



Food and Agriculture  
Organization of the  
United Nations

# CLIMATE CHANGE, BIODIVERSITY AND NUTRITION NEXUS

## In brief



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Humankind is facing a perfect storm of climate change, biodiversity loss and multiple forms of malnutrition (stunting, wasting, micronutrient deficiencies and obesity) coexisting in the same country, community, household and even individual.

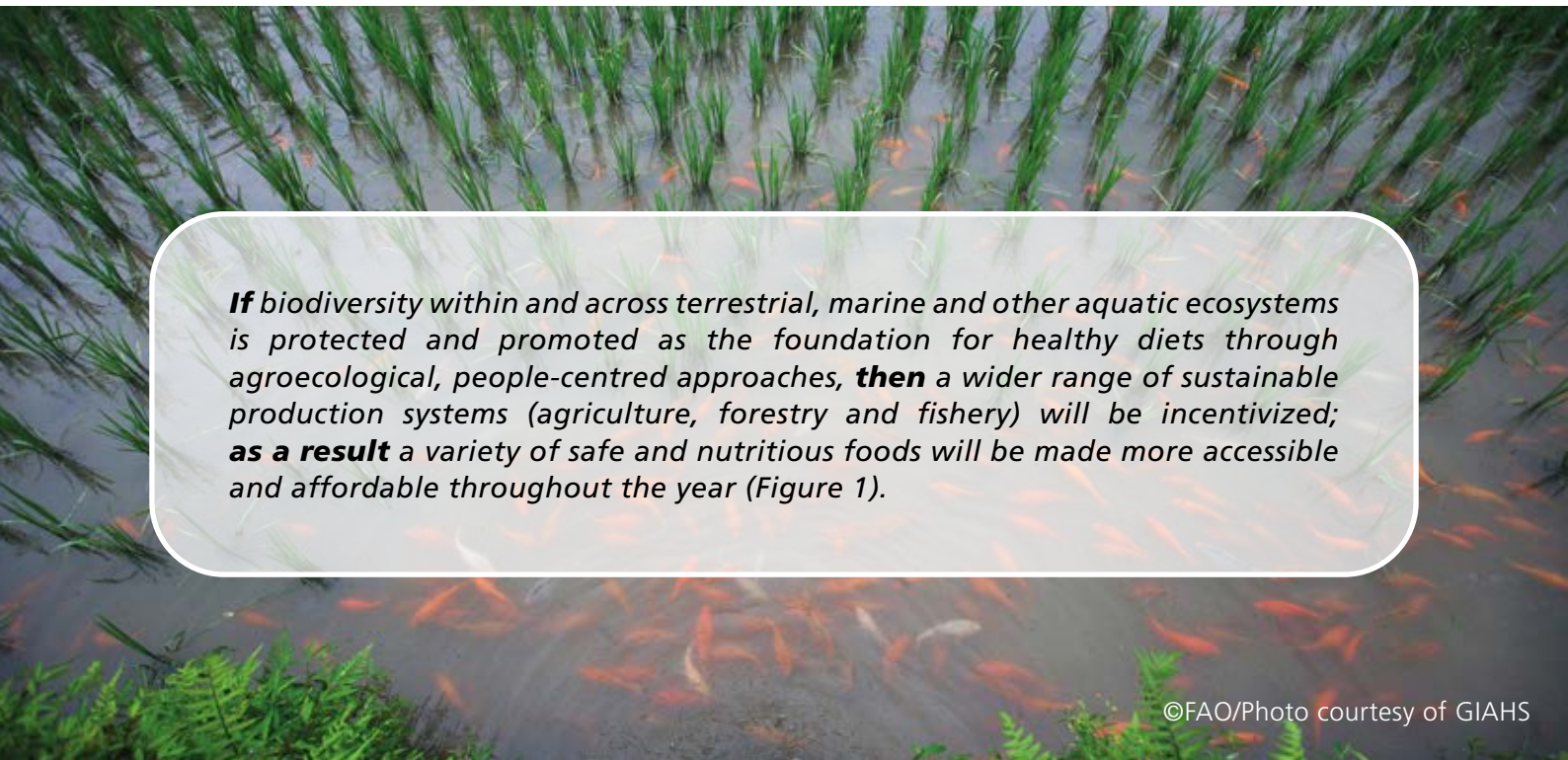
Challenges from each of these areas are well known and recognized. For example, in 2018 the United Nations Secretary-General warned of the “direct existential threat” presented by climate change and called for the world to act swiftly and robustly to limit further warming of the atmosphere. Biodiversity loss is well documented, although this tends largely to overlook loss of genetic diversity in crops, livestock, poultry and fish that are farmed, focusing more on headline species facing extinction. The triple burden of malnutrition – undernutrition, overnutrition and micronutrient deficiencies – is a focus for much work in the nutrition sector.

