



Food and Agriculture
Organization of the
United Nations

AGRIFOOD SOLUTIONS TO CLIMATE CHANGE

FAO's work to tackle the climate crisis



Required citation:

FAO. 2023. *Agri-food solutions to climate change – FAO's work to tackle the climate crisis*. Rome. <https://doi.org/10.4060/cc8055en>

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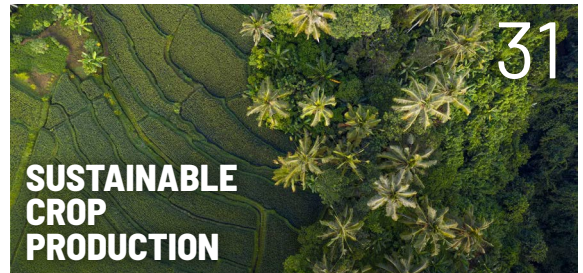
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Climate action, safeguarding biodiversity and the pursuit of food security are intertwined.

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A VISION FOR LONG-TERM CLIMATE SOLUTIONS

Developing better and more inclusive
ways to address climate challenges

Ending hunger is inseparable from
ending ecosystem degradation.

© FAO

Agrifood systems are sustainable, inclusive, resilient and adaptive to climate change and its impacts and contribute to low-emission economies while providing sufficient, safe and nutritious foods for healthy diets, as well as other agricultural products and services, for present and future generations, leaving no one behind.

FAO Strategy on Climate Change 2022-2031

The future of the world as we know it depends on sustainable climate solutions and action.

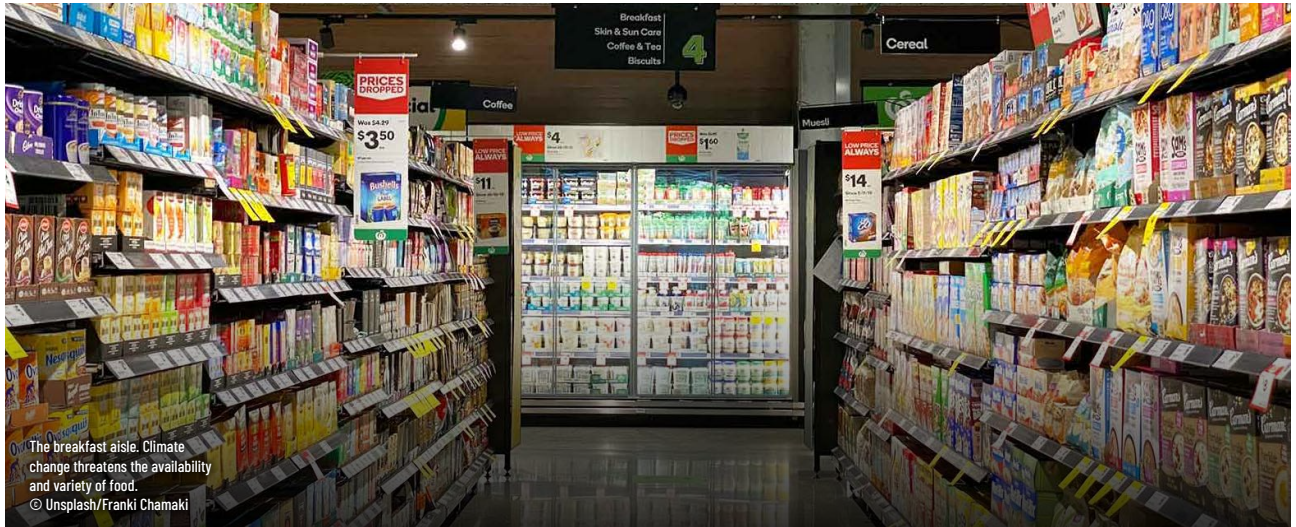
Climate action also lies at the heart of the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs) – an urgent, unanimous call to action.

The ongoing Decade of Action to deliver the SDGs calls for accelerated solutions to the world's greatest, often intertwined challenges: these include poverty and hunger; inequality; climate change; loss of biodiversity; and ecosystem degradation and desertification.



Agriculture is a major part of our climate and environmental challenges. The hard truth in numbers:

- Agrifood systems – encompassing all aspects of the production, distribution and consumption of food – **are responsible for around 30 percent of carbon dioxide equivalent emissions.**
- **In 2021, only 20 percent of climate-related development finance was allocated to agrifood systems, a decrease of 12 percent from the previous year.** The unique potential of agrifood systems to tackle the climate crisis can only be realized by scaling up investments in agrifood systems solutions and actions.
- **Land degradation is a driver of climate change** through emission of greenhouse gases and reduced rates of carbon uptake. It also directly undermines our ability to produce food **affecting the lives of more than 3.2 billion people.**
- **With agriculture accounting for 72 percent of freshwater withdrawals,** actions and investment are needed to produce more with less water and support climate-adapted and resilient agrifood systems.



But agriculture, more than any other sector, might be our best hope for curbing climate change.

- Amid growing climate impacts and slow progress on cutting greenhouse gas emissions, sustainable food systems and agricultural practices can help countries and communities to adapt, build resilience, and mitigate emissions, ensuring food security and nutrition while reversing environmental degradation and its impacts.
- FAO already supports countries to deliver solutions. However, a transformation of agrifood systems to tackle the climate crisis can only be realized by scaling up investment in action at local, national and global levels.

Paradoxically, agriculture may be our best bet for curbing climate change

- Transforming to more efficient, resilient and sustainable agrifood systems must be equitable, inclusive and gender responsive – addressing loss and damage in the agriculture sectors.
- Science, innovation and data are critical for climate policies and informed decision-making –including on proactive measures to prepare for extreme weather.
- Countries need to develop holistic and integrated approaches and national strategies to address the interlinked climate, food, nutrition, water, land, biodiversity and energy challenges.

LEAVE NO ONE BEHIND

The central, transformative
promise of the 2030 Agenda
for Sustainable Development




On the frontlines of the climate crisis, family farmers, herders, fishers and fish farmers, forest dwellers, food workers and their families provide 70–80 percent of the world's food.


They play a fundamental role in biodiversity preservation and climate action, but now face much faster and more severe shifts in weather and climate patterns. These are already undermining years of development gains and have the potential to damage and permanently alter the environments in which they live and work.

Any new policies to combat climate change must be made to last but be flexible enough to adapt to a changing situation. Participatory approaches based on group learning and local knowledge systems such as farmer field schools are one of FAO's main entry points to develop activities that enhance food security and nutrition, and to support climate adaptation and mitigation.

In this endeavour, FAO pays particular attention to removing discriminatory barriers faced by women, youth, older people, Indigenous Peoples and people with disabilities.



For climate policies to work, they must be both lasting and adaptable





ACHIEVING GENDER EQUALITY

Women play a vital role in every sphere of agricultural activity. They have traditionally been the primary stewards of agrobiodiversity, including the management and conservation of crop and animal genetic resources, medicinal plants and other wild foods.

