaging, and recycling and reuse of waste generated
- Safe and clean drinking/tap water in preference to other beverages, especially soft drinks
- Reductions in ultra-processed foods containing high amounts of sugars, salts and saturated fats

1.2 International Commitments

Sustainable healthy diets have received increased attention from the global community. Although not mentioned explicitly, they are recognized as a key determinant for achieving two UN global agreements, which underpin the global interest in and the need to take a systemic approach to many of the sustainability and health challenges associated with food. These are the 2030 Agenda for Sustainable Development¹⁰, which identified 17 Sustainable Development Goals (SDGs) and the Paris Agreement on Climate Change¹¹. These agreements alongside the Convention on Biological Diversity and Decade of Action on Nutrition require leadership, far-reaching commitments and action from all countries of the world for their successful implementation. Sustainable and healthy diets are integral to the success of these.

1.3 Three Influential Reports

This paper does not cover in detail the science and evidence for sustainable healthy diets which is covered in numerous reports, academic research and grey literature. It is however worth highlighting a few of the most globally influential reports which have been published over the last 12 months:

*The EAT- Lancet Commission report*¹² - This provides specific scientific targets for a healthy diet from a sustainable food production system that operates within planetary boundaries for food. It recommends ‘diets consisting of a variety of plant-based foods, with low amounts of livestock-based foods, refined grains, highly processed food and added sugars, and with unsaturated rather than saturated fat’. The

¹⁰ <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>

¹¹ <https://unfccc.int/process/the-paris-agreement/what-is-the-paris-agreement>

¹² https://eatforum.org/content/uploads/2019/07/EAT-Lancet_Commission_Summary_Report.pdf

authors highlight the need to reduce, by more than 50%, the global consumption of foods such as red meat and sugar and increase the consumption of nuts, fruits, vegetables, and legumes by more than twofold, with global targets being applied locally to reflect regional differences in needs. The report has not been without some significant criticisms. Concerns have been expressed over issues of affordability, the lack of attention to the impacts of white meats (poultry, pork), the underplay of the importance of regenerative farming systems and how the report does not tackle issues of power and dynamics within the food system resulting in the commoditization of food. Several interviewees noted that the report did not gain traction/attention in their countries because it focused on over-consumption as opposed to malnutrition (obesity, undernutrition and micronutrient deficiencies).

*The Lancet 'Global Syndemic of Obesity, Undernutrition, and Climate Change' Report*¹³ – Highlighted that malnutrition in all its forms, including obesity, undernutrition, and other dietary risks, is the leading cause of poor health globally and that climate change will considerably compound these health challenges. They point to three challenges—obesity, undernutrition, and climate change that will impact most people across the world. The report called for strong processes to manage conflicts of interest between commercial actors and policymakers, new business models that promote both human and environmental health, and redirecting of government subsidies and taxes across the food system to ones that support the production and consumption of sustainable, healthy, nutritious and affordable foods.

*IPCC Climate Change and Land Report*¹⁴ - This stated unequivocally that land use plays a critical role as a source of greenhouse gas emissions and as a climate change solution. With a focus on nature-based solutions, such as reforestation and improving agricultural practices, the report stressed the importance of dietary change (eating more plants) and reductions in food waste. Reducing inequalities, improving incomes, and ensuring equitable access to food so that some regions (where land cannot provide adequate food) are not disadvantaged were other ways for food systems to become resilient in the context of climate change.

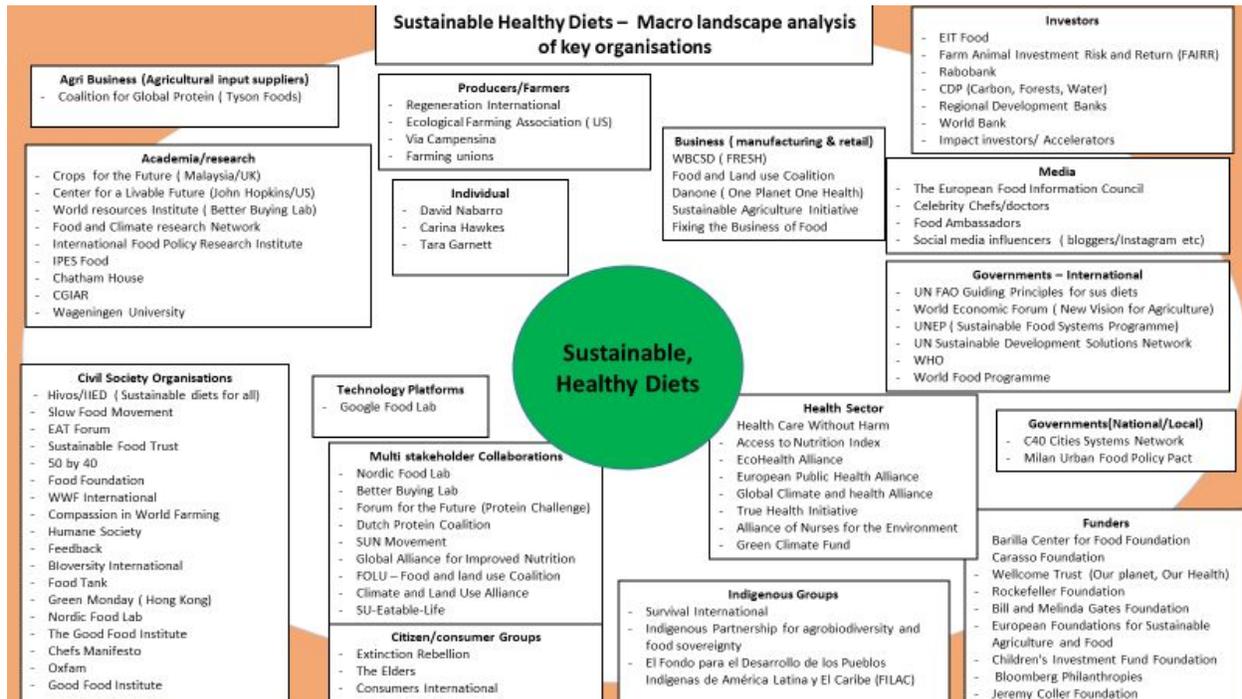
It should be noted that many of the stakeholders interviewed for this paper highlighted the disconnect between some of the reports produced internationally and the needs of those people, at a local level, most impacted by the food system. International reports can sometimes fail to translate recommendations into culturally and environmentally relevant actions at a local/sub national scale that are useful for local leaders/decision makers.

¹³ [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)32822-8/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32822-8/fulltext)

¹⁴ https://www.ipcc.ch/site/assets/uploads/sites/4/2020/02/SPM_Updated-Jan20.pdf

2.0 Landscape Analysis of Key Organisations Working on Sustainable, Healthy Diets

The table below illustrates some organisations working in the sustainable, healthy diets space. It is indicative only and does not include the plethora of organisations working on these issues at global and national levels.



3.0 Convergence, Divergence and Unknowns

This section provides a brief overview of the convergences, divergences and unknowns that could help or hinder the scaling of policy and practice for sustainable and healthy diets, based on author and stakeholder insights.

3.1 Convergences for Sustainable, Healthy Diets

3.1.1 *Creating new partnerships/collaborations with the health sector:* There are significant opportunities for organisations working across the food-health-climate nexus to work in closer collaboration to address common determinants and drivers which can influence policy and practice that drive sustainable and healthy dietary patterns. Taking a systemic approach to health and sustainability can create win-wins. Many people working in the health professions (doctors, dieticians, nutritionists, care workers, nurses, medical insurance etc) are increasingly interested in and understand how ecological (including climate) health underpins human and animal health. This is particularly pertinent in the light of the Covid-19 pandemic. The health profession is in a strong position to combine healthy eating messages and sustainable diet advice, working closely with the food and climate change

communities to influence policy, practice and the narrative of food. There is an opportunity to re-engage other groups, particularly youth groups, farmers and local community/citizen movements in this debate at a more local level, making sustainable diets real, tangible and visible on the ground.

3.1.2 *Adopting Food Based Dietary Guidelines (FBDGs):* FBDGs are intended to establish a basis for public food and nutrition, health and agricultural policies and nutrition education programmes to foster healthy eating habits and lifestyles. Over 100 predominantly high and middle income countries have FBDGs (fewer than half of all countries) and yet only a few have incorporated sustainability criteria into these (examples include Canada, Switzerland, Sweden, Qatar, Norway, Brazil, and Germany). There is an opportunity to encourage more governments to develop FBDGs and align them with national food procurement strategies. Governments need to compliment FBDGs with other behavioural strategies which ensure they are translated from theory into practice. These include food procurement strategies, supporting medical practitioners with the implementation of lifestyle medicine practices and social protection schemes that support the provision of healthy, nutritious foods to those most in need. FBDGs need to be supported by a wider range of agricultural, investment and educational programs.

3.1.3 *Using True Cost Accounting Frameworks:* True Cost Accounting approaches, such as the TEEB AgriFood Framework¹⁵ can help to bring to light the true cost of cheap food, and ensure consideration is given to wider health, environmental and social costs (and benefits) of food systems. Many negative health impacts and their costs continue to fall disproportionately on the poorest and most disadvantaged in society, reinforcing health inequalities. The annual global economic costs of obesity are about US\$2 trillion, representing 2.8% of the world's gross domestic product.¹⁶ The global costs directly related to diabetes are US\$827 billion per year.¹⁷ The need to work much more closely with governments to use true cost accounting frameworks, to influence subsidies, VAT, taxation policies, health and welfare schemes were highlighted as examples of significant untapped opportunities by key stakeholders interviewed.

3.1.4 *Focus on Implementation at a local level:* There is an opportunity for coherent and context-specific policies and practices. Many initiatives offer guidance, research and awareness as key outputs with relatively few focusing on implementation, working with local governments, businesses and community groups at a local level. In general, there is still a significant disconnect between research on sustainable healthy diets, which often originates from higher incomes countries, and those groups this research is intended to benefit. For example, food safety and food security aspects of diets are significant issues within many rapidly growing African cities. The informal food economy (e.g. local food vendors) provides a significant proportion of affordable, accessible meals within emerging economies, yet the informal food sector is ignored or overlooked by the academic community and policy makers. Working with the health sector, there is also an opportunity to focus on health promotion and disease prevention opportunities at a community/local level.

¹⁵ <http://teebweb.org/agrifood/about/>

¹⁶ https://www.mckinsey.com/~media/McKinsey/Business%20Functions/Economic%20Studies%20TEMP/Our%20Insights/How%20the%20world%20could%20better%20fight%20obesity/MGI_Overcoming_obesity_Full_report.ashx

¹⁷ <http://care.diabetesjournals.org/content/early/2018/02/20/dc17-1962>

3.1.5 *Promote Crop Diversity and Forgotten Crops:* There was remarkable convergence around ‘diversity’ as a key principle of sustainable, healthy diets. Over the past 50 years, there has been a major decline in two components of crop diversity; genetic (seed) diversity within each crop and the number of species commonly grown. Stakeholders highlighted that food security, improving farmer livelihoods (and income) adapting to climate change, reducing environmental degradation, protecting nutritional security, reducing poverty and regenerative agricultural practices are all underpinned by crop diversity. Forgotten crops (sometimes referred to as underutilised or orphan crops) comprise the multitude of species that are currently largely neglected by major research, funding bodies and global food manufacturers/retailers. They have largely been ignored or neglected by advances in technology, policy, advocacy and marketing, and there is an opportunity to reverse this trend and build resilience into our food system as a result.

3.1.6 *Shifting the narrative:* Many interviewees emphasized that shifting mindsets and attitudes is as important as influencing policy or practice. For all the emphasis on evidence-based policy making, decisions by key influencers are not usually taken in a purely rational way and are shaped by personal values and individual perceptions of the world. In practice, policy is more often shaped by politics not policy makers. In order to transform today’s food systems and mainstream policy and practice supportive of healthy and sustainable diets, there is a need to counter prevailing and powerful narratives that guide current research, investment, policy priorities, business models and practices across the food system. There is an opportunity and a need to challenge the current ‘yield first’ narrative, often driven by the commodification of our food and driven predominantly by the global North, to one that puts sustainable healthy diets at the heart of a new food economy.

3.1.7 *Placing Citizen Engagement at the heart of decision making:* The opportunity to reconnect citizens across the globe with food, whilst restoring traditions and cultures, from birth to end of life, is an opportunity to reconnect citizens with a sense of place. Schemes which encourage the growing, cooking and preparation of food, whilst ensuring citizens are engaged in food systems decision making, are a powerful driver of citizen behaviour change and have potential in driving healthy, sustainable diets. Reconnecting citizens and reframing the language from ‘consumers who demand, choose or buy food’ to that of a citizen who can ‘participate in, create and shape food systems’ is potentially a very powerful frame. Citizens, Indigenous Peoples and other groups (for example farmer groups) could be more actively engaged in policy making and setting the research agenda, rather than as recipients of it.

3.2 Divergences and Unknowns to Sustainable, Healthy Diets

3.2.1 *No agreed measurement and metrics:* A lack of clear metrics and a shared approach to measuring the multiple components of sustainable diets has hindered progress toward generating the evidence needed to support sustainable and healthy diets. This partly results from differing definitions of sustainable healthy diets but also results from the fact most of the research on sustainable, healthy diets is centred in high-income countries. This results in metrics being focussed on a narrow set of environmental components of diets (GHG emissions, resource use) with limited emphasis on metrics relating to biodiversity, water cycling, nutrient cycling, and resilience in the face of drought. There is also

a lack of clear metrics related to equity, health and cultural context, particularly within the Global South and those that tend to bear the strongest burdens of food insecurity, malnutrition, and poor health. It should be noted that whilst there will inevitably be a need for metrics that reflect geographic and cultural diversity, community-scale indicators of sustainable and healthy diets, using both qualitative and quantitative forms of data, are often overlooked by academic and funding bodies.