But what seems to be missing in many development and policy circles is a recognition that food is at the centre of all three of these issues. As stated by the EAT-Lancet Commission, “Food is the single strongest lever to optimize human health and environmental sustainability on Earth. However, food is currently threatening both people and planet” (EAT, 2019). Crop and livestock production occupy about half of the world’s habitable land surface and consume about three-quarters of the world’s freshwater resources. About three-quarters of deforestation – currently running at about 5 million hectares a year – is driven by agriculture, particularly clearing forest to plant crops or raise livestock, driving biodiversity loss and contributing to climate change.

Turning this around requires food to be part of healthy diets that are “based on a great variety of unprocessed or minimally processed foods balanced across food groups (e.g. cereals, roots and tubers, vegetables, fruits, dairy, fish, meat, eggs, oils and fats), while restricting highly processed foods and drink products” (FAO and WHO, 2019).

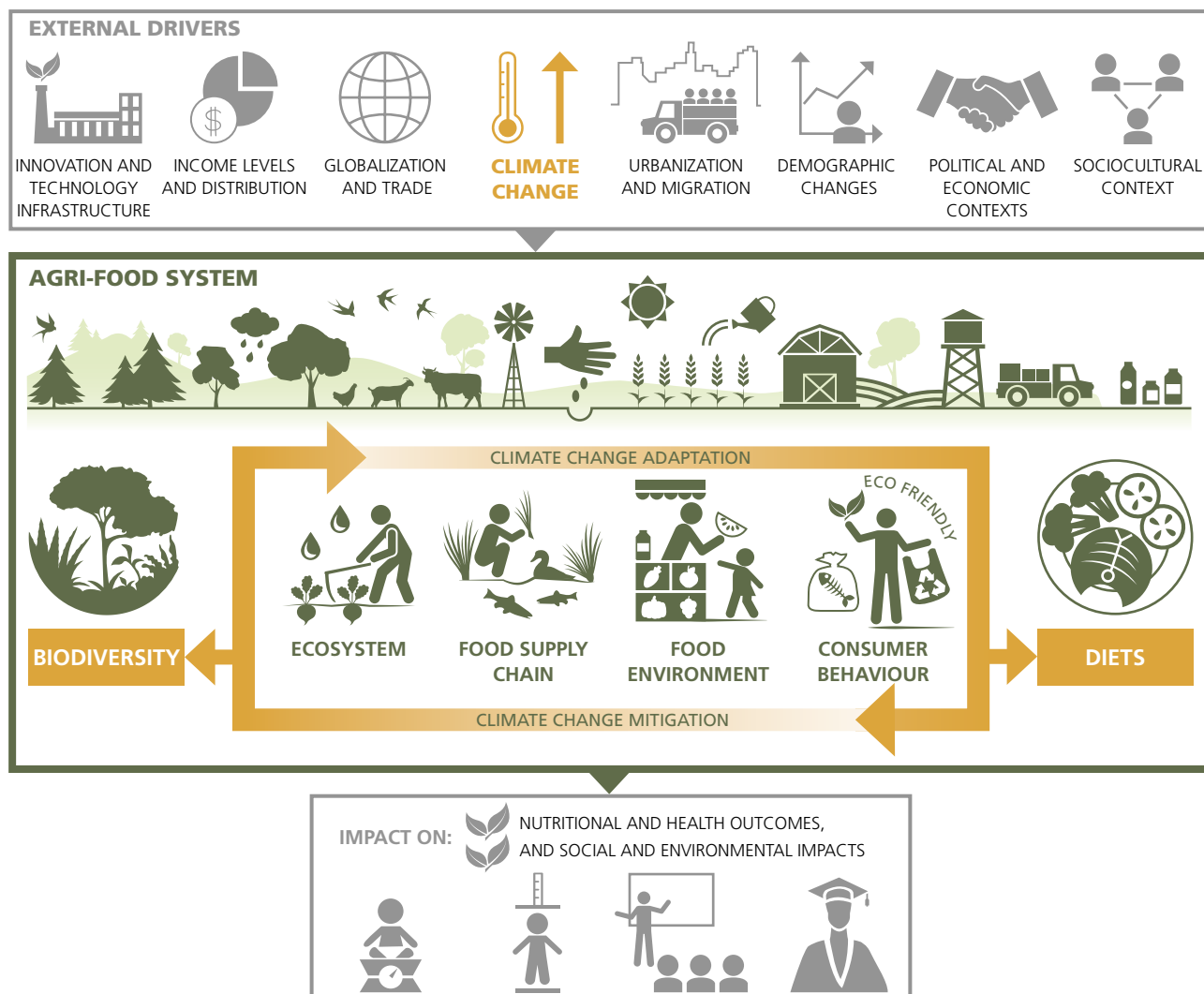
And the starting point for this is to adopt an agri-food-systems perspective – from the ecosystems supporting food production to the actual production, processing, distribution, preparation and consumption of food. Doing so can help to identify key policies and actions needed to address the challenges of climate change, biodiversity loss and nutrition and clarify their health, environment, social equity and economic impacts (HLPE, 2017).

