A photograph of a market stall with several woven bamboo baskets filled with fresh produce. The baskets contain green tomatoes, green bitter melons, a mix of red and yellow chili peppers, green bananas, and small round potatoes. The produce is arranged in a grid-like pattern on a dark surface.

# ACHIEVING A 1.5°C FUTURE REQUIRES A FOOD SYSTEMS APPROACH

Recommendations Paper



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**WWF Food Practice**

WWF is one of the world’s largest and most experienced independent conservation organizations, with over 30 million followers and a global network active in nearly 100 countries. Alongside work in areas like wildlife, oceans and forests, the WWF Food Practice works to transform the food system to protect people and planet. Our vision is a food system which provides healthy food to all people while restoring our planet. To help achieve this goal, we work across three pillars of the food system: Sustainable Production, Healthy and Sustainable Diets and Food Loss and Waste.

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**Authors:**

Haseeb Bakhtary (Climate Focus),  
 Thiago Chagas (Climate Focus),  
 Martina Fleckenstein (WWF International Food Practice),  
 Brent Loken (WWF International Food Practice and Global Science),  
 Matteo Lattanzi (Climate Focus),  
 Stephen Cornelius (WWF UK)

**Contributing Authors:**

David Edwards (WWF UK),  
 Peter McFeely (WWF International Food Practice)

**Contact:**

Brent Loken (WWF International Food Practice) [brent.loken@wwf.org](mailto:brent.loken@wwf.org),  
 Martina Fleckenstein (WWF International Food Practice) [mfleckenstein@wwfint.org](mailto:mfleckenstein@wwfint.org)

**Special thanks for reviewing the report:**

Stineke Oenema (UN Nutrition), Patty Fong (Global Alliance for the Future of Food),  
 Gunhild Stordalen (EAT), Lujain Alqodmani (EAT), Stella Nordhagen (Global Alliance for Improved Nutrition), Ty Beal (Global Alliance for Improved Nutrition),  
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**Design:**

Silke Rofsbach (mail@silke-rossbach.de)

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WWF, 28 rue Mauverney, 1196 Gland, Switzerland.  
 Tel. +41 22 364 9111  
 CH-550.0.128.920-7

For contact details and further information, please visit our international website at [wwf.panda.org](http://wwf.panda.org)

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 Backtitle: Karine Aigner/WWF-US

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## KEY RECOMMENDATIONS:

- 1. Include all parts of food system in Nationally Determined Contributions (NDC)** by examining food systems as a whole, from production to consumption, working together with relevant stakeholders across food systems to prepare and take action on NDCs, including addressing consumption-based emissions and food loss and waste, which are not considered at the moment.
- 2. Include a food systems approach to agriculture and food security in the new outcome for the Koronivia Joint Work on Agriculture (KJWA).** The KJWA workshops have revealed that there is an opportunity to include food loss and waste and sustainable food consumption as thematic areas in the KJWA outcomes to encourage action in these areas of food systems.
- 3. Synthesize approaches taken under different United Nations Framework Convention on Climate Change (UNFCCC) mechanisms to align food system priorities.** The Subsidiary Bodies could reinforce their work on information and knowledge sharing, with a focus on adopting a broader food system perspective. This would send a positive signal for action to Constituted Bodies and financial entities to work on these topics.