3.2.2 *Defining “less but better” meat consumption:* From a sustainability perspective the need to reduce overall quantities of global meat consumption is widely recognised (in some parts of the world, where there are protein deficiencies, it may need to increase). Most of the focus of debate has been on red meats (especially beef) without a nuanced debate which recognises the differences between extensive more regenerative forms of beef production and industrial intensive systems that cause significant environmental impacts. There are also considerable concerns that simplified messages around eating less beef could shift consumption to white meats (chicken) which, for example, consume significant quantities of animal feed (soya) shifting GHG emissions from methane to carbon-rich habitat loss. The debate with regards to the role meat plays within sustainable and healthy diets has become highly polarised.

3.2.3 *Fish and sustainability:* A wealth of evidence finds that eating fish is good for health and yet many wild fish stocks are depleted. Three billion people around the world rely on fish as their primary source of protein.¹⁸ Dietary guidelines around the world often include several portions of fish per week. This nutrition-sustainability dilemma is widely recognized and raises questions around nutritional guidelines and how we produce fish. One solution, to ease pressure on wild caught fisheries, would be to increase sustainable aquaculture production, recognizing that it is however very dependent on external feed sources. Aquaculture comes with its own issues and impacts. The use of GM salmon, local pollutants and parasites that spread from captured fisheries to wild caught fisheries are impacts that require consideration. There may be significant opportunities to scale up production of lower impact more herbivorous (those lower trophic level, plant eating species) fish, such as Tilapia, Pangasius or bivalves such as molluscs or shellfish. These tend to be lower in capital intensity and inputs and thus, more accessible, compared with higher-intensity species, such as Salmon, which use higher impact fish meals and fish oils as feed.

3.2.4 *Economic viability of farming* – Adequately rewarding farmers to produce healthy and nutritious foods sustainably remains a significant barrier/challenge to mainstreaming healthy and sustainable diets across the world. There is concern that policy developed and promoted in the Global North to drive sustainable and healthy diets could undermine the economic viability of smallholder farmers in the Global South. An aging farmer population in many countries, combined with a continued squeeze on farmer incomes means the number of small scale farmers (who are more inclined to agroecological farming practices) is declining and farms are becoming consolidated. In addition, farmers often sell their most valuable and nutritious products into local and international markets, resulting in high levels of malnourishment. Farmers often lose the financial value of healthy and nutritious foods by selling produce through middlemen.

¹⁸ <https://www.worldwildlife.org/industries/sustainable-seafood>

3.2.5 *International trade impacts* - International trade and trade policies are of central importance but their role in supporting sustainable and healthy food systems is often poorly understood. With 80 percent of the world's population depending on imports to meet at least part of their food and nutritional requirements,¹⁹ trade policies which promote good health and sustainable outcomes are crucial. Trade policies today are invariably driven by goals that have little to do with our diets and nutrition, instead focusing on issues such as economic growth, incomes, jobs, and export earnings. If the health, social and environmental costs associated with food production and trade are not reflected in the final price of goods, trade is likely to exacerbate the health and planetary crises. The GLOPAN report²⁰ recommended, amongst other things, that policymakers should consider the impacts of trade tariffs on the promotion and importing of ultra-processed foods and reduce the price of nutrient-rich foods, as this can particularly benefit the poorest. The dumping of foods from Northern markets (e.g. powdered milk or other commodity crops such as rice, wheat, maize, etc.) often undermines prices in local markets, reinforcing the dominance of global markets in driving health and nutritional standards.

3.2.6 *Should Ultra Processed Foods (UPFs) play any role?*²¹: Many foods are processed – changed, prepared or packaged – in some way before we eat them. There is a spectrum from minimally processed (canned, packaged or frozen single ingredients) to those that are ultra-processed (foods made mostly from substances extracted from foods). The use of UPFs is controversial in the sustainable, healthy diets debate. UPFs refer to a specific group of industrially processed foods that are often energy dense and high in fat, salt, sugar and additives, while lacking dietary fibre and micronutrients. The increasing consumption of UPFs (soft drinks, fast foods, ready meals and packaged goods) is associated with an increase in obesity, overweight, diabetes, and related non-communicable diseases. Some proponents suggest these foods can be part of a sustainable healthy diet, in small quantities, whilst others advocate that no ultra-processed foods should be used. This issue has particularly played out in new innovations of highly processed plant-based imitation meat and dairy products in response to increased consumer demand for products that cater to the vegan, vegetarian and flexitarian markets.

3.2.7 *Marketing of Foods* -There is a significant body of evidence to suggest that food adverts influence the foods people (especially children) choose and how much of it they eat. The marketing of UPFs is linked with a strong preference for more snacking and a greater intake of foods higher in sugars and salts and lower intake of healthy food overall. In many countries UPFs now account for over half of total calorie intake and are highly profitable and aggressively marketed. Chile, which is plagued by high levels of obesity, has some of the world's toughest marketing controls (on pack labelling, tv advertising restrictions etc.) which has resulted in a 23% drop in sugary drink sales over just 2 years²².

3.2.8 *Convenience* – Many healthy and nutritious foods take time to cook and prepare and in time poor households this can be a barrier to their consumption. After working the fields during the day, women in Africa for example, point to the luxury of being able to boil rice quickly at the end of the day. A key

¹⁹ <https://hoffmanncentre.chathamhouse.org/article/delivering-sustainable-food-and-land-use-systems-the-role-of-international-trade/>

²⁰ <https://www.glopan.org/wp-content/uploads/2020/02/Global-Panel-policy-brief-Rethinking-trade-policies-to-support-healthier-diets.pdf>

²¹ For a good definition see -

<https://www.foodsource.org.uk/building-blocks/what-ultra-processed-food-and-why-do-people-disagree-about-its-utility-concept>

²² <https://sph.unc.edu/sph-news/study-suggests-innovative-chilean-food-regulations-are-changing-food-perceptions-norms-behaviors/>

barrier to consumption of fresh fruit and vegetables is time to prepare them or lack of knowledge/food literacy in preparing meals using fresh ingredients.

3.2.9 *The role of cultured ‘meats’:* - Uncertainties remain around the health and nutritional benefits of cultured based meat alternatives (also known as lab meats). Whilst there is an assumption and some evidence to suggest that there are environmental benefits of these alternatives²³, significant uncertainties remain, particularly regarding the impacts of the raw material used for these meats. There are also concerns over the cultural benefits of cultured meats and a fear that instead of citizens and farmers retaining the rights to the foods they grow and access to markets, that cultured meat will reinforce commodification and concentration of power within the food system.

3.2.10 *Affordability & Inequality:* Affordability is embedded in the definition of a sustainable, healthy diet. And yet, it’s a perverse truth that for people across the world who are struggling to afford enough to eat, the nature of the global food system means they either go hungry or are dependent on inexpensive but less nutrient dense and more caloric dense processed foods. As a result, food insecurity and unhealthy diets are often interrelated, which can lead to hunger, malnutrition, diet-related disease and obesity. A recent study²⁴ of the affordability of the EAT-Lancet reference diet suggested that the cost of an EAT–Lancet diet exceeded household per capita income for at least 1.58 billion people and in many countries a combination of higher incomes, nutritional assistance programs, and lower prices would be required to ensure affordable prices.

3.2.11 *Power and Dynamics:* Whilst this is a broader issue across food systems, it was an issue that came out strongly through interviews and therefore worth a specific mention in this paper. Power and cultural imbalances remain a key challenge. Those that have the potential to benefit most from healthy, sustainable diets are typically those whose voices are not heard. Those with lived experiences and most impacted by our food system are those that are disconnected from decision making. The current ‘feed the world’ and prevailing ‘yield-first’ narrative, with a focus on the commoditization of food, is dominated by a relatively few number of actors, but has wide-spread influence from inputs for food production to where farmers sell their raw agricultural products, to where consumers shop for groceries. One of the biggest challenges is how to harness and gather credible smallholder farmer and citizen voices to ensure greater alignment between sometimes conflicting top down versus bottom up approaches to policy and practice.

4.0 High Level Recommendations for the Shared Action Framework

It should be noted that these recommendations are focused on the macro level and specific interventions will vary from place to place according to context, culture, scale and the needs of local people/communities. No one intervention will be sufficient on its own. It should also be noted that the need for shifting the overarching narrative/mindsets of key actors will be absolutely essential in achieving the policy, financial, practice and communications reform that are outlined below:

²³ Lynch J & Pierrehumbert R (2019) Climate Impacts of Cultured Meat and Beef Cattle. *Front. Sustain. Food Syst.* 3:5. doi: 10.3389/fsufs.2019.00005

²⁴ [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(19\)30447-4/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30447-4/fulltext)

4.1 Policy Reform

a) *Integrated Food System Approaches* - **Governments should take an integrated approach to food and agricultural policy, with sustainable healthy diets a key element of these.** A siloed approach to policy making across many national governments results in disjointed and fragmented policies, which don't tackle root opportunities (key determinants) for sustainable and dietary healthy solutions. Traditional jurisdictional responsibilities between agriculture, water, health, trade, international development, employment, education, and social welfare (protection) departments are significant barriers.

b) *Food Based Dietary Guidelines with teeth* – **All countries should adopt FBDGs, taking into account cultural and geographical differences, to ensure health, nutrition and sustainability criteria are included in their development.** Governments must align procurement, investment, educational and agricultural strategies with their FBDGs.

c) *Marketing and labelling* – **Governments should apply advertising restrictions to ultra processed foods high in saturated fats, salts and sugars, particularly those products targeted at children, and food labelling should include nutritional information,** to include environmental and social aspects. Mandatory front-of-pack labelling and establishing nutrient profiles would help drive consumers' choices towards healthier and sustainable options.

d) *Agricultural Reform* – **Agricultural subsidies must incentivise the production of sustainable, healthy and nutritious foods,** with a shift from subsidies which encourage the production of more of all foods to the use of subsidies based on public money for public goods(healthy and sustainable foods). This would include subsidy systems that supported more diversified cropping systems, supporting Indigenous crops that are locally resilient, nutritious and which have the potential to deliver more financial, social and environmental value to smallholder farmers.

e) *Supporting Small and Medium Enterprises (SMEs) and informal food sectors* – **Governments need to focus more attention on supporting the role of informal markets and SMEs,** particularly in LMICs who still supply the majority of foods to households within these countries. The biggest barriers to investing in short supply chains include access to credit/finance, government regulations that promote the right enabling environment and technical help to develop new propositions that would attract investment.

4.2 Financial Reform

a) *Health Focused Approach to True Cost Accounting (TCA)* – **There is a need to promote TCA frameworks with a greater focus on health.** Health policy is a route to policy change across sustainability. There is an opportunity to focus work on exploring the true cost of healthcare needs linked to sustainable and healthy diets. Working with one or two countries demonstrating leadership on this agenda (North with a focus on dietary shift and South on agricultural shift) looking at the country level economics, could provide an opportunity (e.g. Denmark and Kenya were touted as good examples).

b) *Adoption of the polluter pays principle* – **Governments should implement a “polluter pays” principle** so that the true costs of food production, including on the environment and public health, are borne by those organisations (e.g. food businesses) that benefit financially.

c) *Investing in the 'Just Transition'*²⁵ – **Investors, public and private sector funding bodies and government funding bodies need to be investing in a Just Transition for healthy and sustainable diets.** There is a need to assess the social and cultural exposure to the social impacts of these diets (employment, income, inequality, identity) by pursuing dialogue with key food system actors who would be most impacted (especially smallholder farmers, SME's, citizens, communities).

d) *Addressing affordability and Inequality* - **Governmental actors and intergovernmental organizations must help facilitate the affordability of healthy diets for poor households through social protection programmes such as vouchers, cash, school feeding, or food supplement programmes.** Food should be a public good, with households supported by the government investing in social infrastructure and safety nets, for the public interest.

4.3 Practice Reforms

a) *Addressing Power imbalances* – **Focus on practices which address imbalances of power.** Power is dominated by a small number of global agri-food businesses and large investors, with concentration of power focused in the middle of the value chain. There is an opportunity to build the capacity of civil society organisations, farmer groups and those working in the informal sectors within LMICs

b) *Collaboration with the health sector* – **Food systems actors need to align and collaborate with the health sector.** Health is often a stronger driver of citizen and government decision making than sustainability. Food system actors, including those in environmental and development movements need to work much more closely with health organisations (Doctors, nutritionists, care workers, insurance etc.)

c) *Governance* – **More focus needs to be given to governance of food systems** - rules and institutions that control/coordinate the way food is produced, processed and distributed, at international, national and local levels Whilst linked to 'addressing power imbalances' there are real opportunities to advocate for clear agricultural and food emissions reduction targets as part of the COP26 process and ensuring the sustainable food systems summit in 2021 prioritizes policy and practices for sustainable and healthy diets. Accountability mechanisms that contribute to fostering citizen participation in national debates on food systems, security and diets based on transparent rules of engagement will be key.

d) *Metrics and Measurement* - **The need to develop a range of quantifiable and qualitative metrics, appropriate to the needs of scale, geography and culture, which can help us measure progress to sustainable, healthy diets, is crucial.** We need better indicators to demonstrate positive impacts, and more work to align macro level indicator sets to the needs of more regional and local food system stakeholders, to demonstrate the impacts of their interventions.

4.4 Political Communications

a) *Narrative/Mindset Shifts* – **Actors working across the food system need to work on new narratives to shift the mindsets of key decision makers challenging the current productivity approach to food and farming.** Transformational change will not occur without a shift of narrative and mindsets and a vision for what is possible. This means a shift from narrowly focused policy and business models designed to deliver productivity, to a focus on delivering multiple benefits that are associated with a focus on sustainable and healthy dietary outcomes. Diverse stakeholders across the food system need to be

²⁵ See the paper Just Transition hot topic paper for further details

supported to get involved in creating, and acting on, these new visions and narratives, including community and youth leaders, citizen movements and politicians working on the international stage, funders, governments, businesses and farmers.

b) *Reconnecting through food: urban with rural, non-farmer with farmer, to lost family or cultural traditions.* - **We need to reconnect citizens to food through celebrating the cultural diversity of foods** – Supporting events, cooking or growing experiences and other activities which link to the senses, fostering an appreciation of our foods, linked to culture, heritage and diversity.

c) *Communicating success/best practice* – **Focus on shining a light on success stories, through case studies, communication strategies and through connecting on the ground implementers with decision makers.** Bridging the action – research through communicating success, demonstrating the economic, health and sustainability benefits of these projects with key decision makers.