But women carry a heavy work burden, having to juggle between their productive activities and domestic chores. They also tend to have poorer access to land, services and resources than men, which makes it harder for them to adopt climate-resilient practices. FAO has calculated that achieving equality for women in agrifood systems would add as much as USD 1 trillion to global GDP and take 45 million people out of food insecurity.

FAO promotes gender-sensitive policies and programmes that support women's leadership, and advocates for women's participation in the management of natural resources and decision-making processes.

A woman from Panama's Arimae community diagnoses plant disease.
© FAO/Cecilia Calatrava



PROTECTING AND PROMOTING THE LIVELIHOODS OF INDIGENOUS PEOPLES

Indigenous Peoples are intrinsically connected to land and nature. They are custodians of 80 percent of the world's remaining biodiversity. They have developed complex knowledge systems around food and natural resource management that have demonstrated their adaptability and resilience.

Indigenous youth are often in a position to preserve these ancestral knowledge systems while harnessing the potential of new practices and technology; and to promote the resilience and continuity of their Peoples. Collaboration between Indigenous Peoples, governments and other stakeholders holds the key to addressing the climate crisis and must be based on respect for Indigenous Peoples' collective rights.

FAO IN THE GLOBAL CLIMATE AGENDA

Agrifood systems at the centre
of solutions to the climate crisis

Navigating the climate crisis is a livewire act: we must address climate change impacts on agrifood systems, and simultaneously reduce the impact of agrifood systems on the environment.

FAO seeks to enhance its support to Member Nations on climate change adaptation and mitigation, to build climate-resilient and low-emission agrifood systems while striving to achieve the Sustainable Development Goals (SDGs), and in particular to eradicate hunger and malnutrition (SDG 2).

Making agrifood systems more efficient and sustainable requires rethinking current agricultural policies, advancing innovation and revolutionizing management approaches.



Agrifood systems emissions 2021

Data source: FAO. 2023. Agrifood systems and land-related emissions. Global, regional and country trends, 2001- 2021. FAOSTAT Analytical Briefs Series No. 73. Rome. <https://www.fao.org/faostat/en/#data/GT>

FAO STRATEGIC FRAMEWORK 2022–2031

The FAO Strategic Framework 2022–2031 is a response to the escalating global demand for more efficient, inclusive, resilient and sustainable agrifood systems.

The document outlines the importance of sustainable consumption and production patterns, through efficient and inclusive agrifood value chains.

The Strategic Framework's better environment Programme Priority Areas include climate change mitigation and adapted agriculture and food systems; bioeconomy for sustainable food and agriculture; biodiversity and ecosystem services for food and agriculture; and sustainable urban food systems.



FAO STRATEGY ON CLIMATE CHANGE

The FAO Strategy on Climate Change is part of the Strategic Framework.

It includes guiding principles, encompassing all areas of agricultural systems (crops, livestock, fisheries and aquaculture, and forestry). Several of these principles speak of the need for country-driven innovation and science-based policy, taking into account the perspectives and needs of farmers, livestock keepers, fisherfolk, aquaculturists and forest-dependent people.

The Strategy on Climate Change embraces a “no-one-size-fits-all” approach, which considers context, diversity and capacity.



FOOD AND AGRICULTURE IN THE GLOBAL CLIMATE AGENDA

The 2015 [Paris Agreement](#) strengthens the global response to the threat of climate change by pursuing efforts to limit the average global temperature increase to 1.5 degrees Celsius.

At the 27th session of the Conference of Parties (COP27) of the United Nations Framework Convention on Climate Change (UNFCCC), hosted by Egypt in late 2022, agriculture and food security featured prominently on the agenda.

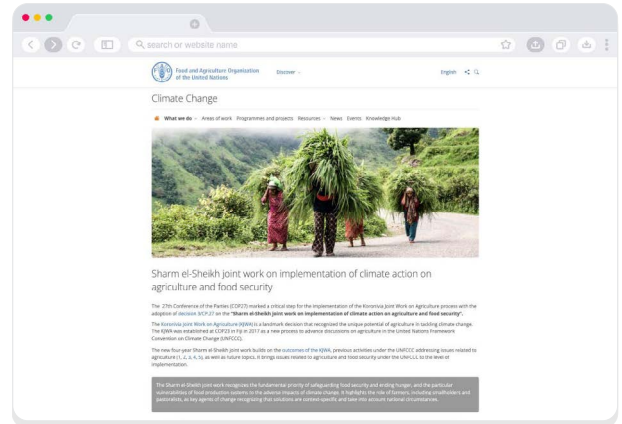
Discussions in Sharm El Sheikh concluded the [Koronivia Joint Work on Agriculture](#) roadmap – a multisector UN approach that places agriculture at the heart of the fight against climate change – and set up a new, four-year [Sharm el-Sheikh joint work on implementation of climate action on agriculture and food security](#), to work on issues related to agriculture and food security, with a focus on implementation.

FAO and Egypt jointly launched the Food and Agriculture for Sustainable Transformation

Initiative (FAST), aiming to support climate action in agrifood systems around three pillars:

1. access to finance and investment;
2. knowledge and capacity development; and
3. policy support and dialogue.

FAST will contribute to the implementation of nationally determined contributions, national adaptation plans, and long-term low-emission development strategies.



[Read more on climate action in practice](#) >



FAO GLOBAL PROGRAMMES ON CLIMATE CHANGE IN AGRICULTURE

The Scaling up Climate Ambition on Land Use and Agriculture through Nationally Determined Contributions and National Adaptation Plans (SCALA) programme is a joint programme between FAO and the United Nations Development Programme (UNDP).

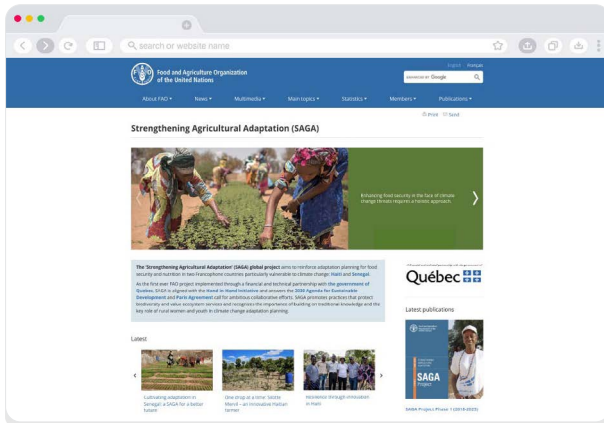
SCALA supports countries across Asia, Africa and Latin America in building adaptive capacity

and reducing greenhouse gas emissions to meet the targets set out in their nationally determined contributions (NDCs) and National Adaptation Plans (NAPs).

It emphasizes private sector engagement, as well as gender-responsive and inclusive approaches to planning and implementation that benefit the most vulnerable natural resource-dependent communities.

Another example is the Strengthening Agricultural Adaptation (SAGA) global project, which is working with farmers, helping them adapt to climate change in three countries particularly vulnerable to its impacts: Haiti, Senegal and Côte d'Ivoire. It does this by:

1. generating data and scientific evidence on vulnerability and adaptation options in the agriculture sectors;
2. undertaking community-based pilot interventions;
3. developing policy guidance; and
4. capitalizing on existing climate change coordination mechanisms to facilitate dialogue among local, national and international partners.