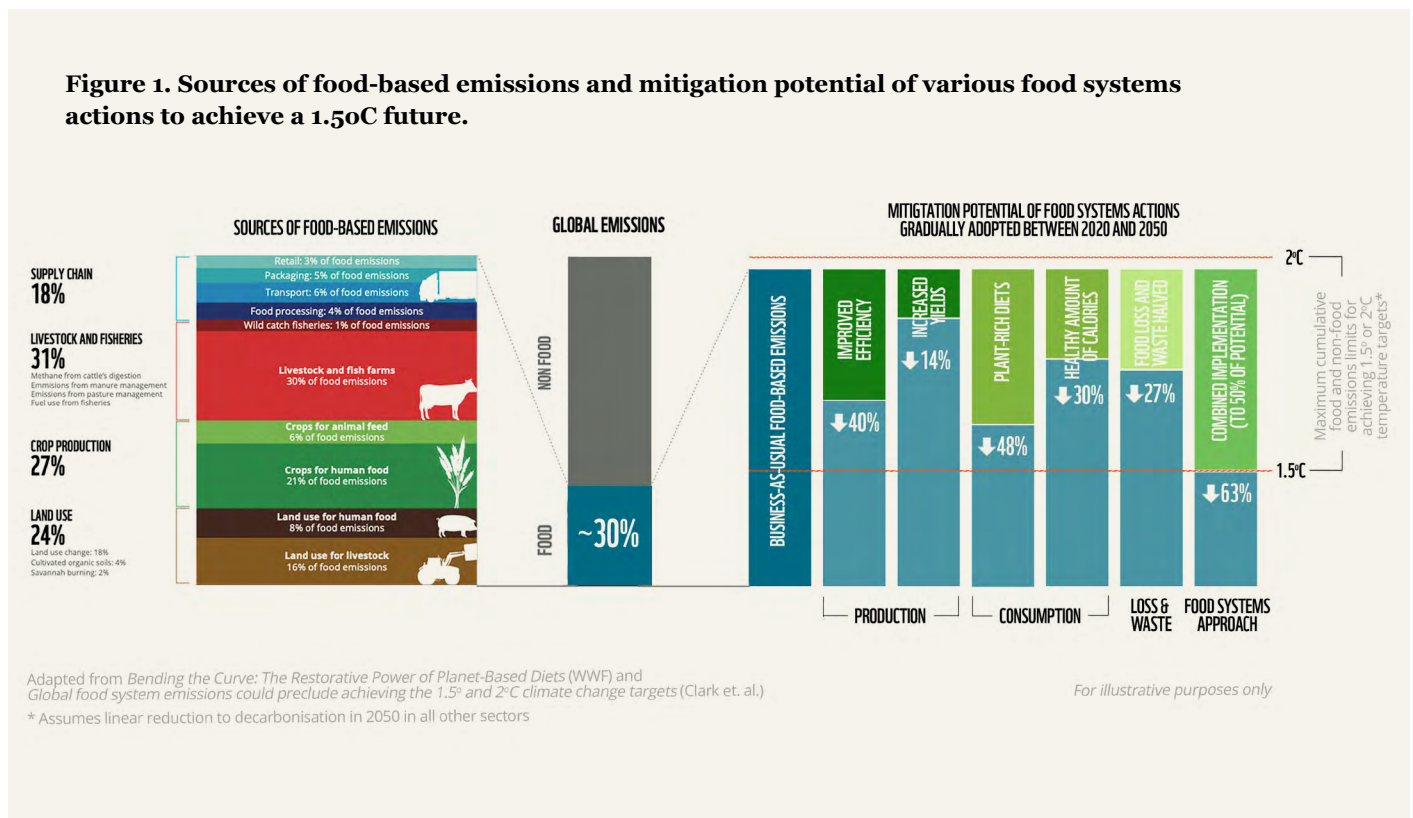
# WHY DO WE NEED A FOOD SYSTEMS APPROACH TO CLIMATE CHANGE?

**We won't have a shot at achieving a 1.5°C target of the Paris Agreement if we don't rapidly reduce emissions from food systems.**

Even if we managed to stop all other (non-food-system-related) emissions immediately and keep them to net zero through 2100, emissions from the global food system alone could exceed the remaining carbon budget to keep warming to no more than 1.5°C in the next 40 years (See Figure 1).<sup>1</sup> Today, emissions from the

food system account for 29 percent of global emissions.<sup>2</sup> If we continue producing and consuming food the way we do now, emissions from agriculture and land use alone will consume 70 percent of the emissions budget available in 2050 to limit global warming to 1.5°C.<sup>3</sup>

**Figure 1. Sources of food-based emissions and mitigation potential of various food systems actions to achieve a 1.5°C future.**



**Given current trends, emissions from the increasing global adoption of animal-source foods in our diets will almost double GHG emissions from food consumption by 2050.**<sup>4</sup> Animal agriculture generates high emissions mainly due to low feed-conversion efficiencies, enteric fermentation in ruminants, and manure-related emissions.<sup>5</sup> Furthermore, most food production today depends heavily on inputs such as fertilizer, pesticides, energy, land and water, is produced using unsustainable practices such as monocropping and heavy tilling and drives conversion of vital carbon-rich ecosystems like forests and peatlands.<sup>6</sup> A shift to agroecological approaches, including climate-smart, regenerative, conservation agriculture, and sustainable fishing, is absolutely necessary to allow nature to recover and revitalize the sources of our food.<sup>7</sup>

**However, improving how we produce food alone will not be enough.** We also need to shift to healthier and more sustainable and equitable diets to improve health, reduce demand for new agricultural land and to release existing agricultural land to grow enough food for all.<sup>8</sup> The global population is growing, and with it, our need for food. By 2050, we will need 50 percent more food from plants and 70 percent more food from animal sources than we do today.<sup>9</sup> As incomes increase, a likely increase in consumption in resource-intensive diets will drive the expansion of food subsectors such as crop cultivation and livestock production, as well as product transportation and processing, agricultural input materials (fertilizer and pesticides) and irrigation.<sup>10</sup> Increased food production will likely also cause further land-use changes (LUCs) for agriculture, resulting in more emissions, reduced carbon sequestration capacities of ecosystems, and hence further climate change.<sup>11</sup>