This is based on the premise that:



***If biodiversity within and across terrestrial, marine and other aquatic ecosystems is protected and promoted as the foundation for healthy diets through agroecological, people-centred approaches, **then** a wider range of sustainable production systems (agriculture, forestry and fishery) will be incentivized; **as a result** a variety of safe and nutritious foods will be made more accessible and affordable throughout the year (Figure 1).***

**Figure 1.** Theory of change – climate change, biodiversity and nutrition nexus



Source: adapted from 2020 HLPE.

However, a recent desk review conducted by the Food and Agriculture Organization of the United Nations found that the majority of tools and policies on climate change, biodiversity or nutrition focus on only one or two of these domains and very few explicitly address all three. The same study identified numerous entry points within agri-food systems to improve biodiversity and diets as the two levers to enhance nutrition and optimize environmental sustainability while ensuring socio-equality, especially of the most vulnerable people.

Based on these findings, the study made a number of recommendations for action by governments, academia, civil society, the private sector and development partners to address these shortcomings.

**Figure 2.** Key recommendations



Promote the climate change, biodiversity and nutrition nexus in all planning processes



Develop tools and methodologies to fill knowledge gaps and address the interlinkages between climate change, biodiversity and nutrition



Promote policy coherence through multistakeholder dialogues to identify key win-win solutions through agri-food systems, recognizing the role of traditional and Indigenous Peoples' knowledge



Support and incentivize agri-food systems that conserve biodiversity while delivering healthy diets as the two levers for better environmental and socioeconomic impacts

Source: authors.

## Governments

A crucial first step is for policymakers to mainstream nutrition and dietary considerations into climate-change planning processes, especially in areas concerned with biodiversity, ecosystems and agri-food systems. In addition, nutrition policymakers should better consider risks related to climate change, biodiversity loss and unsustainable agri-food-systems practices.

**Government** policies should seek to incentivize practices – from production to consumption – that promote biodiversity conservation, climate-change mitigation and healthy diets.

Institutional procurement such as home-grown school feeding programmes can sustainably increase demand for and supply of safe and nutritious foods, while promoting agrobiodiversity. The complementary school food programme in the Plurinational State of Bolivia, for example, supported by the country's Law on School Feeding, incentivizes pesticide-free local food production and agro-biodiversity to enhance meal diversity through increased access to traditional Andean grains, vegetables and fruits.

Policy coherence through multistakeholder dialogues is essential to promote an enabling financial landscape that helps identify key win-win solutions throughout agri-food systems, especially since current policies are lacking in identification of the risks and trade-offs of different policy options.

## Civil society

**Indigenous Peoples** should be fully engaged in developing policies and interventions to address climate change, biodiversity and agri-food systems. For example, the Alliance of Central American Indigenous Fishers was formed in 2018 to protect indigenous ecosystems, which cover 70 percent of the Caribbean coast of Central America and are already being severely impacted by climate change.

Traditional knowledge is vital for the development of integrated production systems that incorporate locally adapted annual and perennial crops, tree crops and terrestrial and aquatic animals to adapt to and mitigate climate change while enriching dietary diversity and contributing to livelihoods. For example, there are important lessons to be learned from the traditional knowledge embedded

in the rice–fish–duck terraces of the Hani people in the Yunnan Province of China. Fish and ducks in the rice paddies help fertilize the crops and control pests and weeds, while the rice provides shelter, shade and food for the animals. The system produces rice and animal protein without the use of pesticides and herbicides, producing health food for home consumption and sale. The circular economy of the rice–fish–duck system ensures year-round food and income sources.