Explore in-country examples of adaptation >

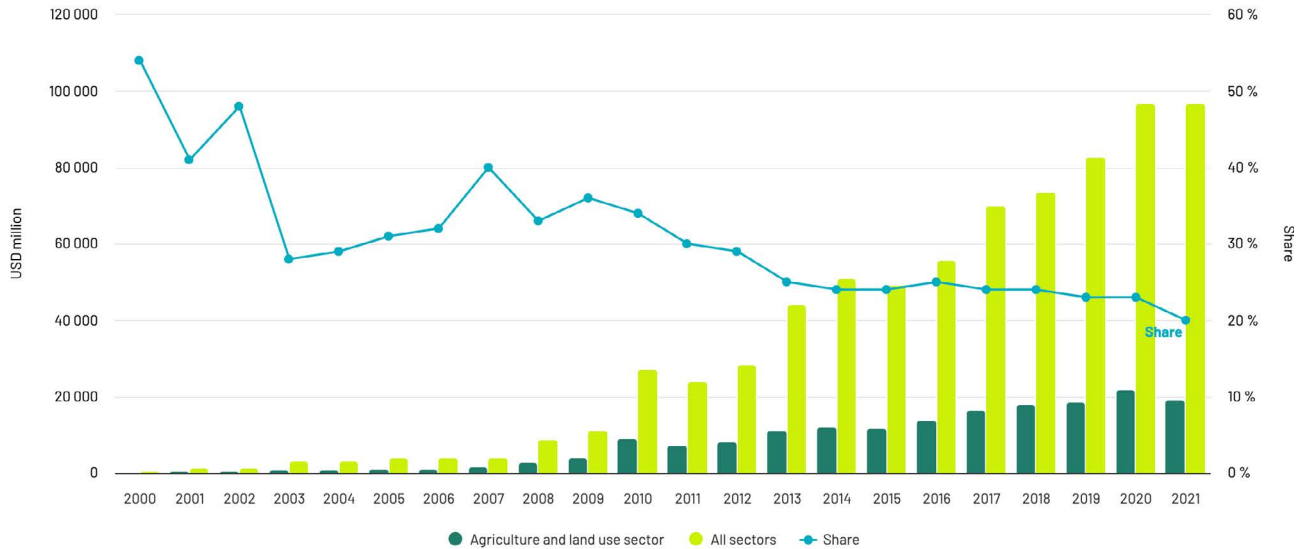
SCALING UP GREEN AND CLIMATE-RESILIENT FINANCE

Climate finance is a fundamental part of the global development agenda, but agriculture and land use do not always benefit from adequate funding. Between 2000 and 2021, financial support for agrifood systems totaled USD 183 billion, with contributions of USD 19 billion in 2021 marking a

12 percent decline from the previous year. Trends analysis shows that although there is a positive trend in absolute terms, the growth rate of climate-related development finance to agrifood systems lags behind the overall average, resulting in a reduction in the proportion of finance allocated to agrifood systems globally.

FAO helps countries consider different financing options and makes a strong case for mainstreaming climate issues into policy.

CLIMATE-RELATED DEVELOPMENT FINANCE TO THE AGRIFOOD SYSTEMS VERSUS ALL SECTORS



Data source: Galbati, G.M., Bernoux, M., Yoshida, M. & Benni, N. (forthcoming). *Climate-related development finance to agrifood systems - Global trends 2000-2021*. FAO, Rome. doi.org/10.4060/CC8055EN-fig01

FAO AND THE GLOBAL ENVIRONMENT FACILITY

Since 2018, FAO has supported over 100 countries to design and implement 159 Global Environment Facility (GEF) projects valued at USD 6.9 billion. The projects are helping governments address the critical issues at the nexus between agrifood systems, climate change, biodiversity, land degradation and international waters. They aim to improve productivity and agricultural livelihoods while boosting the sustainability of ecosystems.

The FAO–GEF partnership tackles both climate change mitigation and adaptation by avoiding and reducing greenhouse gas emissions and bolstering climate resilience. Over the past four years, from Uruguay to Uzbekistan, from Kenya to Cambodia, and from Mongolia to Mauritania to Mexico, GEF has supported the management of 150 million hectares of land and sea; restored nearly 4 million hectares of land; and brought over 2 million tonnes of overexploited fish stocks to a point where fish have the time to reproduce to sustain population levels. The funds have also supported measures that mitigated over 570 million tonnes of greenhouse gas emissions and directly impacted the lives of more than 13 million people.



FAO AND THE GREEN CLIMATE FUND

FAO and the Green Climate Fund (GCF) have been scaling up investments in climate change projects to protect and build the resilience of the agriculture, forestry and fisheries sectors, reaching a milestone in 2022 as the value of FAO's GCF portfolio passed the USD 1 billion mark. The projects focus on limiting or reducing greenhouse gas emissions, and helping vulnerable communities adapt to the

impacts of climate change. FAO also extends its technical expertise to projects led by GCF partners.

Through the Readiness Programme, FAO also helps countries access GCF resources to enhance the capacity of national institutions to engage with GCF and to undertake adaptation planning and develop climate investment frameworks.



THE PARADOX OF HUNGER AND FOOD LOSS AND WASTE

Food loss and waste stands in tragic contrast to widespread hunger and malnutrition.

SOME FACTS AND FIGURES:

- About one-third of the food produced for human consumption is lost or wasted between processing, storage, transportation, distribution and consumption.
- If food loss and waste were a country, it would be the third biggest source of greenhouse gas emissions worldwide.
- Lack of infrastructure, inadequate storage facilities, and inappropriate transportation (i.e. absence of cold storage) are the main causes of post-harvest losses.
- Many countries lack access to energy, which results in increased food losses, limited capacity to process food, and restrictions for farmers looking to boost their incomes.
- Malnutrition affects one in three people globally, through chronic hunger, micronutrient deficiency, child stunting, overweight and adult obesity.
- Beyond the cost in human suffering, the impact of malnutrition in all its forms is estimated to cost the global economy USD 3.5 trillion each year.

Beyond its cost in human suffering, malnutrition costs the global economy USD 3.5 billion a year

PREVENTING FOOD LOSS AND WASTE

With household waste the largest source of food waste worldwide, raising awareness and driving consumer behavioural change is critical. FAO is part of the Food is Never Waste coalition, which encourages countries to share experiences and create new solutions to reduce the phenomenon.