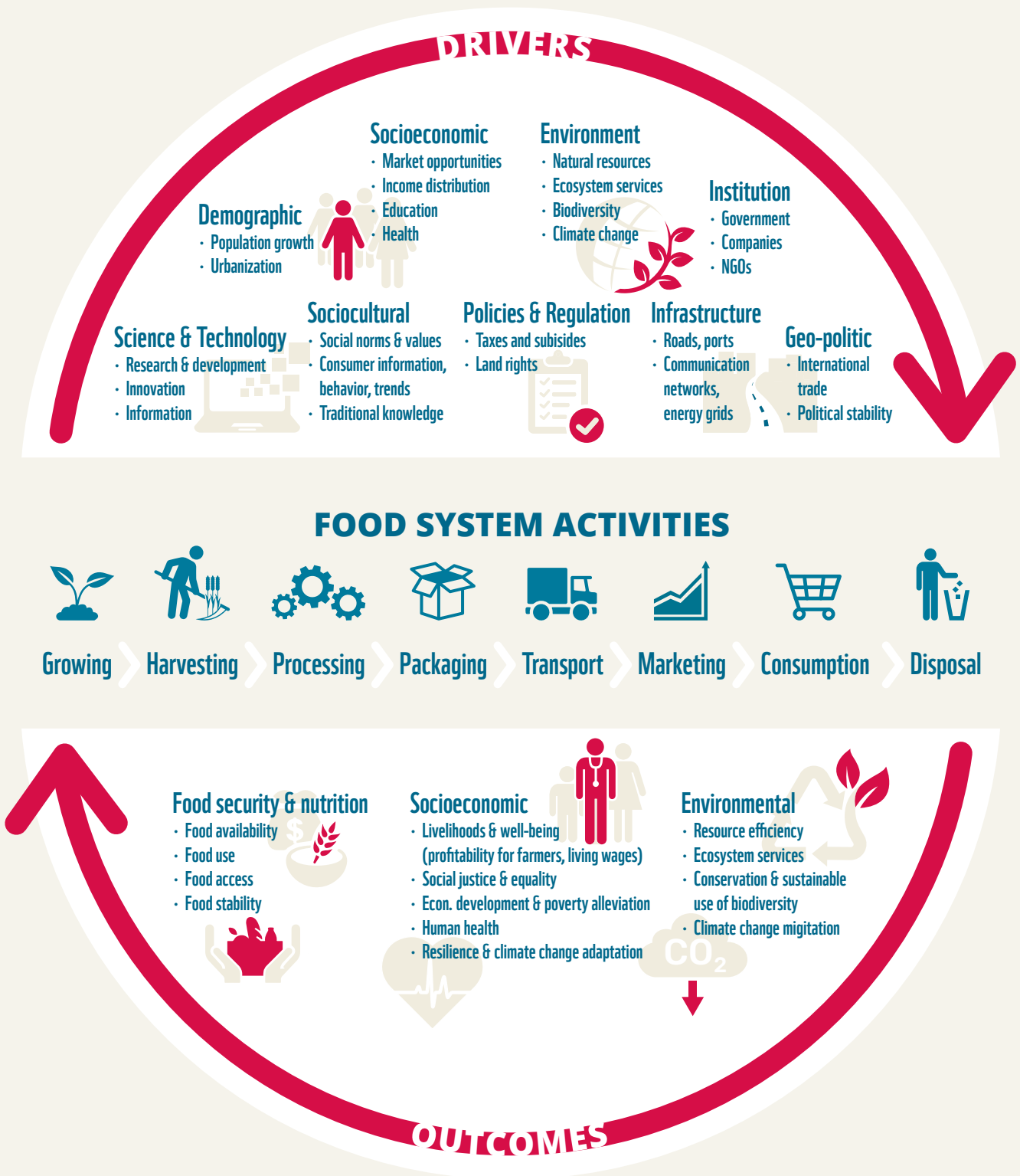
**Similarly, continued high levels of food loss and waste will continue to put pressure on our already threatened ecosystems.** Food loss and waste (FLW) is responsible for 8 to 10 percent of global greenhouse gas (GHG) emissions.<sup>12</sup> Today we are wasting 40 percent of all food produced, which means we are not using our current agricultural lands efficiently. Further, all of the financial and environmental resources used to produce this food, and the emissions released in the process, were expended in vain.<sup>13</sup> If we follow the status quo, more food for more people will mean more food waste and more land being converted for agriculture, and hence more resource use and finally, more emissions. Instead, we need to find a way to produce food for 10 billion people on the current agricultural land that we have. Even if significant technological changes in food production and storage practices are introduced, the efficiency gains will not be enough to close the food systems emissions gap.<sup>14</sup>

**The cost of our broken food system goes beyond climate change.** Today, 3 billion people do not have access to a healthy and nutritious diet, while 2.3 billion adults and children are obese or overweight, which puts them at higher risk of diet-related non-communicable diseases.<sup>15</sup> At the same time, almost one billion tons of food are lost or wasted every year.<sup>16,17</sup> Meanwhile, climate change impacts – including extreme temperatures, floods, droughts and changing rainfall patterns – are already reducing the capacity of our food systems, particularly in the climate vulnerable regions. The hidden environmental, health and economic costs of the food system are estimated at almost USD 12 trillion a year and are expected to rise to USD 16 trillion a year by 2050.<sup>18</sup>

**Despite the precarious state of our food systems, we can feed 10 billion people a healthy diet within planetary boundaries and still leave at least half of natural ecosystems intact if we take a food systems approach to climate change and biodiversity.**<sup>19</sup> Such an approach considers the system in its totality, taking into account all elements and relationships to develop holistic solutions to climate change. Each stage of the system is considered – the production, aggregation, processing, distribution, consumption and disposal of food – as are all social, environmental, and economic consequences of these solutions (see Figure 2).