5.0 Conclusion

The rapid spread of COVID19 around the world is not only a stark reminder of how connected and dependent we are on one another, but also of the deep interconnections that exist between human, ecological, and animal health. We are at a pivotal moment in time to accelerate a paradigm shift towards more sustainable, healthier diets. The evidence of need is strong. There is momentum and a willingness from many actors to work towards this shift. We need to capitalize on this by working across sectors, silos, communities and generations to align around the opportunities, redoubling our efforts to sort our differences to ensure that the forthcoming UN Framework Convention on Climate Change, Convention of Biological Diversity and UN Food Systems summits deliver sustainable and healthy diets for all.

Hot Topic Discussion Paper 4

FOOD LOSS AND WASTE

Marie Mourad, PhD

1) Introduction to the Food Loss and Waste issue

According to the UN Food and Agriculture Organisation, about one-third of the food produced in the world for human consumption — 1.3 billion tonnes every year — is lost or wasted. Countries in the Global North and South discard roughly the same quantities of food, although countries in the Global South tend to have higher levels of losses at the earlier stages of the supply chain, while countries in the Global North generate more waste at the consumption end of the food chain (Gustavsson et al. 2011).

Food loss and waste (FLW) happens at every step of the food supply chain, “from farm to fork.” Some farmers are subsidized to overproduce but leave crops unharvested if prices are too low (and labour costs too high), and some are forced to discard misshapen, blemished, or over-/under-sized produce to meet buyers’ criteria. In the Global South a significant quantity of food is lost after the harvest due to the lack of transportation, (cold) storage, and processing infrastructure. For example, the Rockefeller Foundation estimates that in Sub-Saharan Africa, 50% of fruits and vegetables, 40% of roots and tubers and 20% of cereals may be lost before they reach the consumer. Manufacturers and distributors also lose food when more powerful supermarkets cancel or change orders. Those supermarkets contribute to FLW by culling food that does not meet their marketing standards or by generally encouraging consumers to buy more than they need.

Consumers in North America and Europe waste more food as they eat at restaurants with expanding portion sizes, cannot plan for their meals among irregular schedules, do not eat leftovers, or because they mis-interpret overly-conservative sell-by dates. For example, in the United States, an estimated 40% of food goes to waste, most of which occurs at the consumer level either in their homes or outside in restaurants (Gunders 2012). Moreover, consumer food waste is increasing among a growing middle class in the Global South (Baig et al. 2018, Soma 2018).

Globally, FLW may be equivalent to 9% of humanity’s Ecological Footprint, according to [Earth Overshoot Day](#). This impact comes, first, from the resources that are used to produce food that never gets eaten. For example, in the United States, more than one-fifth of cropland, fertilizers, and agricultural water go to produce food that is wasted (Gunders and Bloom 2017). Significant additional impacts come from the transportation, storage, packing, and preparation of the food from the farm to the consumer as well as from the end of its life, including waste collection and treatment (notably methane emissions if placed in landfills). The overall impact of food waste corresponds to up to 4.4 gigatonnes of equivalent carbon, or 24% to 37% of the global food greenhouse gas (GHG) emissions footprint (FAO 2013).

The UN Sustainable Development Goal 12.3 on Sustainable Consumption and Production aims at halving per capita global food waste at the retail and consumer levels and reducing food losses along production and supply chains, including post-harvest losses, by 2030. The World Resources Institute (WRI), the International Panel on Climate Change (IPCC) report on Climate Change and Land, and the EAT-Lancet Commission all identified reducing food loss and waste as a critical element in achieving a sustainable

future (Searchinger et al. 2018, Willett et al. 2019, IPCC 2020). The [Project Drawdown](#) identified reducing food waste as one of the top three impactful actions to reduce GHG, along with Health and Education and Plant-Rich Diets.

Reducing FLW would have additional co-benefits and help meet multiple SDGs: food access and Zero Hunger, biodiversity, protection of land and oceans, and climate change. We can feed 9 billion people without increasing food production and without consuming more resources if we transform the food system. Reducing FLW and distributing food more equitably is a key aspect of this transformation. Reducing FLW also contributes to a circular economy by re-purposing surplus and by-products into animal feed, energy, or compost. Excess food also comes with excess packaging, especially plastics, which has been identified as a key challenge for sustainability (Ellen MacArthur Foundation 2019).

FLW happens throughout the food system, and addressing it requires a holistic approach that recognizes that interventions at one point in the food chain have effects elsewhere. Preventing FLW, and not only redistributing or recycling surplus, calls for an overall transformation of the food system beyond technological/logistical fixes and the optimization of practices that currently prioritize maximizing profits by producing vast quantities of cheap calories. FLW responses should re-value food and embrace nature-based solutions, a wise use of resources, sustainable lifestyles and diets, and food sovereignty.

There is an urgent need to move from knowledge and awareness-raising to commitments and action. In order to achieve SDG 12.3, the WRI has developed a three-point approach which focuses on countries and businesses setting targets, measuring progress, and taking action (Hanson, Flanagan et al. 2020). A significant proportion of large businesses have made commitments. The momentum seems slower for governments, even if more and more countries such as the Netherlands, the UK, Denmark, France, and Mexico have developed national strategies against FLW. How can we engage more governments, citizens, and businesses?

The current coronavirus crisis creates unique challenges to creating a circular economy and reducing food loss and waste (Crunden, E.A. 2020). It has already generated a high level of FLW at the producer, retail, and food service levels due to the unavailability of workers, demand instability, disrupted supply chains, and business closures. Moreover, at a time of growing food insecurity, food redistribution organizations have had even more difficulties accessing and redistributing available surplus. Yet, the impact of disrupted purchasing, cooking, and eating habits, especially in large urban centres, is still unknown. Household food waste may have increased due to panic buying and “hoarding” behaviours, but people may also have made the most of the food they have, if not learnt new skills that help reduce FLW such as storing food for longer, cooking with available ingredients, or reusing leftovers. The increase of food deliveries may have generated additional food waste, on top of the additional packaging.

Overall, the response to the coronavirus pandemic tends to emphasize technological and biomedical solutions and focuses on hygiene, which may reverse some environmental advances like reducing plastic packaging (Kaufman 2020). This might challenge some FLW reduction strategies such as package-free stores that allow clients to only purchase the food they need. On the other hand, it may push for reinforcing food safety and supply chain infrastructure, which contribute to reducing food loss. In the

long term, the crisis may become a lesson in the importance of designing resilient systems that work with, not against, nature.

2) Landscape Analysis

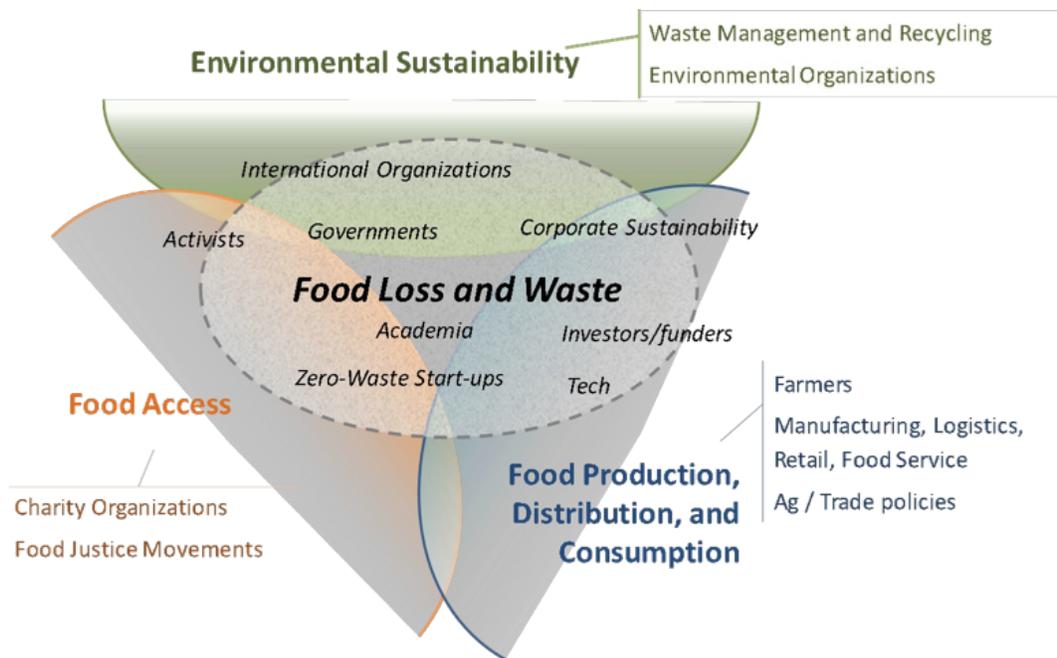


Figure 1. Actors in the FLW field (Source: Marie Mourad). This is an illustrative and non-exhaustive representation of the main actors in FLW. For a more complete list please see [this list](#).

A variety of stakeholders from all parts of the food system work in the area of FLW and some examples of these can be seen in [this stakeholder list](#). In addition to these separate actors, there are a number of key partnerships and multi-stakeholder collaborations that are important in this area. Multi-stakeholder collaboration is crucial to tackle the complexity of the FLW problem across the supply chain. The engagement of key businesses has been particularly effective in the Global North where supply chains are consolidated, which makes it possible for a small number of actors to drive impactful changes. Working collaboratively allows actors to benefit from shared expertise and solutions, instead of “re-inventing” existing ones.

International partnerships have helped build common standards for measuring and fighting FLW, such as the EU Platform on Food Loss and Waste and the World Resources Institute’s FLW Protocol (see section on Convergences). Several influential organizations have also engaged in initiatives to reduce FLW such as [Champions 12.3](#) – a unique coalition of executives from governments, businesses, international organizations, research institutions, and civil society dedicated to inspiring ambition, mobilizing action, and accelerating progress toward achieving SDG Target 12.3.

Several partnerships between governments, non-profits, and businesses have also been established at the country level, for example:

- United Kingdom: The [Courtauld Commitment](#) was signed in 2005 as a voluntary agreement aimed at improving resource efficiency and reducing waste within the UK food sector. It is led by the public-private agency Waste and Resources Action Program (WRAP) and has achieved a reduction in FLW of more than 10% across the supply chain.
- France: The National Pact Against Food Waste is a public-private partnership led by the Ministry of Agriculture. Discussions between multiple stakeholders led to the development of a national law in 2016, which, among other measures, makes it mandatory for most supermarkets to establish an agreement with a non-profit organization to recover their edible food.
- Brazil: The initiative “Save Food Brazil” aims at developing a national awareness campaign. A group of more than 200 stakeholders communicates on the topic on a regular basis.
- Mexico: WRAP Global has implemented a public-private partnership called “Comprometido con la Comida”, funded by P4G (Partnering for Green Growth and the Global Goals 2030)²⁶.

The issue of FLW offers potential partnerships with organizations working toward a circular economy, such as the work of the World Business Council for Sustainable Development and The New Plastics Economy by the Ellen McArthur Foundation. It is also closely connected to the issues of food security and sustainable agriculture, as the UN Food and Agriculture Organization’s (FAO) State of Food and Agriculture illustrates (FAO, 2020). Developing partnerships across these different topics will require resolving some of the tensions between highly technological, efficiency-focused food waste solutions and broader shifts across the food system.

3) Convergence, divergence, and unknowns

Convergences: Constructing a common definition and shared goals

a) Definitions

Researchers within international organizations such as the European Union Platform of Food Loss and Waste, WRI, and the FAO have been working for several years to construct a common definition of FLW. Generally, “food loss” is defined as loss occurring along the supply chain before the food reaches the consumer, as a result of market/trade mechanisms, agricultural processes or technical limitations in the production, storage, processing and distribution phases. “Food waste” refers to food fit for consumption that is consciously discarded at the retail, food service, and household consumption stages. Food loss tends to be bigger in the Global South and food waste in the Global North.

b) Targets and framework for action

While key actors emphasize that it is important to establish an accurate baseline before setting targets, and that more research is needed to identify critical points and take the most effective action, most experts and influential actors indicate that it is also time to move from measurement to action. Converging efforts towards a shared definition and measurement protocol are contributing to set up the baseline for FLW reduction targets. Following the SDG goal of halving FLW by 2030, many countries have committed to achieve similar reductions in FLW. The section “High Level Recommendations for a Shared Action Framework” (see below) highlights several policies and initiatives that show how governments, businesses, and citizens are converging toward adopting similar actions.

²⁶ <https://p4gpartnerships.org/content/wrap-global-awarded-further-funding-cut-food-waste-mexico>

Divergences and tensions: Unstable numbers and competing solutions

a) Scope

Many inconsistencies and tensions remain around the scope of FLW (Chaboud and Daviron 2017):

- **Definition of “food”:** What is considered “edible” is not unanimously shared. There are different ways to include inedible parts of products (e.g. are potato peels food waste?).
- **Avoidability:** Some definitional frameworks consider that food waste is “avoidable” or “potentially avoidable”, while food losses are considered “unavoidable”, but this distinction is not widely accepted.
- **Qualitative vs. quantitative waste:** Waste can be measured in terms of volume or weight, economic cost, but also qualitatively in terms of wasted nutrients and/or resources. Various organizations rely on different indicators based on whether their priority is food security, nutrition, environmental impact, or economic growth, for example.
- **Inclusion of Losses:** Pre-harvest losses are generally excluded from the scope of FLW, but if we take them into account, much more food would be lost at the production/farming stage than in current estimates. Losses have received less attention than waste, notably because many farmers do not perceive putting produce back in the soil as a form of loss or waste.
- **Animal feed:** There are different ways to account for different uses of surplus food, notably when it is used to feed animals. For example, “former foodstuffs” fed to animals are “waste” because they are no longer food for human consumption. But they re-enter the food chain via animal products, so they can prevent waste and create a synergy with other agricultural transformations, because it is an alternative to growing more cereals to feed animals.
- **Extended definitions of “waste”:** Some people have argued that, because animals require more calories of feed than they produce in food, animal agriculture that relies on crops that could feed humans is “waste.” Another more contested claim is that overeating is also a form of “waste,” while the potential classification of certain bodies as a kind of food waste is highly problematic. No major initiatives have adopted these definitions. A recent study also considers that if we took elasticity of demand into account (through physical activity and weight gain), consumer food waste may be over 500 Kcal per person per day globally, which is twice the current FAO estimate (Verma, De Vreede et al., 2020).
- **Cultural context:** While most researchers and professionals use the frameworks produced in North America and Europe, there is a lack of discussion on how concepts of “food waste” might vary between cultures.

b) Measurement

International organizations have developed common measurement standards such as the WRI’s Food Loss and Waste Protocol, which is in line with the work of the UK’s WRAP and the European Union, or the FAO’s Food Loss Index. Yet, while a few countries have established robust data on FLW, most countries struggle to aggregate and consolidate various data in order to establish national estimates. Many studies only offer rough approximations or obsolete numbers. As FLW patterns vary from one country and one region to another, and depend on the sector and type of food, several organizations have developed measurement methodologies tailored to their own context, for instance the Postharvest

Education Foundation, or LeanPath for food service wastes. Current international protocols acknowledge the variability of existing measurement methods and data.