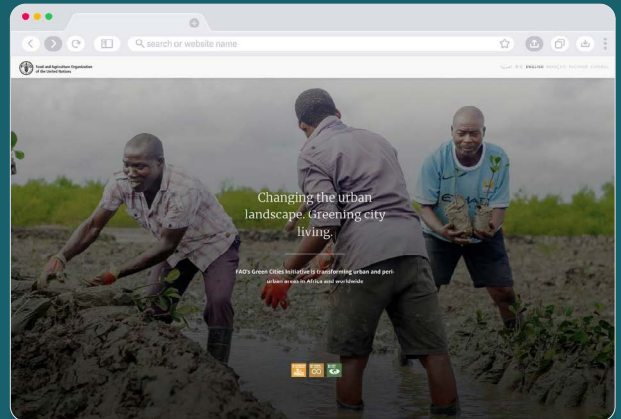


FAO GREEN CITIES INITIATIVE

In the markets of Nairobi, unsold, spoiled or decaying fruit and vegetables are usually abandoned, polluting the streets and burdening waste collection systems. Estimates suggest that up to 40 percent of Kenya's food is lost after leaving the farm and before it is bought by consumers, which in turn contributes to food insecurity.

To address this, under the [FAO Green Cities Initiative](#) launched in 2020, Kenya's National Environment Management Authority has trained 100 market operators in waste management, from composting techniques to using biogas digesters to convert food waste into fuel.

The GCI targets cities of all sizes, collaborating closely with mayors and local authorities, and providing technical guidance and training to improve the urban and peri-urban environment. FAO expects as many as 1 000 cities to join the initiative by 2030.



[Learn more about urban transformation](#)



GLOBAL WASTE INITIATIVE 50 BY 2050

FAO supported the COP27 Presidency in the Global Waste Initiative 50 by 2050, a holistic coalition aiming to treat and recycle at least 50 percent of the solid waste produced in Africa by the middle of the century, including reducing food loss and waste.

FAO has separately called on governments, companies, institutions and individuals to pledge to align their action agendas, halve food waste by 2030 and reduce food losses by at least 25 percent.



Food refuse - here at a market in Jakarta, Indonesia - could find its way into fuel.
© FAO/Harriansyah

ENHANCING HEALTH AND NUTRITION

It has been estimated that investing USD 1 in nutrition results in a USD 16 return by strengthening our immune systems; cutting the risk of chronic disease; improving productivity; and, more broadly, boosting our ability to support economically vibrant societies and expanding gross domestic product (GDP).

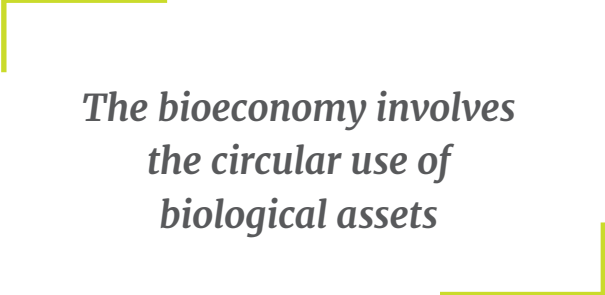
Climate change affects access to nutritious foods, by putting stress on natural resources such as water and soils needed for food production and healthy diets. It reduces yields as well as the level of nutrients in crops. Meanwhile, more frequent extreme weather events increase food loss and decrease price stability, further restricting access to healthy diets, especially for the most vulnerable.



Bioeconomy, a FAO strategic priority, addresses societal challenges such as food and nutrition security, food loss and waste, and dependence on fossil fuels. A bioeconomy is an economy based on the sustainable and circular use and conservation of biological resources and processes. These resources and processes provide food, feed and bio-based products and services, and have major potential to build resilience to climate change.

The bioeconomy embraces biotechnology and bio-innovations to make the most of biomass, including by making bio-based plastics and textiles from agricultural residues. While bio-based plastics should be considered within individual contexts, they can be a positive investment, creating jobs, helping communities to be self-sustaining and reducing the carbon impact of packaged products.

FAO provides policy guidance and technical support to assist policymakers in establishing and implementing national and regional strategies, action plans, and programmes to develop a sustainable and circular bioeconomy, in line with the SDGs, the Paris Agreement and other multilateral environmental agreements.

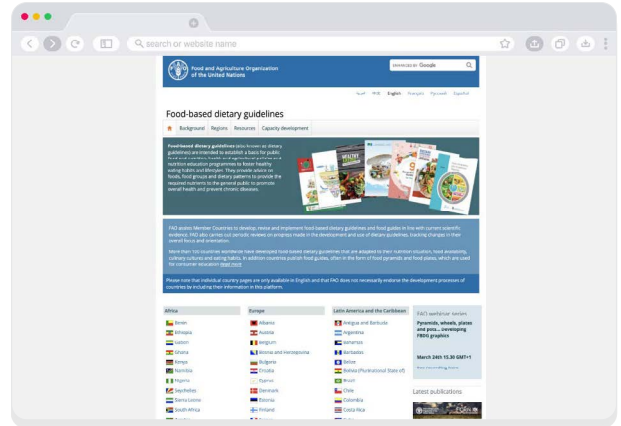


***The bioeconomy involves
the circular use of
biological assets***

PROMOTING HEALTHY DIETS

FAO is supporting its Members to eradicate all forms of malnutrition, promote healthy diets and prevent chronic diseases. FAO's food-based dietary guidelines (FBDGs) provide country-specific recommendations on what constitutes a healthy diet. The guidelines are rooted in sound evidence and have spurred a global FBDG Repository.

FBDGs contain advice on foods, food groups and dietary patterns, and sometimes factors such as eating modes (family meals, conviviality) and food safety. FAO has been working with experts and partners since 2019 to update the methodology for developing and implementing FBDGs. The new “food system-based dietary guidelines” (FSBDGs) methodology is anchored, as its name suggests, in a food systems approach, which considers various aspects of sustainability in addition to health and nutrition.



Browse 100+ dietary guidelines >



FSBDGs can be used to guide policies across agrifood systems. Agriculture-related policies include subsidies, the promotion of particular crops, or investment in specific crops; food environment policies include the restriction or promotion of specific foods.

FSBDGs also lay the groundwork for programmes that support healthy diets from sustainable agrifood systems for healthy people and a healthy planet. To help trigger the transformative processes that could deliver these goals, an Initiative on Climate Action and Nutrition (I-CAN) was developed by the COP27 Presidency, in partnership with FAO alongside the World Health Organization (WHO), and other UN agencies and partners such as the Global Alliance for Improved Nutrition.



SUSTAINABLE CROP PRODUCTION

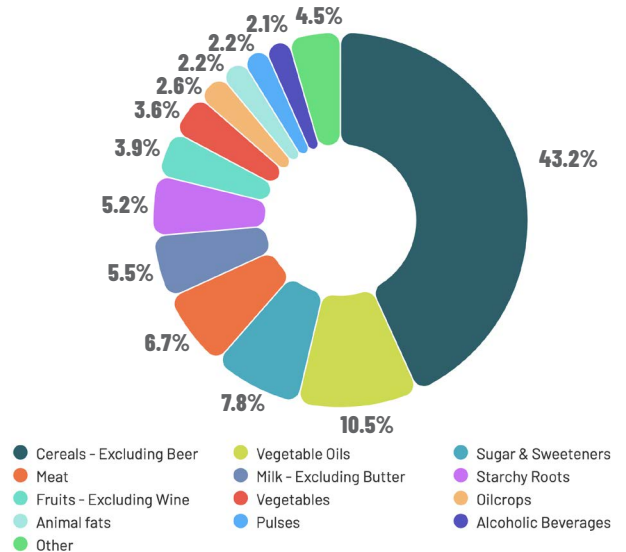
Tomorrow's agriculture means
producing more food with a lower
environmental footprint

Plants make up most of the food we eat: about 12 percent of the world's lands are destined for growing crops. Wheat, rice and maize provide 60 percent of the world's food energy intake.