**But for this, we need to make significant policy and investment shifts** to transform our food systems at a global scale. We need to increase productivity while transitioning to regenerative production practices, shift towards healthy diets and reduce food waste and loss by 50 percent (see Figure 3). These changes must be achieved through culturally and agro-ecologically diverse solutions including recognizing and supporting the different dimensions of local and Indigenous food systems across regions and countries.<sup>20,21</sup> Such a holistic approach requires complementary interventions on both the supply-side (such as sustainable food production practices) and on the demand-side (focusing more broadly on consumer and industry behavior such as dietary change, reduction of food loss and waste).<sup>22</sup>

**Figure 2. Food System elements. Source: United Nations Environment Programme (2019). Collaborative Framework for Food Systems Transformation.**



## BOX 1. ACTIONS NEEDED TO TRANSFORM FOOD SYSTEMS

### 1. A global shift to nature-positive production:

Nature-positive food production systems protect nature, rely on sustainable and regenerative and agroecological practices based on [the Food and Agriculture Organization's 13 agroecological principles](#) that enhance the richness and abundance of biodiversity in land and water, and rehabilitate the functions of degraded natural systems to deliver a climate-positive future in which people and nature can thrive.

### 2. Reduction in food loss and waste and increase in circularity:

Food loss and waste is a major cause of emissions and over-use of resources and land. There needs to be an increasing emphasis on circularity to reduce emissions and build more resilient and sustainable food systems.

### 3. A transition to healthy and sustainable diets:

A transition to diets that are both healthier and produced within planetary boundaries can reduce GHG emissions, protect and restore wildlife, reduce land-use, improve nutrition, and prevent ill-health, premature deaths, reduce antimicrobial resistance and societal costs. However, it needs to be based on the local food context and culture.

### 4. Collaboration at all levels of the food systems:

A food systems approach to climate change needs to be inclusive and collaborative where all stakeholders are involved in designing and implementing relevant interventions.

**Figure 3: Transforming food systems for nature. Source: Loken, B. et al. (2020). Diets for a Better Future: Rebooting and Reimagining Healthy and Sustainable Food Systems in the G20. EAT, Oslo, Norway.**



# INTEGRATING A FOOD SYSTEMS APPROACH IN THE GLOBAL CLIMATE POLICY GOVERNANCE

Under the current international climate governance, a systemic approach to food production and consumption is clearly lacking.

Several climate mitigation and adaptation response options are clearly connected to food systems, but these are currently treated in a siloed and disconnected manner. A number of processes and work programs under the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement are currently discussing relevant interventions and modalities to address issues pertaining to agriculture, land

use, food security, and natural ecosystems. Two processes in particular stand out as having considerable potential for addressing food system issues in an integrated way by including food loss and waste and sustainable food consumption as complementary interventions to tackle climate change: the **Koronivia Joint Work on Agriculture (KJWA)** and the **Nationally Determined Contributions (NDCs)**.



## BOX 2. AGRICULTURE AND FOOD UNDER THE UNFCCC AND THE PARIS AGREEMENT

### Agriculture and food security under the UNFCCC

Across UNFCCC processes there are several references to actions affecting agriculture, land use, food security and natural ecosystems. Food and food security are specifically included in the objective of the UNFCCC under **Article 2** “... to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations ... at such a level that should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened ...” Similarly, Agriculture is mentioned in Article 4 of the UNFCCC for which Parties shall “control, reduce or prevent anthropogenic emissions of greenhouse gases” and “cooperate in preparing for adaptation to the impacts of climate change” that includes planning for agriculture.

In particular, decision 4/CP.23 on the KJWA has elevated the issue of agriculture and food security at the technical and political level by providing a clear space to address the agricultural sector within the UNFCCC, allowing Parties to comprehensively discuss agriculture in the context of climate change from the perspectives of mitigation, adaptation and support needed for action on the ground.

### Agriculture and food security under the Paris Agreement

The preamble of the Paris Agreement makes specific reference to “safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change” and also refers to human rights, gender, ecosystems and biodiversity, all issues that are central to agriculture. The preamble also “recognizes the importance of the conservation and enhancement, as appropriate of sinks and reservoirs of greenhouse gases referred to in the convention” which makes mitigation in agriculture possible.

Similarly, **Article 2.1** of the Agreement states, “the Agreement aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by ... increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production....”

# THE KORONIVIA JOINT WORK ON AGRICULTURE 2017 – 2021 (KJWA)

The KJWA was established at the 23<sup>rd</sup> UNFCCC Conference of the Parties (COP23) in 2017. The purpose was to advance discussion on agriculture and how it can contribute to both increased food security and climate change adaptation.<sup>1</sup>

The Koronivia process is part of the collective effort to push agriculture and climate change in the international agenda and can ensure agriculture remains central in addressing climate change. Decision 4/CP.23 on the Koronivia Joint Work on Agriculture (KJWA) requests the two Subsidiary Bodies under the Convention, namely the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Subsidiary Body for Implementation (SBI), to jointly address issues related to agriculture, taking into consideration the vulnerabilities of agriculture to climate change and approaches to addressing food security. During six rounds of submissions and workshops (2018-2020), the KJWA helped Parties in advancing issues and elements for implementation relating to soils, **nutrient use**,

**water, livestock, methods for assessing adaptation and the socio-economic and food security** dimensions of climate change across the agricultural sectors.