The difficulty of measuring FLW is accentuated by the difficulty in accessing a wide range of data. At the production stage, most farmers do not measure farm loss beyond visual estimates. They do not assess the weight or financial costs of unsold products. Along the supply chain, most businesses are also reluctant to share confidential data because of competitiveness issues. Studies at the household level also rely on self-reported and not necessarily accurate data, without actual waste audits, and do not assess changes beyond the short-term.

c) Priorities and solutions

Tensions also exist about the main priorities and “solutions” to FLW. While policymakers have to focus their efforts with limited funds, priorities diverge depending on what the goal is. For example, reducing food waste may be the best way to reduce GHG, while reducing losses increases food security, especially in the Global South. But reducing losses could actually increase GHG emissions because of the additional quantity of food distributed to consumers—notably when increasing market availability causes prices to go down and demand to go up. A case study in Ethiopia, for example, revealed that there are trade-offs such as when lower levels of losses lead to higher levels of waste at the consumer level (Minten, Seneshaw, and Reardon 2020).

Recent frameworks on FLW generally establish one hierarchy of preferable categories of solutions: first, prevention (reducing agricultural surplus and overproduction in manufacturing and food service), then recovery (reusing for human consumption) and finally recycling (feeding animals, creating energy or compost). Yet, actors with different interests in food commodity chains actually develop competing solutions, both within and between three hierarchies based on environmental, social and economic goals. In the long term, solutions do not always achieve “win-win-win” benefits for all actors and at all scales. As opposed to “weak” prevention that relies on technical and logistical optimization of the current food system, “strong” prevention based on holistic changes in the food system may be the most sustainable solution to food surplus and waste (Mourad 2016).

Uncertainties

It is unclear how many countries in the Global South will address the FLW challenge. Some of them may follow the path of many countries in the Global North and increase FLW at the market and at the consumer level. For example, in Indonesia, a growing middle class shops in supermarkets rather than traditional markets, eats out and has bigger portions. It thus wastes more and more food. The country’s solution is similar to that of countries in the Global North: food banking, which allows for the overproduction of low-quality foods. Yet such changes are taking place in countries with both many more people and without centralized and modern waste management systems. The shift may be even less sustainable, but data on FLW in many of these countries is limited for now.

There is also uncertainty on how to link the FLW strategy with the circular economy agenda. While there are strong synergies between the two topics, such as recycling food waste into energy or composting organic materials, divergences and trade-offs notably exist between reducing FLW and plastic packaging (see description of synergies with other topics).

There also needs to be research on the rebound effect of reducing FLW outside of the food system. For example, if households buy less food that they currently throw away, will they use the money to buy other non-food products that are potentially even less sustainable?

4) High Level Recommendations for Shared Action Framework

Many actions have been implemented to prevent and reduce FLW. Yet, there has been very limited assessment of their effectiveness. Based on several experts' input (see list of interviewees), the following sections present a selection of possible reforms along with the associated challenges.

Policy Reform

a) Establish national targets and strategies that change the business environment

Governments could put FLW on the agenda as a way to achieve goals related to sustainability, climate, nutrition, and the development of a circular economy. Only a dozen countries have included FLW in their Nationally Determined Contributions (NDC) for climate²⁷. It is also important that leading countries disseminate expertise, infrastructure, and technologies.

A few countries, such as the UK and France, have set up a national baseline and a plan for action through multi-stakeholder collaboration. Voluntary public-private partnerships such as WRAP in the UK are often considered as effective as regulations.

Many regulations can contribute to a business environment more favourable to reducing FLW, such as regulating supplier-retailer contracts in order to prevent powerful supermarket chains from cancelling orders and/or exerting pressure on farmers, which generate overproduction and waste, including at the farm level in developing countries for export products.

Preventing FLW also depends on the regulation of expiration dates and labelling that influence products' shelf life. Evidence also suggests that making it mandatory for businesses to measure and report their overall FLW transparently would be particularly effective to identify critical points throughout the value chain and meet FLW reduction targets.

b) Reform agricultural and trade policies

Some agricultural and trade policies have resulted in overproduction, price distortion, and devaluation of food. Many experts blame subsidies that encourage the intensive production and/or importation of specific crops such as wheat, soy, and corn, often used to feed animals. For example, subsidized wheat and flour in North Africa leads people to overbuy and waste bread, or feed it to pigs (FAO, 2020). In developed countries, bread and baked goods are often available in such large quantities that even food banks do not collect them or throw them away.

Agricultural policies and resources could focus on reducing FLW before increasing production. Currently, most of the investment from governments, large companies, and international organizations, as well as extension services and training, are still focused on growing more food and increasing productivity. It is generally more profitable for producers to discard their harvest rather than risking lowering prices in case of overproduction. Supply management—linking production to demand through quotas, for example—has not been considered as a strategy to reduce FLW.

²⁷ See : <https://www.climatewatchdata.org/ndcs-sdg?goal=12>

Challenge: Agricultural and trade policies are particularly difficult to tackle as they have long been established and depend on international relationships and power dynamics between interest groups.

c) Support donation and redistribution of good, nutritious food

Policies can support donations of surplus food by providing guidelines and removing barriers related to safety concerns and liability for donors. For example, the U.S. has long had a “Good Samaritan Law” that protects donors from lawsuits.

Recently, some countries have taken a step further by making donations mandatory and/or preventing businesses from destroying edible food. The 2016 French Food Waste Law makes it mandatory for supermarkets to sign a contract with redistribution organizations and they may receive sanctions for destroying edible food; 2019 California Senate Bill 1383 states that local jurisdictions need to recover 20% of surplus edible food.

Challenges: Regulations are not sufficient without appropriate funding for infrastructure and supporting the workers of redistribution organizations. It is also important to encourage donations of *nutritious* food to break the cycle of overproduction. Policies should discourage donation of low-quality food or what would normally be “trash”, such as bruised produce that food rescue organizations then have to throw away, “mismanufactured” products donated to “second-class” citizens who are the most vulnerable, or even large quantities of candies or soda (for which donors receive tax incentives calculated based on the weight of donations). These products raise concerns of equity and are counter to dignified and healthy food access as a human right.

d) Support reuse for animal feed, recycling, and composting

Specific regulations could further facilitate the transformation of food and food by-products no longer suitable for human consumption into animal feed in a safe and sustainable way. In particular, the [European Former Foodstuff Processors Association](#) advocates for authorizing small percentages of packaging residues and ruminant gelatin (currently banned), so that cookies with incorrect shapes or surplus seasonal candies, for example, could provide high-energy content to feed pigs. This would allow the use of more than 100,000 additional tons of former foodstuffs in the EU. Safe animal feed should exclude animal proteins, catering waste, and intra-species recycling.

Strong regulations against organic waste in landfills and incinerators have been proven to encourage local governments to support FLW prevention and recycling. In California, for example, where many cities and counties have implemented separate organic waste collection and treatment.

Composting at various scales (household, neighbourhood, municipality, county) is a particularly sustainable strategy as it supports the return of nutrients to the land, and results in biologically active soil that will help sequester carbon. Some places also invest in anaerobic digestion facilities to transform waste into energy, which also contributes to a circular economy.

Challenges: The emphasis on recycling may disincentivize prevention. For example, former foodstuffs still suitable for animals tend to be diverted to “waste-to-energy” facilities, which receive higher subsidies and incentives (see below). Some recycling and composting systems also have negative environmental impacts, notably due to soil health issues related to contamination rates in industrial composting facilities or in the digestat of waste-to-energy facilities. An additional challenge may be the

increase of biodegradable foodservice products that composting facilities are not able to process (see Trends in composting in Goldstein and Coker 2020).

Financial reform

a) Reveal the true value of food

True cost accounting to reveal the impacts of FLW is needed to change the way we value food. This requires promoting quality over quantity, seasonality over convenience, livelihoods over profits, and local availability over imported abundance.

Changing the way we shop, in the Global North and increasingly in the Global South, may also reduce consumer waste. Large retail chains tend to encourage shoppers to over-purchase via promotional offers or bulk formats (notably in stores like Costco). The expected growth of online shopping in the following years can reduce “impulse” buying, but it also reinforces a disconnect between citizens and the true value of their food.

Challenge: Food waste is the symptom of an unequal world. Food needs to be more expensive so farmers and food service workers can make a living wage and, in turn, access appropriate food. Significant profits from the food system are centralized within a handful of companies that often pay little in taxes. Healthy food could become a public good for citizens through subsidies that prioritize and lower the cost of healthy food, guaranteed incomes, school food programs, public and local procurement strategies, etc.

b) Invest in infrastructures and training

According to the Postharvest Education Foundation, an estimated 500 million small farmers produce 80% of the world's food, and 40% of what they produce is lost during the harvest. Postharvest handling, storage and/or on the journey from farms to markets. It is essential to improve infrastructures, access to electricity for cold storage, processing technologies, and access to credit so people can invest in improved efficiency especially in the Global South. Modernizing supply chains could not only reduce losses but also improve recycling.

The Foundation calls for more funding and support to train smallholder farmers and businesses, for example through extension services or specialized consultants. Governments and businesses as well as international organizations could provide investments, loans, and incentives for capacity building on FLW reduction (e.g. e-learnings, workshops, etc. for food system professionals).

c) Incentivize food donations

Tax incentives for food donations have been effective for manufacturers/retail, but could be better tied to the quality of the food. For example, the French law requires supermarkets to sort their produce and donate products 48 hours before their expiration date. Specific additional incentives for farmers also help increase the amount of fresh food available to food banks. Several states in the US and Canada have implemented such incentives.

Challenge: Tax reductions are generally less effective for farmers who often operate at a loss and/or do not have the capacity to go through the paperwork.

d) Re-think the incentive structure for recycling

Increasing the cost of landfill/incineration, while collecting everyone's waste, encourages cities to support waste prevention or recycling of organic waste. The "tipping fee" for disposal has to be higher than the cost of redistribution and recycling. Yet, the cost of recycling and composting should also be high to encourage prevention. For example, South Korea has implemented mandatory recycling and a "pay by the weight" system for organic waste, which led to a reduction of 10-15%. Prevention makes disposal costs go down, which benefits businesses, local governments, and citizens.

Re-using food for animal feed should also be incentivized above waste-to-energy (anaerobic digestion), which benefits from high subsidies for renewable energy. Currently, food manufacturers tend to turn to energy producers even when their by-products are suitable for livestock.

Challenge: Increasing waste disposal and recycling fees may have a more negative impact on smaller businesses that cannot cover additional costs.

Business practices

a) Tackle food losses, not only in the Global South

Agricultural strategies can be implemented to reduce losses, such as Climate Risk Agricultural Zoning and Crop-Livestock-Forest Integration, which have been implemented in Brazil. Many countries would benefit from higher coordination of supply chains, with centralized storage and processing. A number of business initiatives have emerged to improve infrastructures, such as the Global Cold Chain Alliance that improves cold chains in rural areas to reduce loss. Processing technologies allow farmers to preserve produce for longer periods and prevent quantitative loss—even if transformation processes may imply a qualitative loss in taste and nutrients (e.g. tomato sauce does not have the same nutritional value as fresh tomatoes). Storage positively affects food and nutrition security by allowing food to be available for longer and reducing negative seasonal changes in diet (Tesfaye and Tirivayi 2018), while offering protection when crises disrupt food chains.

Food loss also exists in the Global North, as a result of overproduction to mitigate risks, stringent aesthetic standards, lack of processing facilities, or difficulties in recruiting seasonal workers at the right moment to harvest produce.

b) Measure and establish the business case for reducing food waste

Businesses that track FLW are more likely to take action to reduce it. For example, the Leanpath tracking tools provide businesses with information on how to better fit supply and demand, as well as FLW's financial and environmental impacts over time, which helps mobilize workers as well as clients. Businesses could invest in FLW prevention through dedicated technologies and staff.

Retailers often see the business advantage of reducing FLW. Studies led by WRAP in the UK showed that even if consumers/clients reduce food waste and potentially buy less food, retailers still benefit from their loyalty and higher-price purchases, for better quality versions of their food, other foods, or other purchases—which also have environmental impacts.

c) Develop alternative models to sell food

Retail strategies to reduce FLW include selling items at a discount price before they expire, getting rid of “Buy One Get One Free” options, improving products’ labels and best before/expiration dates, and using “imperfect” products or parts of the products that are often thrown away, including in prepared foods.

Challenge: Actions such as selling imperfect products have significant impact in terms of awareness, but are separated from ‘perfect’ versions and therefore not very effective in terms of quantities and logistics. While supermarkets are the main food distribution channel in many countries and push people to buy in large quantities, the horizon of where we obtain our food needs to be expanded. There are alternatives, from coops to community farms to “zero waste” stores.