Altogether, some 6 000 plant species are cultivated for food production. But climate change is altering ecosystems and damaging biodiversity, while creating new niches for pests to thrive.

Restoring ecosystems contributes to climate mitigation and curbs the risk of species extinctions and future pandemics. **Agroforestry alone could increase food security for 1.3 billion people.**

**WORLD FOOD SUPPLY BY FOOD GROUP, 2021
(KCAL/CAPITAL/DAY)**



Data source: FAO. 2021. Food Balances. In: *FAOSTAT*. Rome. Cited 07 November 2023.
<https://www.fao.org/faostat/en/#data/GT>
doi.org/10.4060/CC8055EN-fig02

SUSTAINABLE AND CLIMATE-RESILIENT PLANT PRODUCTION FOR FOOD SECURITY

Soil is a vital carbon sink and home to 25 percent of the world's biodiversity, hosting ecosystems that are essential to the preservation of life. Better management of soils can increase the food supply and offset up to 20 percent of current global greenhouse gas emissions, providing a valuable lever for climate regulation and a pathway to safeguarding ecosystem services.

Preventive climate change mitigation and adaptation measures are necessary to limit the international spread of pests through trade and travel.

Short- and mid-term mitigation and adaptation options include the use of resistant plant varieties and the modification of the microclimate.

Through instruments such as the [International Plant Protection Convention](#) and the [Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade](#), FAO provides field-level technical assistance to its Members for the identification and pilot-testing of valuable, sustainable and ecologically friendly, less hazardous alternatives to chemical pesticides.



Stirring the soil around seedlings - here in Senegal - can promote root growth.
© FAO/Olivier Asselin

GLOBAL SOIL PARTNERSHIP

FAO's Global Soil Partnership (GSP) is a globally recognized mechanism established in 2012, whose mission is to position soils on the global agenda. Its main objectives are to:

- promote sustainable soil management and improve soil governance to guarantee healthy and productive soils; and
- support the provision of essential ecosystem services towards food security and improved nutrition, climate change adaptation and mitigation, and sustainable development.

The GSP and its Intergovernmental Technical Panel on Soils have produced a series of soil maps through country-led processes to support informed decision-making at country level. Since 2012, the GSP's capacity development programme has reached more than 7 000 national experts from over 170 countries.

Two of the maps produced are essential tools to address the climate crisis: the global map on soil organic carbon (SOC), which enables countries to draw conclusions on the distribution and status of their soil organic carbon stocks; and the SOC sequestration potential map, which allows the identification of regions, soil types and farming systems with the greatest potential to offset greenhouse gas emissions.

FAO Land and Water
@FAOLandWater · Follow

The loss of soil organic carbon results in:

- less fertile soil and crops
- food shortages
- increased food prices
- less biodiversity
- increased GHG emissions
- decreased water retention and filtration

What causes it? 🌳 🌳 🌳
Let's #SaveSoil & save our 🌍 #SoilHealth

The infographic illustrates the following causes and effects of soil organic carbon loss:

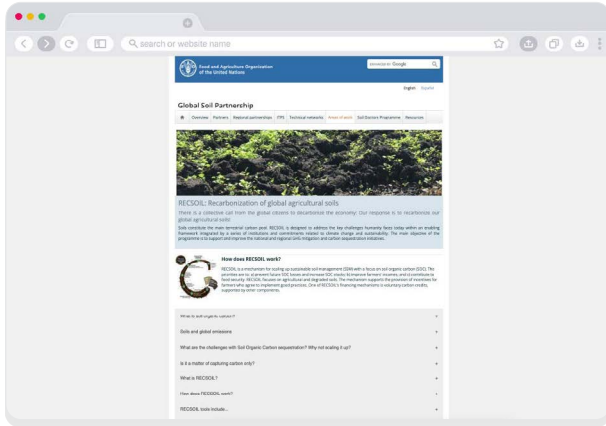
- Soil and water erosion:** Leads to loss via dissolved organic carbon (DOC).
- Deforestation & land use change:** Results in aggressive tillage, which causes soil aggregates breakdown.
- Aggressive tillage:** Leads to the appearance of bare-ground surfaces and increased SOM mineralization rates.
- Overgrazing:** Contributes to the appearance of bare-ground surfaces.
- Monocultures:** Lead to decreased soil and fertility.

Food and Agriculture Organization of the United Nations | GLOBAL SOIL PARTNERSHIP

11:27 AM · Aug 4, 2023

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RECARBONIZATION OF GLOBAL SOILS

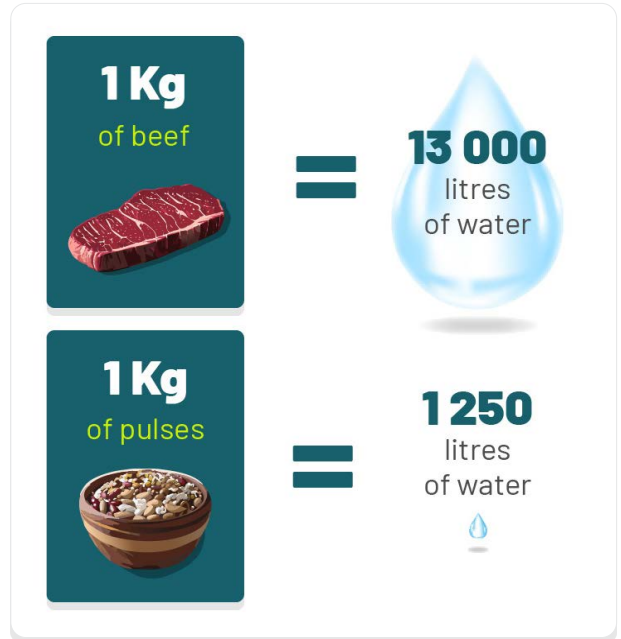
The Recarbonization of Global Soils (RECSOIL) facility is a mechanism that scales up sustainable soil management. It backs national and regional farming incentives that restore degraded soils, while preventing the release of greenhouse gases into the atmosphere and contributing to carbon sequestration efforts.



WATER – AN EVER-SCARCER RESOURCE

Agriculture accounts for around 70 percent of all freshwater withdrawals. In some developing regions, 95 percent of water is destined for agriculture. Meanwhile, much of our water footprint is hidden. We “eat more water” through the food we ingest than the water we drink: 2 000 to 5 000 litres are needed to produce the food consumed per person per day. And while about 1 250 litres of water go into 1 kg of lentils, about 13 000 litres of water go into 1 kg of beef.

As the world’s population continues to grow, living standards increase, diets change and the effects of climate change intensify. If current consumption patterns continue, two-thirds of the global population could be living in water-stressed countries by 2025.