**KJWA workshops have revealed how different actors frame policies and investments and prioritize different issues.** While some stakeholders focused on climate-smart agriculture and its three pillars (increasing productivity and incomes, enhancing resilience of livelihoods and ecosystems and reducing and removing greenhouse gas emissions), others prioritized working under the four pillars of food security, as introduced by the Committee on World Food Security (availability, access, utilization and stability).<sup>23</sup>

## Entry points to integrate food systems approaches into future KJWA

**At COP26 this year, Parties need to agree on a new mandate for the KJWA under the Convention. This includes agreeing if the work is to continue and under which format.**<sup>24</sup> Several Parties have indicated that they want the work to focus on implementation of workshop outcomes to achieve adaptation and adaptation co-benefits at the national and global levels, while others want to focus on

mobilizing technical and financial support. African and Latin American countries have expressed support for a focus on food security, while the European Union, Norway and New Zealand want to focus more on technical discussion and exchange of information for better implementation and measuring progress.<sup>25</sup> The SBSTA and the SBI are to report on progress and outcomes at COP26 this year.<sup>26</sup>

<sup>1</sup> See <https://unfccc.int/topics/land-use/workstreams/agriculture>

## BOX 3. SUBMISSIONS OF PARTIES' VIEWS ON THE PROGRESS OF AND FUTURE TOPICS FOR KJWA

For the 53<sup>th</sup> session of the subsidiary bodies, taking place from 31 October to 6 November 2021, in Glasgow, the United Kingdom, several Parties submitted their views on KJWA progress and proposals for future topics not listed in the KJWA. Submissions present a wide array of potential outcomes of the work program, future topics and related means of implementation. Topics arose around sustainable production, diets and consumption, food loss and waste, as well as cross-cutting themes such as food security, adaptation and resilience and enhancing technical as well as financial capacity for implementing actions.

Issues related to sustainable production include agroecological practices (such as valuing indigenous/traditional knowledge) and sustainable resource use through improving soil health, livestock management, water management and actions on fisheries, aquaculture and the blue economy. While there is a recognition of the importance of food systems for climate change adaptation, only Kenya and Fiji refer to interventions for addressing food loss and waste. Dietary shifts do not feature as a potential future topic under KJWA, except in Brazil's submission that proposes that strategies that aim to shift diets should carefully consider local socio-cultural and economical aspects of food systems through dialogue on food security.

A number of Parties also call for institutionalizing the KJWA as a Constituted Body under the Convention and setting up an international agriculture program similar to the UNREDD Program. New support mechanisms are widely proposed with calls for collaboration to exchange knowledge, technology and setting up financial mechanisms for implementing KJWA and methodologies for monitoring progress.

An ideal outcome on the future of the KJWA would go beyond sustainable agriculture and address all components of food systems, while also contributing to climate goals.

## 1. Future KJWA topics: going beyond the perspective of agriculture production

**The negotiations related to the future of KJWA present an important opportunity for acknowledging the importance of a more systemic approach considering other dimensions of food systems in addressing the nexus between agriculture, food security and climate change.** The KJWA already addresses six interrelated topics on soil, livestock, nutrient and water management as well as the food security

and socio-economic impacts of climate change across agriculture, and methods for assessing climate change. Additional topics related to agriculture, food, and climate change could be for example the issue of food loss and waste (FLW), and demand-side interventions such as the promotion of more sustainable and healthy diets as put forward by some Parties in their submissions.

## 2. Capacity building and alignment among existing climate governance

**The KJWA could also provide technical capacity building and promote enhanced collaboration and alignment of existing climate processes.** For example, an enabling program for KJWA could be established to act as a forum for discussing agriculture and food security, keeping in mind the need to move from a production perspective to a food systems approach for transformational change. KJWA could act as a platform

to guide the implementation of KJWA outcomes, in particular on capacity building on agriculture practices which also take into account the interlinkages with other land-use practices and other components of food systems, to advance agriculture and food security issues. This would ensure a more systematic treatment of agriculture, food systems, and land use, under the climate regime, uncovering synergies and possible trade-offs.

## 3. Encourage synergies between KJWA and the Paris Agreement

**There is a need to ensure that the outcomes of the discussions on agriculture and food systems under KJWA can feed into the processes established under the Paris Agreement (such as NDCs, Long-Term Low GHG Development Strategies, and the Global Stocktake).** The Subsidiary Bodies could reinforce their work on information and knowledge sharing, keeping in mind the need to adopt

a broad perspective on food systems and to successfully transform agriculture in all its dimensions. Agreeing on the adoption of such perspective at KJWA in the outcomes and conclusions could send a positive signal for action from Constituted Bodies and financial entities to work on these topics. This could also encourage donors, private sector actors and nongovernmental organizations to support countries in addressing food system issues.