**Consumers** also have a crucial role to play in transforming agri-food systems for healthy diets that are sustainable in terms of environment, socio-economic, cultural and health requirements. Concerns over the sustainability and healthiness of diets continue to influence consumer choices, as is evidenced by the growing popularity of food lifestyles and food movements. Various mechanisms can be used to help consumers make better choices. For example, food labelling can increase consumer awareness of the climate impact of their food choices in addition to providing details on packaged foods' ingredients and nutritional content, guiding choices to sustainable, ethical and health options. Food-based dietary guidelines like those launched by the Government of Denmark in January 2021 consider both the health and environmental impact of diets as part of the government's ambition to reduce the climate footprint by 70 percent by 2030. Apps such as Yuka can help to build consumers' awareness on the health impact of the products they consume, including food safety information.



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### Private sector

The private sector can directly influence the ways in which natural resources and agri-food systems are managed. FAO encourages every food industry – irrespective of size – to align and commit to integrate their production systems with science-based targets, putting humans and planetary health at the foundation.

**Producers**, especially smallholder farmers, fishers and pastoralists, are encouraged to apply agroecological regenerative approaches that promote biodiversity conservation to build sustainable agri-food systems that mitigate climate change and increase access to healthy diets. The promotion of well-adapted animal species, crop varieties (including biofortified crops), landraces, wild and underutilized plant species that are rich in micronutrients, combined with nutrition education, can provide innovative targeted solutions to improve farmers' livelihoods and dietary quality. However, for this to happen, producers will need the right incentives.

**Agribusinesses and retailers** play a key role in reducing food loss and waste through adoption of improved food storage, processing, packaging, distribution and transportation. Public-private partnerships, such as those promoted in the FAO-NORAD project on Empowering Women in Small-scale Fisheries for Sustainable Food Systems, for example, can help small-scale producers to reduce food waste and improve the safety of their products while ensuring decent livelihoods. Geographical indications can promote short food supply chains by informing consumers of local production factors (e.g. natural resources, traditions, expertise) while maximizing local potential and granting market access for quality origin-linked food products. Slow Food Presidia are another example where small-scale producers are empowered to protect local biodiversity against social, economic and environmental changes, maintaining local food knowledge and cultural practices and connecting producers directly with consumers.

**Retailers** also have a central role to play in reducing food waste, especially in high-income countries. Apps such as TooGoodToGo can facilitate this, providing real-time information on unsold perishable foods that consumers can buy from nearby retailers at a reduced price. Since 2016, TooGoodToGo has saved 63.1 million meals from being wasted in 13 European countries and has launched public awareness campaigns at household, business, school and national levels.

### Academia

**Academia** has a crucial role to play in developing the tools and methodologies to fill knowledge gaps and to deepen our understanding of the impacts of changes in ecosystems, food production practices and consumption patterns on climate change, biodiversity loss and nutrition.

Academia also has a key role to play in investigating promising emerging areas that can contribute to improving environment–nutrition linkages. For example, more research is needed into the connection between the soil microbiome and human gut microbiome and its relationship to agrobiodiversity to provide the missing link between diets, agri-food systems and soils.

### Development partners

**Development partners** including United Nations agencies, international organizations and donors, should promote healthy diets that ensure access to safe and nutritious foods for all. As part of a shift to sustainable and healthy consumption patterns, they should avoid promoting single food items or products whose over-consumption could lead to higher environmental impacts and negative outcomes in human nutrition.

**International organizations such as FAO** have a vital role to play in raising awareness of the climate change, biodiversity and nutrition nexus. This is essential to ensure a broadened dialogue to help leverage climate finance opportunities to support development of healthy diets and better nutrition from inclusive, resilient, sustainable agri-food systems. More attention should be given to evaluating the impact of programmes in agriculture and agri-food systems to assess the benefits and risks for nutrition and climate change.

## MAKING FOOD WORK FOR THE HEALTH OF THE ENVIRONMENT AND HUMANKIND

Food is the single strongest lever to optimize human health and environmental sustainability on Earth but currently works against both. Changing this will require shifts in demand for food to increase biodiversity in production systems that are environmentally and socially sustainable and resilient to climate change. The best way to achieve this is to adopt an agri-food-systems perspective – from the ecosystems supporting food production to the actual production, processing, distribution, preparation and consumption of food – to identify key policies and actions needed to address the challenges of climate change, biodiversity loss and nutrition and clarify their health, environment, social equity and economic impacts.

This study identifies key entry points within the agri-food systems that can trigger the actions required by governments, civil society, private sector, academia and development partners to deliver agri-food systems that will protect and enhance biodiversity and improve access to healthy diets for better nutrition while helping mitigate and adapt to climate change.

**Figure 3.** Key entry points within the agri-food systems



Source: authors.



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