ACTION ON WATER, ADAPTATION AND RESILIENCE

The COP27 Presidency initiative, Action on Water, Adaptation and Resilience (AWARE), was launched to catalyse inclusive cooperation to address water as a key to climate change adaptation and resilience. The initiative's mission is to: 1) decrease water losses and improve water supply; 2) support policy and adaptation action; and 3) promote cooperation and interlinkages between water and climate action in order to achieve the 2030 Agenda, in particular SDG 6.



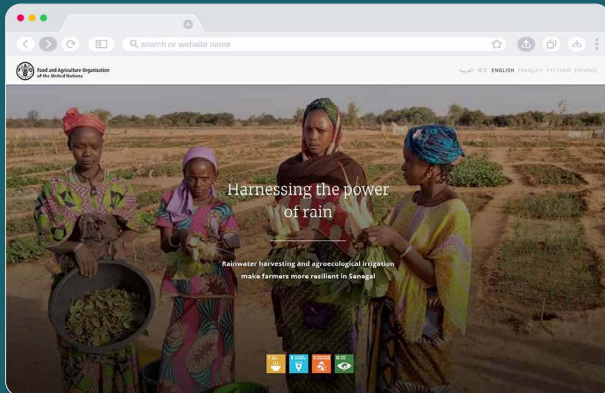
HARNESSING THE POWER OF RAIN

Senegal is susceptible to extreme weather events, including heavy rainfall followed by long dry spells. These events are becoming more intense and unpredictable, making farmers' lives much more difficult. Almost 90 percent of Senegalese farmers rely on rainfed agriculture.

In Senegal, the SAGA project has been working to enable regular access to water, as well as increase the efficiency of its use. In close consultation with local communities, FAO has implemented irrigation systems tailored to the needs of farmers.

In the northeastern village of Oudalaye, for example, FAO helped producers focus on a traditional agroecological practice, called Gulle Kislal, to reduce water evaporation.

Gulle Kislal is an agroecological water management technique where a half-moon shape is created around the plants to ensure water remains concentrated inside the mini-basin and is not wasted through evaporation or runoff. Alongside other methods, growing plants using Gulle Kislal under FAO's SAGA project has increased profits and brought more nutritious and balanced diets to over 300 households.



Learn more about rainwater harvesting




WORKING FOR SUSTAINABLE LIVESTOCK SYSTEMS

Finding practical solutions
to maximize benefits while
minimizing emissions


Meat, eggs and milk offer crucial sources of much needed nutrients which cannot easily be obtained from plant-based foods, a 2023 FAO study has found. The report also concludes that unprocessed red meat in moderate amounts (ranging from 9 to 71 grams per day) is safe. Meanwhile, hundreds of millions of pastoralists and smallholders depend on livestock for their nutrition and livelihoods.

But the livestock sector is a major source of global greenhouse gas emissions. Balancing the benefits of animal-sourced foods and the livelihoods of livestock keepers with the urgent need to limit global warming is crucial.

Yet to date, just over a third of countries have included livestock-related mitigation interventions in their climate commitments, while barely more than half have indicated that livestock systems are a priority area for adaptation in agriculture.



The benefits of animal protein must be balanced with the urgent need to limit emissions



Against this backdrop, FAO has gone all out to help Members generate climate solutions through livestock systems. These include assessing the environmental impact of livestock, and helping stakeholders identify best management practices to enhance livestock's role in sustainable development. The effort requires capacity development, technology transfer, tools and data.

Separately, from solar-powered water pumps and freezers, to milk chilled with energy from biogas digesters, FAO's Energy-Smart Food Programme is supporting countries in identifying opportunities to expand the use of clean or renewable energy in the agrifood sector.

Critically, such interventions need to address the social and poverty-reduction dimensions of livestock: when alternatives are lacking, livestock-dependent livelihoods are jeopardized.



Only a third of countries have included livestock action in their climate commitments.
© FAO/Farhad Kaizer

FAO has identified five practical actions that can be taken to work towards low-emission livestock systems:

- boosting the efficiency of livestock production and resource use;
- intensifying recycling efforts and minimizing losses for a circular bioeconomy;
- capitalizing on nature-based solutions to ramp up carbon offsets;
- striving for healthy, sustainable diets and finding protein alternatives; and
- developing policy measures to drive change.

CLIMATE-FRIENDLY LIVESTOCK PRODUCTION FOR HIGHER FAMILY WELL-BEING IN URUGUAY

Extensive grazing of grasslands in Uruguay is leading to degradation, desertification, and loss of livelihoods and incomes for farmers as forage dries up and soil conditions worsen.

FAO is working with farmers to implement climate-smart livestock practices that improve production and increase incomes even as they reduce greenhouse gas emissions and restore natural ecosystems. The project is led by the Uruguayan Ministry of Livestock, Agriculture and Fisheries and the Ministry of Environment, with financial support from GEF.



Steps towards sustainable
herding in Uruguay.
© FAO



Over 60 producer families across Uruguay have been taught strategies to improve the soil and manage grasslands and natural resources more sustainably while reducing livestock emissions – for example, by adjusting the quantity of fodder to the body condition of the animals, avoiding overgrazing.

Farmers were able to produce more forage, which builds resilience to drought and water scarcity. By improving grassland management and halting overgrazing, the amount of vegetation cover starts to increase, allowing for more retention of carbon in the leaves and roots of plants. This process is already leading to a visible increase in the flora, birds and general biodiversity.



For six farms out of ten, net income jumped by 50 percent in the year after the project began. Costs fell by 7 percent, and the intensity of greenhouse gas per kilogram of meat by 16 percent. The project intends to reach 700 more family farms over the next few years.



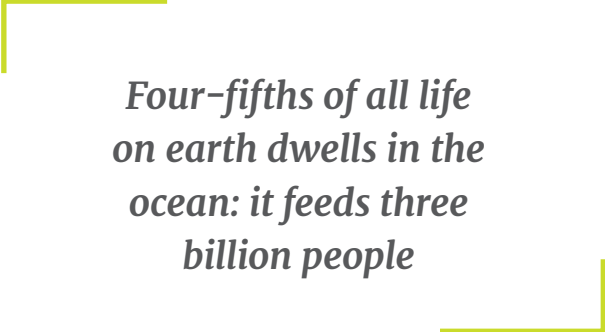
Steps towards sustainable herding in Uruguay.
© FAO

TRANSFORMING AQUATIC FOOD SYSTEMS

Anchoring fish and aquatic food
systems in policies and action

The ocean houses up to 80 percent of all life. It is also the world's largest carbon sink and a crucial resource in fisheries and aquaculture, contributing to food and nutrition security, maintaining wildlife and providing jobs. Rivers and lakes too play a significant role in global food security. Aquatic food, from both marine and inland waters, provides vital food sources for 3 billion people.

Climate change is affecting the accessibility, availability and trade of aquatic food products. It is exacerbating existing threats such as pollution, overfishing and habitat degradation, making the fight for sustainable aquatic food more difficult. It is making the ocean and freshwater systems warmer; expanding low oxygen zones; acidifying the ocean; and causing extreme weather events to become more intense and frequent.