# NATIONALLY DETERMINED CONTRIBUTIONS (NDC) UNDER THE PARIS AGREEMENT

**The Preamble of the Paris Agreement makes specific reference to “safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change”.**

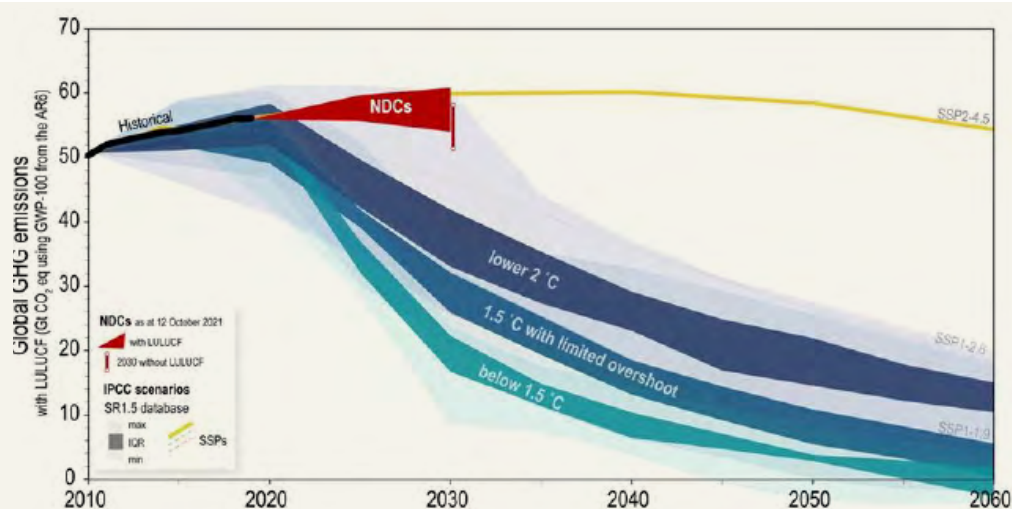
It also refers to human rights, gender, ecosystems and biodiversity, all issues that are central to agriculture and food systems in general. Article 2.1 of the Paris Agreement, in particular, mentions the importance of protecting food production while reducing emissions.

**While these references put food systems squarely under the ambit and scope of the Paris Agreement, a food systems approach to target setting and implementation remains largely absent from countries’ NDCs.** As much as 96 percent of the NDCs address the land sector in their mitigation and/or adaptation contributions.<sup>27</sup> Although most of the latest NDCs include agriculture and land-use change in their emission reduction targets or propose land mitigation actions such as conservation, reforestation and revegetation, measures related to FLW and food consumption are generally absent.

**It is necessary to include FLW and dietary interventions in NDCs to help narrow the climate ambition gap.** According to the recent NDC Synthesis Report by the UNFCCC, current measures and targets under submitted NDCs fall significantly below what is needed for a 1.5- or 2-degree world (see Figure 3). Reducing FLW and shifting towards sustainable and healthy diets could reduce emissions by 1.8 Gt CO<sub>2</sub>e per year. In addition, changing agriculture and land-use practices – by reducing the use of agricultural inputs, methane emissions from livestock production and land use change like conversion of forests and other ecosystems – would deliver 7.2Gt CO<sub>2</sub>e in emissions reductions per year.<sup>28</sup> Together, these food systems changes could contribute about 20% of the global mitigation needed in 2050 to deliver on the 1.5°C target.

**Figure 3. Global GHG emissions under different scenarios.**

Source: UNFCCC NDC Synthesis report



**In their adaptation measures in the NDCs, Parties continue to focus on food system issues separately.**

These include, among others, measures on food production and nutrition security; freshwater resources; terrestrial and wetland ecosystems; human health; key economic sectors and services; disaster risk management and early warning; human habitats and urban areas; coastal areas and sea level rise; ocean ecosystems; and livelihoods and poverty.<sup>29</sup> These are also

included in National Adaptation Plans, national adaptation programs of action, and national communications. However, these measures are generally designed and implemented through siloed processes in different sectors rather than through a coordinated approach that recognizes mitigation and adaptation benefits of all policy interventions and tackles potential trade-offs.

## INTEGRATION OF FOOD SYSTEMS INTO NDCS

**A more comprehensive integration of food systems into NDCs can lead to a more systematic treatment of food systems under the Paris regime as a whole.**

Addressing food systems components in a concerted manner under NDCs would allow countries to more transparently and clearly address the relevant synergies and trade-offs associated with e.g., mitigation, adaptation, food security, nutrition, health and equity. Once integrated into NDCs, food systems approaches proposed by countries could also seep into the technical and political discussions and the outcomes of the

Global Stocktake. This could raise the visibility of food system interventions and help attract finance for developing countries. It could also trigger a process under the Standing Committee on Finance to assess and clarify specific financial needs of developing countries with respect to (systemic) food system interventions, leading to mitigation and adaptation benefits. Finance is an important enabler for transitioning to sustainable and more diversified food practices, and high-income countries should support lower-income countries by financing NDC implementation.