Challenge: Developing alternative food channels requires changes in urban planning, which has increased the spatial and psychological distance between cities and agriculture and food. Countries in the Global North could learn from countries in the Global South strategies for improving urban-rural connections.

d) Mobilize innovations and technologies

Innovative agricultural and processing technologies can decrease FLW, such as “Smart harvesting” that tracks maturation and optimize harvests, preservation techniques such as edible coating for fruit (Ex: Apeel), or smart packaging to increase product shelf life and improve consumer decisions.

Manufacturing innovations also make it possible to (re)use more by-products, for example by making beer with old bread, or using spent grains from alcohol production to make granola bars.

The use of blockchain can help match supply and demand through dedicated data-sharing platforms.

Many start-ups such as Olio and TooGoodToGo have also developed technologies that play a match-maker role for food redistribution.

Challenge: Technologies do not tackle the issue in a holistic way, and sometimes only contribute to the optimization of current, inefficient systems. Innovative models have not been evaluated in terms of their effectiveness compared to traditional food redistribution.

e) Develop redistribution, reuse, and recycling without encouraging overproduction

While tensions exist between different solutions to FLW and various hierarchies of food surplus use (see part on divergences), businesses can create value from redistributing and recycling food. Food donations are often a privileged solution, despite the following limitations:

- Food redistribution is already the symptom of overproduction, including Global South countries that are developing food bank networks, such as Mexico and Indonesia.
- Food banks’ impacts have not been sufficiently assessed, since they are measured in terms of volume or quantities of meals, regardless of the nature of the food. There is no measurement of food thrown away at food banks and charities.
- In some instances, competition exists between donating the surplus, which is still fit for human consumption, or selling it to make animal feed. It is the responsibility of the food manufacturer to make the effort to donate.

Supermarkets as well as manufacturers can find uses for by-products that are not fit for human consumption, including sending them to make animal feed. More informal systems exist in developing

countries, despite the lack of centralized infrastructure, such as feeding food by-products to pigs or goats. Additional innovative uses of food scraps consist in feeding them to insects (such as black soldier flies) that in turn constitute a source of protein and nutrients for other animals (Palma, Fernandez-Bayo et al. 2019).

Local infrastructure for waste collection and recycling is key. For instance, used frying oil is generally collected in high income countries to make biodiesel. In Europe, centralized operators generally collect for the city, while the U.S. has a decentralized system. Waste collection depends on the specificity of the local context. For example, there is a separate bread collection in Rotterdam because bread attracts seagulls.

Communication and awareness

a) Communicate to farmers, businesses, and investors

Many farmers and small businesses do not adopt solutions because of a lack of information and efficient training on what infrastructures are available and/or on how it would improve their returns. Industries and investors need measurement and indicators as well as “storytelling” based on case studies from successful businesses.

It is important to construct a positive image of recycling practices, such as feeding food by-products to animals. Former foodstuff companies are often seen as waste brokers and not well respected in the world of feed. Yet the practice has positive environmental and nutritional impacts.

b) Drive behavioural change through effective communication and citizen education

The most effective campaigns are not just about awareness but offer concrete actions. For example, the “Love Food Hate Waste” campaign in the UK tailored messages to specific groups and behaviours and engaged retailers in providing households with tools, tips, specific packaging, recipes for leftovers, and guidance on storing food. It helped reduce FW by 31% (1 million tons per year) for households between 2007 and 2012, and is now used in eight countries and in three languages.

Measuring the impact of campaigns will help better target specific behaviours and develop appropriate strategies. For example, expiration dates have been a major topic in campaigns, but are not actually a big contribution to food waste (about 5% of food waste in the home). One study in Canada showed that awareness campaigns or workshops were less effective than a “gamification” operation to change behaviour (Li 2020). The impact of education campaigns also has to be evaluated over the medium or long term.

Education on FLW prevention could also be included in school curriculums and professional training. For instance, France established dedicated curriculums in culinary schools.

Challenge: Changing social norms takes time. FLW are complex and many people feel that their own actions do not matter. It is important to give an ethical value to food, which tends to be too cheap in the Global North. These messages might change with the economic crisis following the COVID-19 pandemic.

c) Adapt messages and means of communication to the local context

Many countries still have not developed large awareness and education campaigns among businesses and citizens. In countries with large inequalities, such as in Indonesia, Brazil, and the Middle East,

communication campaigns have to be targeted to a growing middle class that wastes the most food and not lower income groups that cannot afford to waste.

Cultural issues also have to be addressed. In many countries, it is seen positively to have too much food at large events and parties (see for example Baig et al. 2018).

The means of communication themselves have to be adapted to the local context. For example, e-trainings do not make sense for farmers in rural areas with no internet.

5) Potential synergies for food system transformation: Connection between food loss and waste and other “hot topics”

Nature-based solutions

Reducing FLW supports nature-based solutions because it decreases demand on land and resources. It allows us to repurpose the land we have for nature-based solutions. Agriculture could be more regenerative and agroecological, enhancing positive environmental and health benefits even if yields drop slightly: We could tolerate a lower productivity per unit if we did not waste as much. This needs to be associated with good processing and preservation methods, which also makes products available for longer periods of time and decreases pressure on food systems. Such an overall change toward nature-based solutions challenges the political power of the food industry.

On the other hand, nature-based solutions support reducing and recycling FLW. Agroecological systems and regenerative agriculture incorporate food by-products to feed animals, put organic matter back to the soil and/or for anaerobic digestion to make biofuels. The effort to produce food with minimal environmental damage and to value resources creates a strong incentive for farmers and citizens to respect and not to waste food.

Reducing FLW requires regenerative, closed-loop cities or neighbourhoods as well as regenerative farming. Both require designing and organizing space in a certain way, for example leaving room to put food scraps into the soil near markets and housing. Developed urban centres need to manage waste in a local way at the same time as they re-localize food production. Other synergies may emerge by recycling human and organic waste from urban areas. For example, the East Bay Municipal Utility District (EBMUD) in California jointly processes food waste from businesses, households, and human waste from the wastewater system.

Just transitions for farmers and local communities

While conversations on FLW are focused on big actors and large companies mostly from the Global North, there is not enough conversation on smallholder agriculture, equity and community. Diversity, abundance, and consumer waste in developed countries rely on unequal international trade relationships and highly-centralized, demand-driven markets where retailers can cancel orders, for example, with little transparency. This generates losses of food, land, and resources for smallholder farmers in developing countries. Currently, for example, bananas from developing countries are thrown away in developed countries when they only have a black spot, because of their low price. If consumers in developed countries paid the true cost of food and supported farmers and local communities, less food would be lost.

Reducing food waste could increase food availability especially in the Global South, with more storage, transportation, and processing capacity allowing to sell food for a longer period of time. It could therefore help subsistence farmers and consumers.

Building up regenerative systems that waste less resources will rely on stronger connections between rural and urban areas.

Sustainable and healthy diets

Sustainable and healthy diets and FLW are closely linked topics and a lot of companies engaged in promoting more sustainable diets are also increasingly committing to reducing FLW.

More sustainable and healthy diets consist of less animal products, more plant-based proteins, and more local and seasonal products. They require less resources, in particular to feed animals (which arguably constitutes a form of waste), and make it more difficult to overconsume: “Buy 1 get 1 free” is rarely “buy one broccoli get one free”, but usually ultra-processed items. In the Global South, strategies to reduce food losses generally improve diets by allowing healthy food to be stored and available for longer (e.g. tomato sauce, dried greens, etc.).

Overeating and/or poor diets may be seen as a form of waste not only of calories but also nutrients. Having more appropriate portion sizes would both reduce food waste and address the environmental and public health impacts of poor diets. Yet, presenting overeating as a form of waste is problematic because it tends to stigmatize overweight people, and because the function of food is not just to eat the optimal number of calories. Eating has a much broader social function.

On the other hand, some elements of more sustainable diets might result in more food waste, through a higher consumption of fruit and vegetables and pulses that are all more perishable. This also depends on the commodities that we include in healthy diets: apples last a long time, whereas kiwis do not. It is important to have consistent messages connecting diets to FLW.

Discussions should accept that the optimal rate of FLW is not zero, although identifying it exactly is a difficult question to answer. To ensure food security and safety, we need a buffer of food that may be wasted, as the case of COVID-19 reminds us. Extending sell-by dates for milk could substantially reduce waste, but there is a potential trade-off with safety.

Industrial livestock production

Current industrial systems generate overproduction of grains and soy that lower the price of meat. Although meat is not wasted at particularly high rates at the household level, its resource intensity means there are big gains to achieve in terms of resource efficiency of its production. Feeding animals is high in the hierarchy of food surplus use, notably compared to waste-to-energy or composting, because organic materials re-enter the food chain. Thus, industrial livestock production needs to rely on food by-products and on materials that are not in competition with food production directly for humans. Lifecycle analyses are all the more favourable to using former foodstuff to feed livestock because the methodology does not include the impacts occurring before food production.

Industrialized countries have a “former foodstuff” industry and large-scale feed manufacturing for compound feed. In Europe, EFFPA plans to use 7 million tons of food to feed animals by 2025: key challenges include avoiding competition from the waste-to-energy sector and allowing more products to

be used. Japan has a high use of food scraps for animals, including catering waste. Businesses are also developing creative use of by-products to reduce FLW and produce sustainable protein, by using insects or seafood, for example.

Using food scraps to feed animals is also common practice in rural areas and in developing countries where scraps go directly to farmers (e.g. informal circuits to feed goats in Egypt, pigs in Peru).

Another hot topic: Circular economy, packaging and plastic pollution

The Circular Economy community, notably the Ellen McArthur Foundation's Cities and Circular Economy for Food initiative (Ellen MacArthur Foundation, 2019), addresses both FLW and packaging materials. Plastic pollution in particular has received a lot of attention. Yet, there is an apparent trade-off between reducing food waste and reducing plastic packaging.

Packaging preserves food effectively with single-serve, breathable, or reusable/resealable packaging and sometimes reduces food. When this kind of packaging is needed, we also need to maximize biodegradable materials or recycling. Lifecycle analyses show that wasting food is worse than wasting packaging—but this assumes that we are wasting one or the other.

In fact, the need for packaging to extend shelf life and allow food to travel for long distances relies on a certain model of industrial food production and global food distribution networks. We eat high quantities of food that was not intended to last as long, such as meat and dairy. With shorter food chains, shelf lives could be regulated and restricted to prevent both food and packaging waste.

Packaging is a problem for reusing and recycling food. It contaminates food scraps and compost, which require a high level of purity to be usable. For example, in Indonesia, any food waste or scraps used to be fed to animals or buried in the ground, because packaging was biodegradable (e.g. banana leaves), but the advance of plastic packaging has made this difficult. In the EU, there is also a regulation to prevent animal feed contamination with plastic residues.

Interviewees mentioned that while the concept of "Extended producer responsibility" has never been applied for food, it works for packaging and may be an opportunity to explore.

6) Conclusion

With a decade of studies available to quantify, measure, and evaluate the causes of food waste, it is time to move from knowledge to action and commitments. Key drivers of change to reduce FLW will increase food systems sustainability while creating synergies with healthy diets, regenerative agriculture, just transitions, and sustainable livestock production.

JUST TRANSITIONS

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Introduction

‘Just Transition’ is a framework developed by the trade union movement to encompass a range of social interventions needed to protect workers’ rights and livelihoods in the transition to a low-carbon climate-resilient economy. To meet climate goals, sectors such as energy, manufacturing, agriculture and forestry, which employ millions of workers, will need to restructure. Investments in mitigation and adaptation are expected to lead collectively to economic transformations that have profound long-term effects on economies and societies, with important consequences for different socio-economic groups. A ‘Just Transition’ aims to protect workers and their families in the transition by providing new skills and employment opportunities of the same or better quality (see Box 1). The concept has been expanded to encompass a broader and more fundamental transition to ecologically sustainable, equitable and just economies for all, that addresses structural inequalities in governance systems (Movement Generation, 2016). Similarly, the International Labour Organisation’s (ILO) Guidelines for a Just Transition speak of a “Just Transition for all”, not just organized workers (ILO, 2015).

The ‘Just Transition’ has mainly been applied in fossil fuel and car manufacturing sectors. It is now being applied to food systems, which contribute 21-37% of greenhouse gas emissions – mainly from industrial livestock production, but also from deforestation, agrochemicals and energy use (IPCC, 2019). In food systems, it means supporting workers and producers in the transition away from industrial practices, and supporting vulnerable farmers impacted by climate change to transition to more resilient livelihoods. Many farmers are already experiencing significant livelihood losses and some may have to abandon farming (IPCC 2019; FAO, 2019). A Just Transition means transitioning towards more sustainable and equitable food systems, and enhancing support for existing localised food systems that are low carbon, agroecological and provide food, socioeconomic, health and community care benefits to smallholders, but often face policy constraints (Anderson, 2019).

The IPCC Special Report on Climate Change and Land concluded that in an era of climate change, agriculture must move away from intensive and industrialised approaches towards food systems based on agroecology and less and better meat (IPCC, 2019). Similarly the 2019 IPBES report concluded that feeding humanity and conserving nature are interdependent goals that require transformations towards sustainable agriculture (IPBES, 2019). There are huge inequalities in food systems as wealth is concentrated in a few large agri-business corporations, and food insecurity is rising (FOLU 2019; FAO 2019). Over 2 billion people face food insecurity and 820 million go to bed hungry, and many of these are smallholder farmers and agri-food workers who produce food (FAO, 2019). Many farmers and workers feel that their livelihoods are already precarious, squeezed by more powerful buyers and retailers (Anderson 2019). A Just Transition means enhancing equity in value chain relationships and the organisation and negotiating power of vulnerable producers.

The COVID-19 pandemic highlights how economic shocks are hardest felt by small businesses, the self-employed, and particularly by informal and migrant workers who get no formal support or social

protection when jobs and livelihoods are lost. These inequitable impacts mirror broader food systems dysfunctions. COVID-19 is also putting livelihoods at risk through containment measures that prevent farmers from harvesting, border closures, and disruptions in domestic and export markets.