***Four-fifths of all life
on earth dwells in the
ocean: it feeds three
billion people***

FAO ADAPTATION TOOLBOX

A variety of solutions have been compiled into FAO's adaptation toolbox, focused on changing the way fisheries are managed.

For example, farming extractive species such as bivalves and macroalgae offers further potential to remove waste and improve water quality. Such solutions must be deployed urgently and at scale if they are to be effective. FAO has been implementing projects to support countries in the adaptation of the fisheries and aquaculture sector in the Caribbean, Latin America, Africa, Southeast Asia and Pacific Small Island Developing States.



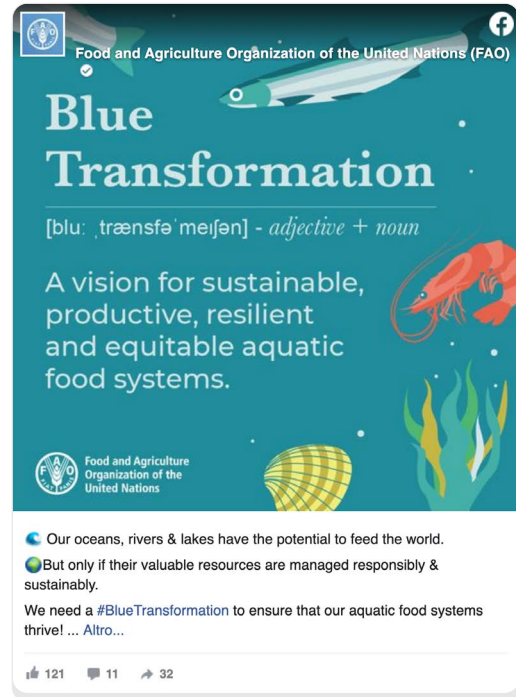
Fishing boats line up at
Gabura, Bangladesh.
© FAO/GMB Akash

BLUE TRANSFORMATION

Blue Transformation outlines a vision to expand aquatic food systems and increase their contribution to nutritious and affordable healthy diets for the most vulnerable, while fostering equitable growth, especially for those communities that depend on fisheries and aquaculture.

Under this policy, FAO, its Members and partners are working towards three main objectives:

1. Sustainable aquaculture intensification and expansion. Aquaculture must expand sustainably to feed a growing population, and secure income and employment opportunities. The aim is to increase global aquaculture production by up to 40 percent by 2030.
2. Effective management of all fisheries. FAO is focused on helping its Members achieve effective fisheries management systems that restore resources and ecosystems to a healthy and productive state.
3. Upgraded food chains through innovative practices or technologies. These will reduce loss and waste, enhance traceability and transparency, facilitate trade, and improve access to markets.



ALGAE IN PANAMA

The Guna are Indigenous Peoples who have been fishing in the Caribbean Sea off Panama for centuries. Generations have relied on marine and coastal resources for their livelihoods. But climate change and overfishing are leading to a decrease in fish stocks, making it harder for fishers to make a living. Women in the Guna community clean and process the fish, yet most of their income these days is derived from tourism and the sale of handicrafts. In recent years, decreasing tourism due

to the COVID-19 pandemic has added to the stress of declining fish stocks, pushing many families, especially women-led households, below the poverty line.

FAO, in partnership with the Aquatic Resources Authority of Panama (ARAP), has opened up new opportunities for the Guna people by sharing knowledge related to the production and processing of algae. The FAO-ARAP pilot worked with a largely female group of 25, training them to transform the algae into commercial soaps and creams. As well as empowering Guna women, the project has provided the community with an alternative source of income.



Marine algae provide an alternative source of income as fish stocks diminish.
© FAO/Epimenides Diaz

SUSTAINABLE FOREST MANAGEMENT

Protecting nature's legacy
for a greener future

In southern Chile as elsewhere,
ancient forests are at risk from
illegal logging.
© FAO/Max Valencia



Halting deforestation has the potential to **cut greenhouse gas emissions by approximately 11 percent annually**, safeguarding much of the Earth’s terrestrial biodiversity and providing critical ecosystem services.

Ecosystems at risk of deforestation and degradation, such as peatlands, mangroves, old-growth forests and marshes, contain at least 260 gigatonnes of “irrecoverable carbon”. Unless additional measures are taken, an estimated 289 million hectares of tropical forests will be lost between 2016 and 2050, resulting in 169 gigatonnes of carbon dioxide equivalent released into the atmosphere.

But forests are not only an essential carbon sink: they also help rural communities adapt to the impacts of climate change, including through the provision of livelihoods for more than 1.6 billion people. Protected, sustainably managed and restored forests provide a host of biodiversity benefits and other ecosystem services. Halting deforestation and increasing forest cover are therefore cost-effective solutions to mitigate climate change.

FAO Forestry  
 @FAOForestry · Follow

Forests are crucial in helping us adapt to climate change.

They:

-  help ensure water availability
-  protect against landslides and floods
-  prevent desertification
-  provide alternative livelihoods for people

[#ClimateAction](#) [#GenerationRestoration](#)



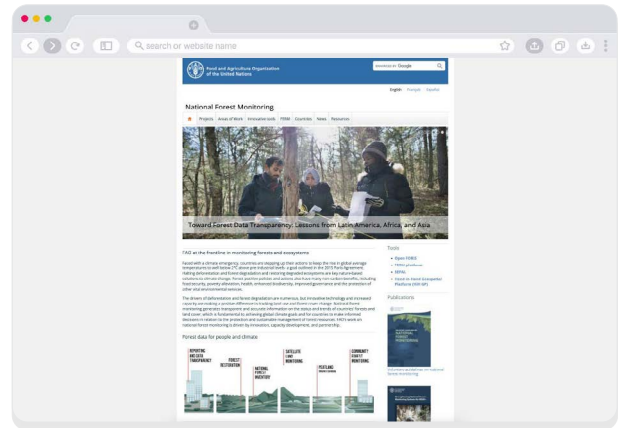
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NATIONAL FOREST MONITORING SYSTEMS

FAO has supported more than 50 countries in developing National Forest Monitoring Systems (NFMS) to collect relevant and reliable information about forests. NFMS typically produce data that allow the measurement, reporting and verification of forest carbon fluxes, information that is crucial to participate in the REDD+ programme (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries).



[Read more on forest monitoring](#) >

FORESTS AND INDIGENOUS PEOPLES



A community of just a few hundred, the Paumari people live along the river Tapauá in Brazil.
© FAO/Adriano Gambarini/OPAN

Indigenous Peoples and the forests in their ancestral territories have an irreplaceable role to play in climate action. In the forests of Latin America and the Caribbean alone, their territories contain 14 percent of the carbon stored in tropical forests worldwide.

Historically, where Indigenous Peoples have been present, forests have suffered much less deforestation and degradation than elsewhere, but that is changing rapidly.

In 2015, together with Caucus of Indigenous representatives from the seven sociocultural regions of the world, FAO established a roadmap for working with Indigenous Peoples. The aim is to promote the recognition of their food and knowledge systems as game changers for sustainability.