### 1. Design climate actions with a focus on food systems

**The bottom-up structure of NDCs provides enough flexibility for Parties to establish their own climate goals, the mitigation and adaptation measures they will adopt to achieve those goals, as well as the selected indicators to track their progress.**

Parties could therefore design climate actions focused on food systems more holistically by including FLW and sustainable consumption, and define the indicators they would use to monitor progress in implementing these actions. These actions with a focus on food systems could, for instance,

emphasize the mitigation and adaptation benefits of proposed food systems policies and measures; outline specific GHG targets for different (but interlinked) food systems components; or even propose specific non-GHG targets that can later be translated into concrete GHG results. This would allow countries to take an integrated approach to climate change mitigation and adaptation and other socio-economic benefits while identifying and addressing synergies and trade-offs among different food-related interventions.

### 2. Establish inclusive and holistic policy development processes

**Integrating a food systems approach into NDCs requires inclusive and coherent policy development processes (see Box 4).**

NDCs need not only to be aligned with existing and planned national development plans, but also with other government commitments put forward under other relevant international conventions and frameworks, such as the Convention on Biological Diversity and the United Nations Convention to Combat Desertification.

Furthermore, the legitimacy, quality and implementation of NDCs could be enhanced by including a diverse set of stakeholders in their formulation and review process, including subnational governments, smallholder farmers, local and Indigenous communities, as well as health and food systems experts and practitioners. Women should be given special attention when considering the needs and perspectives of different stakeholders.

## BOX 4. ADOPTION OF A FOOD SYSTEMS APPROACH SHOULD CONSIDER NATIONAL AND LOCAL CONTEXTS<sup>30</sup>

**In adopting food system measures, it is important to understand what mitigation and/or adaptation activities are appropriate in a given context, including:**

- The position (power) and role of the country in the global food system (e.g., exporter vs. importer)
- The local food systems including indigenous foods
- The types of food system activities in their country (e.g., type of commodity, production or processing)
- Food consumer habits of their population (e.g., eating habits/food preference and household levels of food waste)
- Existing challenges related to nutrition and health (e.g., prevalence of undernutrition or obesity)
- The direct and indirect emissions and mitigation potential from those activities (e.g., food transport emission reduction potential)
- The economic and technological status of the sector and the diverse actors that compose them.
- International (e.g., Sustainable Development Goals, Convention on Biological Diversity) and national policy priorities and potential co-benefits or trade-offs of the proposed activities and institutions and food actors that influence the food systems

### 3. Allocate national budgets to sectoral NDC implementation

**National budgets need to be allocated to sectoral NDC implementation with the involvement of finance and planning ministries from the get-go.**

Redirecting and repurposing harmful agricultural subsidies towards healthier, more sustainable, equitable, and efficient food systems must be a priority aspect in NDCs. Currently, just 1 percent of the USD 700 billion in agricultural and fisheries subsidies are explicitly used to benefit the environment.<sup>31</sup> FAO, United Nations Development Programme and United Nations Environment Programme estimated the projected impacts of eliminating agricultural producer

support to make a strong case for repurposing this support, which is considered largely harmful and unsustainable for nature, climate, nutrition and health, while disadvantaging women and a large share of smallholder farmers. Eliminating agricultural fiscal subsidies alone would cut emissions by an estimated 11.3 million tons CO<sub>2</sub>e by 2030.<sup>32</sup> However, the short-term impacts of such elimination would trigger high costs for a healthy diet, while causing a decline in farm income that would push a small portion of the population in developing countries into extreme poverty, thus increasing the prevalence of undernourishment.<sup>33</sup>

### 4. Unlock and align private finance with food systems priorities

**NDCs should include clear measures and plans to unlock and align private finance with sustainable food system priorities.** Governments should initiate well-designed and durable reforms through collaborations with food system actors including farmers, banks and corporations, researchers and other stakeholders to channel private finance toward sustainable and regenerative forms of farming, better and healthier food and resilient livelihoods and communities for a just rural transition. At the

moment, private finance flows to the land sector far outweigh public finance ones.<sup>34</sup> Hence, reforming and repurposing public funds alone will not be enough to achieve food systems transformation. Business-as-usual private finance for agriculture, forestry and fishing totaled USD 191.6 trillion between 2010–16, or USD 27 trillion per year on average, much of which is driving GHG emissions, biodiversity loss and land degradation through financing industrial agriculture.<sup>35</sup>



# RECOMMENDATIONS FOR FOOD SYSTEMS TRANSFORMATION

General recommendations for food systems transformation to achieve net zero emissions from food production by 2030 and net negative emissions from food systems by 2050:

## 1. A global shift to nature-positive production:

Nature-positive food production systems protect nature, rely on sustainable and agroecological practices that enhance the richness and abundance of biodiversity in land and water, and rehabilitate the functions of degraded natural systems to deliver a climate-positive future in which people and nature can thrive.

## 2. Reduction in food loss and waste and increase in circularity:

Food loss and waste is a major cause of emissions and over-use of resources and land. There needs to be an increasing emphasis on circularity to reduce emissions and build more resilient and sustainable food systems.

## 3. A transition to healthy and sustainable diets:

A transition to healthy diets produced within planetary boundaries – while respecting the local food context – can reduce GHG emissions, protect and restore wildlife, reduce land-use and prevent premature deaths.