Box 1 - Just Transition: Definitions and Policy Context

The **International Trade Union Confederation** (ITUC) has defined a Just Transition as a tool “aimed at smoothing the shift towards a more sustainable society and providing hope for the capacity of a green economy to sustain decent jobs and livelihoods for all”. In 2010, the ITUC Congress declared Just Transition to be the approach to fight climate change: “Congress is committed to promoting an integrated approach to sustainable development through a just transition where social progress, environmental protection and economic needs are brought into a framework of democratic governance, where labour and other human rights are respected and gender equality achieved”.

The preamble to the **Paris Agreement** states that Parties are “taking into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities”.

The 2015 **ILO Guidelines** for a Just Transition towards environmentally sustainable economies and societies for all, state that the greening of economies requires a coherent country-specific mix of macroeconomic, industrial, sectoral and labour policies. The aim is to generate decent jobs along the entire supply chain with employment opportunities on a wide scale. As sustainable development cuts across several domains, it needs to be addressed across all policy fields. Institutional arrangements are needed to ensure the participation of all the relevant stakeholders at all levels.

The **UK Committee on Climate Change** has suggested a wider definition that incorporates impacts on consumers and cost of living considerations, to ensure the transition does adversely affect poor groups through rising fuel costs and fuel poverty.

In Global North countries and some Global South countries (e.g. Brazil), a Just Transition entails shifting from industrial livestock practices to agroecology and mixed farming and offering alternative green employment, as well as addressing social justice, farmworker justice, health and economic equality. In all countries, it means addressing unequal relationships in supply chains, and enhancing support for localised, agroecological food systems. It also means tackling structural racism, as food systems labour is often racialised, gendered and reflects class divisions, and improving conditions for migrant workers. For Global South countries with low industrialisation and emissions, a Just Transition means supporting vulnerable people (eg. smallholders, Indigenous Peoples, pastoralists, plantation workers) to enhance resilience, diversify livelihoods, or move into other sectors, and enhance local control of food systems and protect the commons.

Most farmers and workers in the Global South are informally employed with no labour contract or social protection²⁸ and poor working conditions. Informal food workers include poor traders who are highly

²⁸ Informal workers do not have adequate social protection, eg. healthcare, occupational health and safety, and are usually paid below minimum wage, particularly in Asia, Latin America and Africa.

vulnerable to climate related price spikes (see Box 2). Formal job losses may occur, for example due to reduced demand for air-freighted produce, but these are likely to be a minority in largely informal economies. A Just Transition also means recognising that industrialisation of the dairy and livestock sector in the Global South poses a huge threat to climate and jobs. Mechanisation of crop farming can also displace vulnerable farmers and increase emissions.

Social dialogue is central to a Just Transition, to ensure impacts on workers and vulnerable groups are identified and addressed. A key lesson from the energy sector is that it is very difficult for governments to understand exactly what impacts transitioning will have on different groups without actively involving them. Unless the impacts are addressed, the people affected will continue to be blockers of change, as in the case of the ‘gilet jaunes’ in France. This means not only talking to businesses, but also engaging unions, informal workers and vulnerable consumers in meaningful policy dialogue.

Box 2 - Just Transition for Informal food workers

Many informal food workers are traders. Climate change can create a lot of price volatility – e.g. seasonal fluctuations and sudden peaks. Smaller traders can be very badly hit when prices go up and consumers are not willing to pay more. For example, if the price of animal fodder goes up they would be ‘squeezed’ and may have to exit the sector. The livelihoods of traders, processors and producers may be affected if certain crops become scarce due to climate change; or if the costs of cheap imported products go up (e.g. soya feed from Brazil). Poor urban street food consumers are also very vulnerable to price increases. For the very poor (e.g. street vendors), climate change will exacerbate vulnerability and a Just Transition means providing a basic minimum of social protection (e.g. income security, social assistance, pension and healthcare schemes). The more entrepreneurial informal sector (e.g. traders in a market), are likely to have some sort of federation and could be retrained through their organizations.

Landscape Analysis: Just Transition Actors and Initiatives

The ILO is a UN agency that represents governments, workers and employers. Its [Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All \(2015\)](#) emphasise that a Just Transition “needs to be well managed and contribute to the goals of decent work for all, social inclusion and the eradication of poverty”. They note that the greening of economies has the potential to be a new engine of growth, and a net generator of decent, green jobs that can contribute significantly to poverty eradication and social inclusion. They include overall guiding



principles for a Just Transition (see Appendix 1 - LINK), and guidelines for key policy areas: i) macroeconomic and growth policies; ii) industrial and sectoral policies; iii) enterprise policies; iv) skills development; v) occupational safety and health; vi) social protection; vii) active labour market policies; viii) rights; ix) social dialogue and tripartism. The ILO also supports the Just Transition through its country work to promote the employment quality agenda (eg. wages, safety and health) and international labour standards and conventions (eg. ILO Convention 169 on Indigenous and Tribal Peoples). It promotes policies that support employment for Indigenous Peoples, women and refugees, and help address inequality; and employment intensive investment schemes which boost local economies and employment, including schemes for agricultural resilience building.

The **International Trade Union Confederation (ITUC)** is supporting countries to develop Just Transition plans. It has identified [5 Key principles of a Just Transition](#):

- Research and early assessment of social and employment impacts;
- Social dialogue and democratic consultation of social partners and stakeholders;
- Active labour market policies and regulation, including training and skills development;
- Social protection, including securing of pensions;
- Community renewal and economic diversification plans; and sound investments leading to high quality, decent jobs.

The ITUC's Just Transition Centre has been supporting Just Transition planning for coal miners in South Africa, with government, employers, workers and communities; and is supporting Nigeria's Labour Congress to explore a Just Transition for the energy and agriculture sectors. ITUC Africa is encouraging African countries to explore a Just Transition in agriculture as this is the bedrock of their economies, but there are as yet few concrete examples.

The **International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations (IUF)** is a federation of trade unions that represents workers in these sectors. It is exploring how to manage a Just Transition in intensive livestock production so there can be planning in job changes, training support and placements. It aims to be on the ground negotiating the changes, so its members do not become victims of change.

Trade Unions represent formally employed workers in national Just Transition dialogues. Although they tend to regard the Just Transition as applying to formal sectors, they have started to reach out to informal groups (eg. rubbish pickers) to get them more involved in the union movement and related dialogues.

Governments: 54 governments signed the 'Solidarity and Just Transition Silesia Declaration' during COP24 in Katowice, Poland, in December 2018. At the [UN Climate Action Summit 2019](#), 46 countries made commitments to formulate national plans for a Just Transition through social dialogue and creating decent work through green jobs. At COP25 in Madrid in December 2019, the UN [launched a Climate Action for Jobs Initiative](#), with the ILO, governments, the Institute of Education (IOE) and ITUC, which the ILO has been tasked with leading. According to the ITUC, the best Just Transition processes have been in New Zealand, Scotland, Canada and Germany. New Zealand set up a Commissions' process to develop policies with all stakeholders involved, including union representatives. The Pacific countries Just Transition Plan is about resilient agriculture, justice, equity and inclusion; and Ireland has developed

a Just Transition Plan specifically for agriculture. Europe's Green New Deal emphasises employment issues, including the idea of supporting people to transition.

Investors: Many investors in the public, private and third sectors have made commitments to implement a Just Transition. More than 140 investors with US\$8 trillion in assets have signed an international statement to support a Just Transition. Multilateral development banks published a high-level statement at the 2019 Climate Action Summit, which included a commitment to “continue working with national development banks and other financial institutions, to develop, by COP26, financing and policy strategies supporting a Just Transition that promotes economic diversification and inclusion”. The World Bank is now helping countries make a green and Just Transition, and the European Investment Bank is investing towards a green economy.

Civil Society Organisations: Action Aid has developed a set of [Principles for a Just Transition in Agriculture](#) (Anderson 2019) which provides one of the few comprehensive sector-specific guidances. It's Just Transition principles and strategies align with and complement the Global Alliance's principles for transitions to agri-food systems that are healthy, equitable, renewable, resilient, diverse, inclusive and interconnected:

1. **Address and don't exacerbate inequalities:** The transition to climate-friendly forms of agriculture should not be a burden for vulnerable farmers and workers, but should address inequalities. For example, by providing support to smallholders practicing agroecology, and to women facing particular barriers and burdens; and addressing existing inequalities that concentrate land and wealth while leaving people hungry. A Just Transition must address the root causes of hunger, including structural economic policies that disadvantage smallholders and women.
2. **Transform the food system to work for people, nature and the climate:** To avoid climate disaster, food production will need to be transformed so that it no longer harms nature, soil, human health and the climate. This means supporting farmers to transition to agroecology through enabling policies such as seed laws that support local seed systems, improved smallholder access to markets, and shifting subsidies away from chemical inputs and larger industrial farmers. The transition to better meat production and plant-based foods must also protect jobs; and occupational safety and health issues in agriculture should also be addressed. The principles of 'food sovereignty' can provide the basis for shaping a food system that works for farmers, workers, consumers and the planet.
3. **Ensure inclusiveness and participation in planning and governance processes:** A Just Transition gives marginalised groups a seat at the table when defining what food systems will transition to, and how that transition is achieved – this is critical to ensure the needs of the most vulnerable groups are identified and prioritised. It recognises the knowledge and leadership of smallholder farmers, who provide up to 80% of food supply in Asia and Sub-Saharan Africa through largely agroecological practices (FAO, 2012; IAASTD, 2009). An essential first step is to map the many different stakeholders who are likely to be affected by changes, including local farm workers, seasonal and migrant workers, traders, consumers and young people. Stakeholders need to be actively engaged to generate shared ownership and ensure the issues are tackled systematically.
4. **Develop a comprehensive framework of inclusive policies, training and social protection:** Assessments should be conducted to understand transition impacts on different agri-food sectors, including job losses, job creation opportunities and skills needed. Budgets need to be established for training, education, reskilling and extension support, eg. to convert to agroecology or agroforestry,

produce different types of crops or livestock, reach new markets or shift into new sectors. Ensuring social protection or temporary jobs through public employment programmes is crucial to overcome resistance to transitioning – e.g. to compensate for temporary yield and income losses in the first years of transitioning to agroecology, provide job guarantees, income support and pensions. Ongoing evaluation and learning from policy implementation and outcomes should continuously inform policy design and review.

Multi-stakeholder collaborations: Under the UK’s co-leadership on Resilience and Adaptation for the UN Climate Action Summit, a Just Rural Transition (JRT) initiative was launched in September 2019, bringing together governments, companies, civil society, farmers groups and Indigenous People to support a growing global ‘community of purpose’. The [2030 Vision Statement and Principles for Just Rural Transitions](#) was endorsed by over 50 entities, including Colombia, Ethiopia, Ghana, Mars, Nestle, Olam, Unilever, World Bank, MacArthur Foundation, CGIAR, GEF, Indonesia Farmers’ Association, Rainforest Alliance, WRI Rights and Resources Initiative, World Farmers’ Organisation and WWF International. The Vision aims to transform how food is produced and consumed and how land and natural resources are used to enhance resilient livelihoods and create jobs in the rural economy; encourage sustainable food production; promote good stewardship of land, forests, oceans and the protection and restoration of critical ecosystems; and reward people for actions to protect the environment. The Principles include supporting Indigenous and community land tenure and “embedding a strong focus on job creation, equity and social justice within the transition to sustainable food systems and land use and the provision of sustainable and healthy diets” ([see Appendix 2](#)). They build on FOLU’s ‘Growing Better’ report which identifies ten critical transitions to transform food and land use to sustainable and healthy diets and feed the global population within a 1.5 degree global warming limit by 2050 (FOLU 2019).

The UK Department for International Development (DFID) has announced £9.6 mil to support this initiative over the coming three years. A Secretariat at Meridian Institute will support the JRT community of practice. Other elements include a Policy Action Coalition (PAC) which is supporting governments who want to reform agri-food support systems including subsidies, price support measures and policies. Subsidies for chemical inputs amount to billions of dollars – the aim is to re-purpose these public funds for better use and reward farmers and producers for supporting public goods such as biodiversity and nutritious food. The PAC focuses on both Northern and Southern countries and promotes learning between all countries. It is also looking into agrobiodiversity. This needs to be addressed at the national level where trade-offs need to be made to protect vital ecosystems.

The PAC will work closely with Technical Assistance from the World Bank to Realign Agricultural Policies and Support for Sustainable Food Systems. This will expand the global analysis of agri-food support, develop a toolkit for practitioners, and provide support to selected countries to conduct in-depth technical analysis, country-level modelling, assess capacity needs and support. Also part of the JRT initiative is an Investment Partnership Network currently being developed by the World Business Council for Sustainable Development (WBCSD). It will focus on how to mobilise investment to support for JRTs, by:

- 1) Developing and aligning investment criteria to support JRT, developing short guides, and incorporating criteria for JRT into Principles for Responsible Investment.

2) Identifying investment opportunities and facilitating scaling of proven models, by providing seed funding. For example, the Sustainable Rice Landscape initiative is exploring sustainable rice production models that capture mitigation opportunities and protect crops and ecosystems.

Business: Many international companies have zero carbon and SDG commitments, which provide the basis for dialogue on a Just Transition. As one example, Olam International, a commodity trader and producer which works in 67 countries in Africa, Southeast Asia and Latin America, is not using the ‘Just Transition’ term much, but is trying to tackle similar issues by enhancing sustainability and improving smallholders’ livelihoods. Commodities such as cocoa and coffee are affected by climate change “there are many crops for which crop failure has become a significant issue”, so enhancing resilience is key.

Convergences and Divergences

This section reviews the main convergences and divergences, as well as key tensions in the global discussion about a Just Transition for agri-food systems.