At COP26, held in Glasgow in 2021, 141 governments committed to halt and reverse forest loss and land degradation by 2030 through the Glasgow Leaders' Declaration on Forests and Land Use.

More than USD 20 billion was pledged to achieve this goal, including USD 1.7 billion from 2021 to 2025 to advance the forest tenure rights of local communities and Indigenous Peoples.

These goals were reinforced through the Forest and Climate Leaders' Partnership, launched at COP27 to ensure commitments made in Glasgow to halt and reverse forest loss and land degradation by 2030 are achieved. This voluntary partnership of 26 countries is fully in line with FAO's work on forestry and the Collaborative Partnership on Forests.

CPF
Collaborative Partnership
on Forests

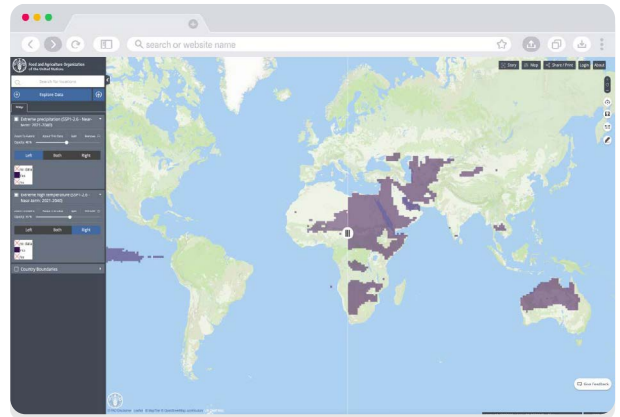
CLIMATE CHANGE AND DISASTER RISK REDUCTION

Building resilience to manage risk
and protect people with agriculture
and food-based livelihoods

More than ever, agricultural investment projects must be informed by robust evidence about both past and future climate variability, seasonality and extremes to drive sustainable, resilient and inclusive development.

To this end, FAO has developed a Climate Risk Toolbox, which uses advanced climate-related geospatial information and data that identify baseline and future climate-related hazards in a chosen area. Users can perform climate risk screenings and generate an automatic report, which includes tailored climate-resilient measures that can be integrated into projects.

At COP27, a specific fund for loss and damage was set up for those on the frontlines of climate change, in particular Small Island Developing States (SIDS) and least developed countries. FAO will support governments to pursue resources available through the new fund.



Take a tour of FAO's Climate Risk Toolbox >

Vast tracts of forest burn near Mafinga, United Republic of Tanzania in September 2022.
© FAO/Luis Tato



In the context of disaster risk reduction and management, FAO focuses on anticipating and responding to major threats to agrifood systems, in particular extreme weather events as drivers and amplifiers of damage and losses.

Measures include:

- response programmes focused on saving livelihoods through assistance in clearing and cleaning fields, repairing canals, and providing materials to sustain agricultural production;
- emergency preparedness for anticipatory action through early warning systems, such as extreme weather advisories, funds and technical resources that aim to protect assets and move people to safer areas in advance of shocks; and
- rehabilitation action in the aftermath of disasters, focused on helping people build better and prevent food crises. Risks can be minimized by climate-proofing infrastructure and monitoring early warning signs.

HURRICANE MARIA AND DOMINICA

After Hurricane Maria left an estimated 90 percent of buildings damaged or destroyed in Dominica in 2017, the small Caribbean Island of just 70 000 is en route to becoming the first climate-resilient nation by 2030. The National Resilience Development Strategy Dominica 2030; the Dominica Climate Resilience and Recovery Plan; and the plan to establish a Global Centre for Agricultural Resilience; as well as the newly drafted National Agricultural Policy 2021-2030, all reflect this ambition.

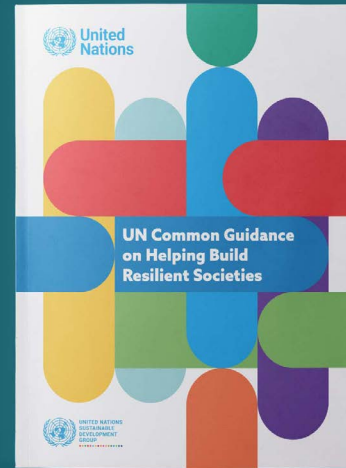
With the support of FAO and a wide range of stakeholders, a transformation roadmap has been developed with four main lines of action:

1. addressing food and nutrition security threats;
2. enhancing the resilience and sustainability of crop, livestock and fisheries farming systems;
3. expanding risk-informed and risk-responsive markets and value chains; and
4. strengthening the base of natural resources through improved land, soil and water management.



Hurricane Maria brought
Roseau, capital of Dominica,
to its knees.
© Russell Watkins/DFID

Within the four lines of action, 14 transformative interventions have been defined. These include early warning systems; emergency response measures; access to finance and insurance; diversified, local and resilient food value chains; and reduced food loss and waste. Cross-cutting actions such as policy incentives and gender and youth empowerment are also prominent. Dominica's roadmap is aligned with the five resilience capacities of the UN Common Guidance on Helping Build Resilient Societies. Dominica aims to become the first formally climate-resilient nation on earth.




THE PATH AHEAD

Solving the climate crisis
through sustainable
agrifood system solutions


Sustainably fishing for nutritious
Amazonian pirarucu (*Arapaima
gigas*), one of the world's largest
freshwater species.

© FAD/Adriano Gambarini/OPAN





***Building climate-resilient
agrifood systems
is crucial to grow a
sustainable future***



The importance of building climate-resilient agrifood systems cannot be overstated. Climate change is already affecting agrifood systems around the world, posing risks to food security, nutrition and livelihoods. These impacts not only threaten food security, but undermine economic development and exacerbate poverty and social inequalities.

FAO's work remains vital in the quest for a world free from hunger and malnutrition. Our efforts to empower local communities and engage all stakeholders, including the private sector, will play a crucial role in achieving the 2030 Agenda and the SDGs. FAO's continued leadership in supporting implementation of the SDGs through the initiatives outlined above, as well as monitoring and reporting on 21 SDG indicators and hosting the UN Food Systems Coordination Hub is testament to its commitment to these global goals.

As we look to the future, FAO will continue to innovate, collaborate and drive progress. This means developing and implementing strategies that support adaptation and build resilience across the entire agrifood value chain, from production to distribution and consumption. Supporting farmers and rural communities is a vital part of this process. The benefits are abundantly clear, and the cost of inaction shockingly high.

Building climate-resilient agrifood systems is not just about growing food: it is about growing a sustainable future. To reap a bountiful and secure tomorrow, we must plant the seeds of resilience today.

 **SUSTAINABLE DEVELOPMENT GOALS**



Amid a worsening climate crisis and slow progress in cutting greenhouse gases, sustainable agrifood systems practices can help countries and communities to adapt, build resilience and mitigate emissions, ensuring food security and nutrition for a growing global population.

FAO is working with countries and partners from government to community level to simultaneously address the challenges of food security, climate change and biodiversity loss.

But none of this will ultimately succeed unless the world commits to a significant increase in the quality and quantity of climate finance.