## 4. Collaborate at all levels of the food systems:

A food systems approach to climate change needs to be inclusive and collaborative where all stakeholders are involved in designing and implementing relevant interventions.

## A GLOBAL SHIFT TO NATURE-POSITIVE FOOD PRODUCTION

Nature-positive food production systems protect nature, rely on sustainable and regenerative practices that enhance the richness and abundance of biodiversity in land and water, and rehabilitate the functions of degraded natural systems to deliver a climate-positive future in which people and nature can thrive.<sup>36,37</sup> Agroecological approaches including organic farming, agroforestry and regenerative farming have gained prominence as a way to protect, manage and restore nature, while providing healthy food and securing the livelihoods of the people that produce it.<sup>38</sup>

Nature-positive production is meant to protect natural ecosystems against new conversions for food and feed production, to manage sustainably existing food production systems to the benefit of both nature and people and to restore degraded ecosystems and rehabilitate soil function for sustainable food production.

**This requires a shift to:**

- Transitioning to renewable energy-efficient water use and improved efficiency measures, especially in the production of inputs.<sup>39</sup>
- Investing in digital technology including better weather information, traceability of supply chains and early warning systems for pest and disease outbreak.<sup>40</sup>
- Fostering new business models, market incentives and regulations for sustainable food supply chain.<sup>41</sup>
- Encouraging a more holistic understanding of agriculture, not only as producing healthy food but also rendering services for soil, biodiversity, clean water, landscape management and livelihoods for communities.<sup>42</sup>
- Protecting and supporting the recovery of agrobiodiversity, pollinators and organisms critical for soil fertility and soil health and investing in large scale soil restoration and rehabilitation.<sup>43</sup>
- Promoting nutrition-sensitive agriculture practices to ensure producing food in adequate quantity and quality while also safeguarding water and other natural resources.<sup>44</sup>
- Redirecting finance and repurposing subsidies to support more sustainable land-use practices while investing in production of diverse foods.<sup>45</sup>

## REDUCTION IN FOOD LOSS AND WASTE AND INCREASE IN CIRCULARITY

Food loss and waste is a major cause of emissions and over-use of resources and land. There needs to be an increasing emphasis on circularity to reduce emissions and build more resilient and sustainable food systems.

**A shift to circularity and reducing food loss and waste require:**

- Measuring food loss and waste to enable understanding of the reasons for FLW, creation of a case for change, prioritization of interventions, and tracking of progress and evaluation of impact.<sup>46</sup>
- Proving that added value can be effectively extracted and valorized from food waste and loss<sup>47</sup> through reuse, e.g., a food-waste-to-feed approach. By fully utilizing and processing larger amounts of food waste, it could be possible to decrease demand for commodity corn, soy and animal/vegetable fat production.<sup>48</sup>
- Adopting voluntary agreements to build a longer-term strategy to reduce food waste across an industry sector, a region or a nation.<sup>49</sup>
- Investing in supply chain infrastructure and storage facilities to reduce post-harvest food loss including equipment and techniques.<sup>50</sup>
- Supporting short supply chain management (e.g., transport to local markets, urban-rural links, and connection between food producers and consumers).<sup>51</sup>
- Piloting and evaluating behavioral change interventions that reduce consumer food waste generation, and developing policy measures and awareness-raising activities based on country-specific research.

## A TRANSITION TO SUSTAINABLE AND HEALTHY DIETS

A transition to healthy diets that can be achieved within planetary boundaries can reduce GHG emissions, protect and restore nature, reduce land-use and prevent premature deaths.<sup>52</sup>

### **This transition requires:**

- Understanding and addressing local “food environments” and implementing activities to facilitate consumption of healthy and sustainable foods.
- Increasing food availability, affordability and access to diverse and nutritious food at the local levels, including in public institutions such as schools, hospitals and other institutions by adopting sustainable food procurement policies at the national and subnational levels and addressing the true value of food.
- Introducing regulations to incentivize sustainable food choices through lower prices and disincentivize unhealthy and unsustainable foods through taxation.
- Implementing policy measures and awareness programs to engage and involve consumers to encourage healthy and sustainable diets that include promoting plant-rich diets among populations with consumption levels of animal-sourced foods above dietary recommendations to accelerate health and environmental benefits.

## COLLABORATE AT ALL LEVELS OF THE FOOD SYSTEMS

A food systems approach to climate change needs to be inclusive and collaborative where all stakeholders are involved in designing and implementing relevant interventions.

### **This collaboration requires<sup>53</sup>:**

- Identifying food system advocates and building momentum for a change. This will allow policy makers to estimate the level of “buy-in” from the governments at different levels of food systems (international, national and sub-national). It can also help create awareness-raising activities and training on the food systems approach.
- Defining and introducing good governance principles, inclusiveness, transparency and accountability in engaging stakeholders to enable dialogue and collaboration across agendas and at different levels and priority areas, and to connect different interventions for addressing food system issues.
- Assessing and strengthening institutional capacity and governance at the national level. This can help share knowledge and lessons learned in policy planning and implementation and governance and their effectiveness and coherence.

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