The need for a Just Transition: There is broad agreement amongst different stakeholders that the Just Transition framework needs to be applied to agri-food systems, and that this includes reducing emissions from livestock in the Global North and enhancing resilience for vulnerable groups, as well as ensuring labour rights and social justice for workers. There is also broad consensus on the need to enhance food security in the Global South, and promote more sustainable and equitable food systems. However, some Global South countries, for example the Least Developed Country (LDC) negotiating group engaged in the climate negotiations, are not keen on the term ‘Just Transition’ because they feel Global North countries have used ‘energy transition’ to delay mitigation commitments. They don’t see a Just Transition in food systems as a priority for LDCs but rather emphasize the importance of “sustaining food, fulfilling future needs and feeding people with existing and future climate risk”. This may reflect a narrower interpretation of the Just Transition concept within the climate negotiations.

Agroecology versus industrialisation: There is less agreement on how to enhance climate resilience and food security in the Global South, and which agricultural models are needed to facilitate a Just Transition. NGOs, Indigenous Peoples’ organisations, multi-stakeholder collaborations and trade union organisations (e.g. IUF) advocate for agroecology as it improves soils and water availability, enhances biodiversity, reduces risk and greatly reduces chemical inputs (Andersen 2019, FOLU, 2019). Agroecology has been widely endorsed by scientists for delivering economic, environmental and social goals, including by the [World Bank-led global agriculture assessment \(‘IAASTD’\)](#), the FAO, [IPCC](#) and [IPBES](#). Although yields may be lower in the short term, agroecology and diversification enhances stability of yields, lowers input costs and benefits diets by providing diverse and nutritious food (IPES-Food 2016). ILO suggests that agroecology could be subsidised by temporary employment in public investments to build infrastructure needed (eg. irrigation schemes). Many smallholders have developed resilience strategies based on reviving agroecological practices, stewarding ecosystems, and diversifying crops (Altieri and Koohafkan, 2008; Swiderska et al, 2018). Some governments (eg. Mexico, India, Cuba) and farmers are also advocating for regenerative agroecological practices. Some actors argue that industrialisation has actually undermined food security (Anderson, 2019).

A number of Global South agriculture ministries, agri-business corporations, agricultural research organisations and some donors are advocating for intensification of agriculture systems to enhance yields, using high-tech 'climate smart' crops and monocultures, while reducing chemical inputs where possible. The LDC group feels that the high food insecurity in their countries is because production systems are outdated, and that modern technology is needed to enhance productivity and hence resilience to extreme events. However, they also recognise the risk associated with monocultures and one-size-fits-all approaches, the role of agroecology and diversification, and the need to blend Indigenous knowledge with new technologies. The ILO believes that using traditional technologies can yield higher productivity, and provide jobs and income at the same time if public investments are used efficiently. Agribusiness is also increasingly concerned about ensuring natural resources such as water are conserved. For example, Olam believes that chemical inputs and modernisation are needed to enhance yields and livelihoods, but they also invest in mulching and 'better practices', and feel that action is needed to conserve water catchment areas.

Local rights versus foreign investment: Many agroecology advocates are also advocating food sovereignty to enhance local resource control and hence resilience and food security. While there is consensus that land-grabs and human rights abuses must be avoided, many governments are still promoting external investments and control of assets. Vulnerable producers (e.g. smallholder farmers, Indigenous Peoples and pastoralists) have voiced concerns about loss of land and access to resources and are calling for secure land and resource rights. Some Southern countries have introduced northern-style seed laws that threaten to undermine diverse local seed systems that small farmers rely on. Sustainable agricultural investments which respect rights to land and resources can be a driver for sustainable rural economies in some countries.

Silver bullets versus place-based solutions: Climate change is a 'wicked problem' that cannot be effectively addressed by transferring solutions or 'silver bullets', such as the Green Revolution for Africa. Similarly, the effectiveness of crop insurance has been questioned as the poorest farmers can't afford it and can't get insurance as they are not formally employed. Arguably, the most vulnerable should not bear the costs of mitigating climate risks - these costs should be borne by actors higher up the value chain.

Corporate power versus inclusive governance: Many actors recognise that there are already very unequal power relations in agri-food systems, which a Just Transition needs to address. However, there are different perspectives on the role of corporations in food systems and whether corporate power should be constrained through voluntary or legal measures. There is concern that large agribusiness has influenced government policies, while policies that protect smallholder interests are not being implemented, such as the FAO Committee on World Food Security (CFS) policies, and UN Declarations on the Rights of Peasants and the Rights of Indigenous Peoples (UNDRIPs).

Pathways to change, levers and tools

Mobilizing networks for a Just Transition: Greater collaboration and networking is needed between different actors and initiatives working to promote a Just Transition in agri-food systems, to develop a shared agenda, enhance awareness and mobilise action. For example, a partnership could be

established between ILO, UNEP and FAO (UN agencies), and a global network also involving the ITUC, IUF, NGOs, the Just Rural Transitions Initiative, governments and financial institutions. At the country level, there is a need to bring together governments, trade unions, farmers' organisations and cooperatives, environment and labour NGOs and ILO, to promote awareness of the need for a Just Transition and mobilise dialogues. The involvement of agribusiness, including large landowners and companies, will also be important to achieve a Just Transition.

Inclusive Governance: Procedural justice, or 'polycentric governance', is vital to ensure that any Just Transition action – policy, finance, technology transfer etc - is aligned with the priorities of the most vulnerable. Comprehensive policy frameworks should be developed for a Just Transition (eg. universal social protection, employment guarantee schemes and small enterprise support) and implemented with the active participation of all key stakeholders. A Just Transition requires a genuinely inclusive and participatory process, which includes representatives from governments, employers, trade unions, smallholders, women, youth, informal workers, migrants, Indigenous Peoples and pastoralists. Underlying factors contributing to vulnerability should be addressed including structural inequality (e.g. land access) and structural racism in governance and institutions. Representative associations of vulnerable groups and informal workers should be identified and strengthened. CSOs can play a key role in engaging marginalised groups not represented by unions. Dialogues should address power imbalances, create safe spaces where less powerful groups feel confident to speak, and include CSOs working on farming, climate, labour, human rights etc.

Inclusive multi-stakeholder dialogues such as food policy councils and food change labs provide a way to mobilize different actors around transitions in particular places. For example, 'Nourish' Scotland is bringing together rural and urban communities to discuss how to transform the food system. Such localised dialogues can be transformational. The SDGs provide a common framework for dialogue between different stakeholders – business, civil society and government.

Employment guarantee and small enterprise support schemes: Employment Guarantee Schemes are important for a Just Transition, to provide employment for farmers and workers and enable drought-ridden farmers to invest in their land. India's Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGA) provides a legal guarantee for one hundred days of employment per year for unskilled manual work at the statutory minimum wage. It provides "Green" and "Decent" work which addresses climate change vulnerability, protects farmers from risks, conserves natural resources, and promotes women's empowerment. It provides a safety net so people don't have to sell their land if they lose their job, and allows workers to be paid to work on their own land and build assets. South Africa also has an employment guarantee scheme.

The transition to more resilient livelihoods also means supporting vulnerable people to build and grow small businesses and access markets. For example, the Africa Enterprise Challenge Fund supports small enterprises to provide services to smallholders through green technologies. Agriculture investment programmes eg. building irrigation or roads, soil and water conservation and reforestation, can be employment intensive and boost local economies if governments employ local people and procure tools locally. Rural regeneration is important to provide alternative employment opportunities in rural areas; as well as strengthening local institutions and the bargaining power of communities by supporting communities to organise themselves. Where ILO has supported communities to establish local

associations and cooperatives these have been sustained for over a decade. Creating jobs in a way that builds resilience will also build better outcomes for peace – win-wins for jobs, resilience and peace should be sought.

Enhancing land and resource rights: Often transformative benefits only materialise if schemes also transfer assets – eg. if governance of a landscape is being given in some form to communities. Experience in Nepal and other countries shows that giving land to communities can have a transformative impact on natural resource management. Legal and governance reforms are also needed to expedite land titling and ensure communal lands and resources are protected for smallholders, pastoralists and other vulnerable groups. Engaging farmer and producer cooperatives in awareness raising about land and resource rights and the causes of climate change will be key for a Just Transition.

Finance and incentives for a Just Transition: International climate funds (eg. the Green Climate Fund and international financial institutions) should support the Just Transition, so that vulnerable people impacted by climate change can get support to establish more resilient livelihoods or move to other sectors. Some Global South governments cannot afford to cover social protection and, from a climate equity standpoint, should not be expected to pay for the transition. For example, Africa contributes only 4% of global GHG emissions. How to shift capital to invest in more climate-friendly jobs also needs to be part of the Just Transition discussion. Decentralised climate finance has proved effective for channelling climate funds directly to communities to invest in local resilience building (e.g. in northern Kenya's drylands). The "LDC Initiative for Effective Adaptation and Resilience" (LIFE-AR) aims to push donors and climate finance to channel 70% of all mitigation and adaptation finance to the local level.

Currently, many donors are heavily supporting input support programmes that promote the use of agrochemicals and 'improved' seed varieties. Some donors support agroecology and farmer cooperatives (e.g. the Swiss), but also promote Intellectual Property Rights on seeds through trade policies. Ghana has allocated over 40% of its national agricultural budget to subsidise fertilisers. In Malawi, a massive fertiliser subsidy has led to overuse of fertilisers. International assistance finance is needed to support the removal of oil-based agrochemicals and replace them with subsidies for investment in soil health. There is evidence that reforming subsidies has not decreased yields.

High level Recommendations

A Just Transition means not only protecting the jobs and livelihoods of unionised workers in agri-food systems but also protecting the livelihoods of millions of informal farmers and workers in the South who are highly vulnerable to climate change. The following macro-level actions are needed to deliver a Just Transition, and will need to be tailored to different contexts:

Policy Reform

1. *Countries should establish an inclusive Just Transition policy process which engages trade unions, farmers' associations, representatives of small producers, cooperatives, Indigenous Peoples, pastoralists, fisherfolk, informal traders and other food system actors to determine what kind of transition is required and how to ensure a Just Transition. Less powerful groups should be given*

support to engage on an equal footing and form representative organisations, and resulting policies and plans should support the priorities of the most vulnerable groups.

2. *Provide a package of policy support for different actors*, including training for people to transition to green jobs and resilient livelihoods; employment guarantee schemes, employment intensive public programmes and small enterprise support schemes; universal social protection (eg. healthcare); and tailored support for women and Indigenous groups including secure land tenure. Win-wins and coherence across sectors should be sought by engaging different ministries (agriculture, environment, labour etc).
3. *Address existing structural inequalities in agri-food systems*, including policies and institutions that favour more powerful groups and create barriers and constraints for vulnerable groups, eg. insecure land and resource rights, lack of support for smallholders, informal seed systems and local markets, lack of representation in policy and decision-making, ethnic discrimination, and top down agricultural research and extension services.

Financial Reform

1. *Mobilise international climate finance* (eg. the Green Climate Fund, the Adaptation Fund), multilateral development banks and bilateral donors to support Just Transition planning in Southern countries. Decentralised funds should be established to enable vulnerable groups impacted by climate change such as smallholders and pastoralists, to diversify, enhance resilience or transition to other sectors.
2. *Reform agricultural subsidies*: Bilateral donors and governments should repurpose input support programmes to subsidise agroecological inputs and reward investment in healthy soils.
3. *Allocate funds for a Just Transition*: Global North countries should ensure that their green economy plans – such as the Green New Deal – have adequate finance attached to support a Just Transition for agri-food systems.

Political Communications

Political and public communications are vital to promote a Just Transition - to raise awareness, change narratives and mindsets, and bring about systemic change beyond individual policy reform. Priorities include:

- Raising awareness of governments and financial institutions of the need for a Just Transition in agri-food systems, and the need to actively engage vulnerable groups in Just Transition planning.
- Raising awareness of consumers to promote shifts towards more responsible consumption.
- Raising awareness of workers and producers so that they engage in Just Transition advocacy, debates and planning, and are aware of support available.

Influencing Global Initiatives

UNFCCC COP26: Agriculture, food security, agroecology and the Just Transition should be given greater attention in UNFCCC negotiations. A Just Transition should not be a pretext to delay mitigation commitments, but rather accelerate them. COP26 should request industrialised Global North countries and International Financial Institutions (IFIs) to make resources available to support a Just Transition for agri-food systems in the Global South.

CBD COP15: Should recognise the role of Indigenous Peoples and local communities (IPLCs) in nature-based solutions and ecosystem-based adaptation. It should require Parties to protect the rights of IPLCs over land, biodiversity, seeds and knowledge, and request the Global Environment Fund (GEF) to establish a decentralised biodiversity fund to support resilience building by IPLCs.

World Food Systems Summit: There is concern that this Summit has emerged from closed-door negotiations between the UN and the World Economic Forum, and that instead of providing for a balanced assessment of different paradigms, [leadership roles](#) have gone to the proponents of high-tech, high-cost 'green revolution' approaches. The Summit should be turned into an inclusive 'Congress' with an agenda set by a steering committee that reflects the diverse constituencies of the CFS and the growing consensus on the need for agroecological transformation.

SDG process: Donors and governments should support inclusive dialogues on SDG 2, End Hunger, to bring vulnerable groups into policy debates on agri-food system pathways, and support dialogues for a Just Transition to address multiple SDGs and leave no-one behind.

Decade for Action on Nutrition: This should be used to better integrate nutrition into agri-food policies, and to highlight the critical role of vulnerable Indigenous Peoples and small producers in providing nutrient dense functional foods and the dangers of transitioning to energy dense foods characteristic of modern agri-food systems.

AUTHORS

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Faris Ahmed is an Ottawa-based consultant working on sustainable food systems, specializing in agroecology, biodiversity, climate resilience seeds and human rights. Over the past two decades he has played leadership roles in civil society networks such as the CSM (Civil Society Mechanism of the Committee for World Food Security), the Food Security Policy Group, the CBD Alliance and Food Secure Canada. Faris was Director of Policy and Campaigns at USC Canada (SeedChange) during 2007-2019, and prior to that worked at the International Development Research Centre (IDRC) and Oxfam Canada. He is currently a Research Associate with the Laurier Centre for Sustainable Food Systems, and an advisor to the UNESCO Chair on Biodiversity. Faris holds a Masters in International Development from the University of Toronto, and has worked as a writer and documentary photographer in Asia. Faris co-authored the paper on nature-based solutions.

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Elise has been working in the field of sustainable development and climate change for fifteen years. She is the Founder and President of Climate & Sustainability, a platform for collaboration for change-makers, advising the UN on climate and SDGs, and facilitating the Planetary Emergency Partnership, a group of 180+ influential partners from around the world. Most recently, she was the senior advisor to David Nabarro, appointed by the Secretary General to develop the Nature-Based Solutions coalition co-led by China and New Zealand for the UN Climate Action Summit in New York in 2019. Previously, she worked for Climate Action Network International as Special Projects Director and was responsible for leading three global initiatives: the Climate Vulnerable Forum Summit, the Step Up campaign, and the Shift-SEA project for shifting financial flows towards clean energy access in South East Asia. She also advised Ambassador Khan, Chief Negotiator of the COP23 Fijian Presidency and lived in Chile and Tajikistan. Elise co-authored the paper on nature-based solutions.

Mark Driscoll

Mark is Founder and Director of [Tasting the Future](#), a not for profit sustainable food systems consultancy. He is a global expert in and a passionate advocate for the need for food systems change. He has over 30 years experience of working with businesses, governments and civil society organisations on solutions that address some of the key social and environmental challenges confronting our global food system. He has developed and led large sustainable food programmes with organisations including WWF and Forum for the Future, focussing on policy and practice at the intersection of health, nutrition and sustainability. Mark graduated from Wye College (London University) with a degree in Environmental science. He sits on several advisory boards for business, government and non-profit organisations. He also writes and blogs extensively on issues and trends impacting on the food system. Mark is the author of the Health and Sustainable Diets paper.

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Arthur Getz Escudero is a participatory action researcher and policy analyst tracking food systems innovation and governance, currently with Arizona State University's [Swette Center for Sustainable Food Systems](#). He has conducted [landscape analyses of European food systems research](#) for the EU Standing Committee for Agricultural Research, was a consultant to the [Milan Urban Food Policy Pact](#), and has advised science-practice-policy projects such as Linking Farmland Biodiversity to Ecosystem Services for Effective Eco-Functional Intensification ([LIBERATION](#)). He also supported UN Habitat in multi-stakeholder development of [Guiding Principles for Urban-Rural Linkages to Advance Integrated Territorial Development](#). He co-authored [City Regions as Landscapes for People, Food and Nature](#) (2014) and has provided facilitation and technical support to both [IIED](#), and the [Prince of Wales International Sustainability Unit](#) on Rural-Urban Transformations and Food Systems. Formerly a food systems researcher at Cardiff University School of Geography and Planning, he has also been on research staff at [WRI](#), [TNC](#) and [EWC](#). Arthur co-authored the livestock production discussion paper.

Kathleen A. Merrigan

Kathleen Merrigan is an expert in food and agriculture, celebrated by Time Magazine as one of the 100 Most Influential People in the World in 2010. Currently she serves as the Kelly and Brian Swette Professor in the School of Sustainability and executive director of the Swette Center for Sustainable Food Systems at Arizona State University. From 2009 to 2013, Kathleen was deputy secretary and COO of the United States Department of Agriculture. She is currently a board member of FoodCorps, Stone Barns Center for Food and Agriculture, Center for Climate and Energy Solutions (C2ES) and World Agroforestry (ICRAF). She is a partner in Astanor Ventures and an advisor to S2G Ventures, two firms investing in ag-tech innovation. Kathleen holds a PhD in Public Policy and Environmental Planning from Massachusetts Institute of Technology, Master in Public Affairs from University of Texas at Austin, and BA from Williams College. Kathleen co-authored the livestock production discussion paper.

Marie Mourad

Dr. Marie Mourad has over eight years of experience working as a food, waste, and sustainability expert and consultant for non-profits and governmental agencies in the United States and Europe, including the European Research Executive Agency, the French Environmental Agency (ADEME), the U.S. Natural Resources Defense Council (NRDC), and Sustainable Agriculture Education (SAGE) in the Bay Area. Her PhD in Sociology at Sciences Po, Paris, focused on public policies against food waste and new markets for surplus food in the United States and France. Her academic work has been published in international journals including the [Journal of Cleaner Production](#) and the recent [Handbook of Food Waste](#). Marie is the author of the food loss and waste discussion paper.

Krystyna Swiderska

Krystyna Swiderska is a Principal Researcher at the UK-based International Institute for Environment and Development (IIED). She has 25 years' experience of sustainable development policy and practice research at IIED, focusing on agriculture, biodiversity, climate change and indigenous peoples in Latin America, Asia and Africa - particularly Peru, India, China and Kenya. She has coordinated several

participatory action-research (PAR) projects on traditional farming and food systems, agricultural resilience and biocultural heritage in mountain and semi-arid areas. Krystyna co-chaired the International Society for Ethnobiology's Global Coalition on Biocultural Diversity (2012-2014) and supported the establishment of the International Network of Mountain Indigenous Peoples. She is currently coordinating research on biocultural heritage and indigenous peoples' food systems with funding from the British Academy and the UK Arts and Humanities Research Council, and is conducting a part-time PhD on biocultural heritage territories at Coventry University. Krystyna co-authored the paper on Just Transitions.

Marie-Laure Varanne

Marie-Laure Varanne is co-director at climate-sustainability.org where she offers consultancy and private sector expertise. Passionate about challenge solving and development in favor of sustainable business and people, she joins with 20 years of successful experience as a marketer and strategist in different FMCG companies. She has delivered \$10M to \$4Bn projects from strategy, brand equity, innovation and business models, to commercialization, digital marketing and execution. As a dynamic leader, driven by results and action oriented, she has been leading teams in matrix organizations at Local and European level. Convinced of the urgency to drive more resilient and sustainable businesses for a bright future, and benefitting from her experience, Marie-Laure is committed to supporting global issues concerning sustainable development, the future of food and nature-based solutions. Marie-Laure is a co-author of the nature-based solutions paper.

INTERVIEWEES

The following experts were interviewed for each of the hot topic papers. Their perspectives helped us better understand the issues, the convergences and divergences, complemented the desktop research, and helped to inform the recommendations. We are extremely grateful for their time and early engagement in this process and benefited from each person's input and insights.

Nature-based solutions

Carlos Manuel Rodriguez, Minister of Environment of Costa Rica

Hindou Oumarou Ibrahim, President, AFPAT, Tchad

Tony Simons, Director General, World Agroforestry

David Perry, CEO of Indigo Agriculture

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Dennis Garrity, Chair of The Global Evergreening Alliance

Betsy Taylor, President, Breakthrough Strategies & Solutions LLC

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Livestock Production

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Sustainable and Healthy Diets

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Sayed Azam-Ali, Crops for the Future

Fabrice DeClerk, EAT

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Tumaini Mikindo, Partnership for Nutrition, Tanzania

Duncan Williamson, CIWF

Janet Ranganathan, World Resources Institute

Vositha Wijenayake, Sri Lanka Slycan Trust

Food Loss and Waste

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Andrea Cattaneo, team leader for "State of Food and Agriculture" at FAO

Steven Finn, Vice President of Food Waste Prevention at Leanpath and Director and ResponsEcology

Murillo Freire, agricultural researcher and leader of Save Food Brazil

Liz Goodwin, Senior Fellow and Director at WRI

Roni Neff, Associate Professor at Johns Hopkins Bloomberg School of Public Health

Lisa Kitinoja, Founder at Postharvest Education Foundation.

Anne Scheinberg, Working group chair International Solid Waste Association

Tammara Soma, Assistant Professor at Simon Fraser University

Richard Swannell, Director at WRAP Global (working with 20+ countries)

Just Transitions

Christopher Stewart, OLAM International

Bert van der Wel, Climate Policy Officer, ITUC

Rhoda Boateng, ITUC Africa

James Ritchie, IUF (International Union Federation of Agriculture, Food, Hotel and Restaurant workers)

Ruchi Tripathi and Teresa Anderson, Action Aid

Hindou Ibrahim, Chair of Indigenous Forum at UNFCCC, Chad.

Melissa Pinfield, Program Director, Food and Land Use Coalition (FOLU).

Caterina Ruggeri, Research Director, FOLU

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Alejandro Guarin, Sustainable Markets Group, IIED

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APPENDICES

Food Loss and Waste

Appendix 1: Landscape Analysis Key Organizations

Academia/Research:

- International food loss and food waste studies group
- World Resources Institute
- Rethink Food waste through Economics and Data (ReFED)
- International Food Policy Research Institute (IFPRI)
- US National Academy of Science
- Wageningen University and Research

Business:

- Manufacturers: Nestlé, Kellogg, Unilever, etc.
- Retail: Tesco, Carrefour
- Food Service: Sodexo, etc.
- Animal Feed/ Former Foodstuff Industry: EFFPA, FIFAC
- Logistics/Packaging industry: Global Food Cold Chain Council
- Waste sector: ISWA, composting/anaerobic digestion

Corporate Sustainability Initiative:

- World Business Council for Sustainable Development

Civil Society Organizations:

- Food Banks and food redistribution organizations
- NRDC, WWF; Feedback
- Post-Harvest Education Foundation
- Stop Food Waste Denmark

Government:

- Local government
- Regional government
- National government
- International or Inter-government: FAO, UNEP, EU

Farmers/Producers:

- Global Alliance for Climate Smart Agriculture
- World's Farmer Organisation

Health Sector:

-

Individuals:

- Tristram Stuart

Indigenous groups/organizations:

-

Funders/Investors:

- The Rockefeller Foundation
- World bank, Rabobank
- Ellen MacArthur Foundation

Media:

- Biocycle

Tech and Start-up:

- P4G Partnerships
- Leanpath, TooGoodToGo, Olio

Just Transitions

Appendix 1 - ILO Guidelines for a Just Transition

Guiding Principles

(a) Strong social consensus on the goal and pathways to sustainability is fundamental. Social dialogue has to be an integral part of the institutional framework for policymaking and implementation at all levels, and should involve all relevant stakeholders.

(b) Policies must respect, promote and realize fundamental principles and rights at work.

(c) Policies and programmes need to take into account the strong gender dimension of many environmental challenges and opportunities and promote equitable outcomes.

(d) Coherent policies across the economic, environmental, social, education/training and labour portfolios need to provide an enabling environment for enterprises, workers, investors and consumers to embrace and drive the transition towards environmentally sustainable and inclusive economies and societies.

(e) These coherent policies also need to provide a just transition framework for all to promote the creation of more decent jobs, including as appropriate: anticipating impacts on employment, adequate and sustainable social protection for job losses and displacement, skills development and social dialogue, including the effective exercise of the right to organize and bargain collectively.

(f) There is no “one size fits all”. Policies and programmes need to be designed in line with the specific conditions of countries, including their stage of development, economic sectors and types and sizes of enterprises.

(g) In implementing sustainable development strategies, it is important to foster international cooperation among countries.

Appendix 2 – Just Rural Transitions Vision and Principles

The **Vision** commits to putting in place policies, regulations, plans and incentives, which:

1. Support farming, fishing, livestock-keeping and indigenous communities to adapt; and realise the potential of good stewardship of land, oceans and natural resources to build resilience and mitigate climate change.
2. Provide sustainable, healthy and affordable food for all people, through culturally-appropriate food systems.
3. Halve global food loss and waste from 2019 levels.
4. Recognise the full value of natural capital to human health and wellbeing.
5. Halt the degradation of critical ecosystems and loss of biodiversity.
6. Deliver up to a third of the required reduction in global carbon emissions.
7. Mobilise significant public and private finance in support of this vision.

This will support the Call for Action: Raising Ambition on Climate Adaptation and Resilience and Nature-Based Solutions for Climate Manifesto, set out at the 2019 UN Climate Action Summit

Principles

Governments, international organisations, companies, investors, civil society organisations, local and indigenous communities must deepen collaboration to realise this vision, including through:

Developing aspirational, long-term targets and pathways to align food production, national dietary guidelines, agriculture and use of land, forests and water with sustainable development and climate goals. These should cover domestically produced sustainable and healthy food, as well as the impact of imports and foreign aid and investments.

Strengthening land use planning and governance to manage competition and trade-offs across different land uses, support indigenous and community land tenure, and deliver national economic, social, rights, health and environmental goals which enhance long-term resilience of economies, communities and ecosystems.

Implementing policy, fiscal and regulatory reform to enable and accelerate the transition to resilient and sustainable food and land use, including fully valuing and pricing natural capital, repurposing

agricultural subsidies and social assistance to guarantee access to affordable and nutritious food for lower income groups.

Prioritising greater investment in insurance, innovation and agricultural research and development to help local and indigenous communities and vulnerable populations build resilience, and mobilise capital and knowledge in support of this goal, including indigenous people's traditional knowledge.

Embedding a strong focus on job creation, equity and social justice within the transition to sustainable food systems and land use and the provision of sustainable and healthy diets.

About the Global Alliance for the Future of Food

The [Global Alliance for the Future of Food](#) is a strategic alliance of philanthropic foundations working together and with others to transform global food systems now and for future generations. We believe in the urgency of transforming global food systems, and in the power of working together and with others to effect positive change. Food systems reform requires that we craft new and better solutions at all scales through a systems-level approach and deep collaboration among philanthropy, researchers, grassroots movements, the private sector, farmers and food systems workers, Indigenous Peoples, government, and policymakers.

Our program area on climate aims to reduce GHG concentrations by transforming food systems globally and improving the climate resiliency of food systems. We work with diverse partners and communities to build a collective vision and identify strategic pathways via changes in agricultural and food production practices and the global food system. We recognize the interrelationship between climate change, biodiversity, health, food security, land rights and human rights, and the uneven burden of climate change impacts on low-income countries and vulnerable populations.

About Salzburg Global Seminar

[Salzburg Global Seminar](#) is a non-profit that fosters lasting networks and partnerships for creative, just and sustainable change. It regularly convenes outstanding talent across generations, cultures and sectors to inspire new thinking and action, and to connect local innovators with global resources. They have programs in Finance & Governance, Justice & Security, Planet & Health, Culture & Society, Education & Work, and Media & Voice.

